# VULCAN IRON WORKS

## CHICAGO.

# PILE DRIVING MACHINERY.

CATALOGUE NO. 48, 1920

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## 1920

WESTERN UNION CODE
CABLE ADDRESS: "WARRINGTON" CHICAGO

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## VULCAN IRON WORKS

327 NORTH IRVING AVENUE
NEAR FULTON STREET
STATION D

*For Fifty-two Years at 86 North Clinton Street and 59 Milwaukee Avenue (Same Building)*

CHICAGO, ILL.
U. S. A.

## PILE DRIVING MACHINERY

WE INVITE the attention of contractors, engineers of public works, managers of railroads, and others interested in Pile Driving Machinery, to the illustrations we present herewith of the various Pile Driving Outfits manufactured by us.

An experience of over fifty years in the construction of successful Pile Driving Machinery justifies us in claiming the highest efficiency and durability.

The appreciation shown us for many years has encouraged us to give increased attention to this branch of our business.

We have made this one of our leading specialties, and are constantly making improvements to add to the efficiency, durability and appearance.

We realize that there is room for many improvements yet, and shall aim to keep in the lead.

## COMPLETE PILE DRIVERS

### INCLUDING WOOD WORK

We illustrate on the succeeding pages eleven different forms of Pile Driver leaders. We can furnish either iron work only, or iron work and wood work complete, ready to be set up.

A bill of material and working drawings for wood work will be included with an order for a full set of iron work.

When a complete outfit is ordered we assemble the entire leaders in the shop, and when taking apart mark all joints to facilitate erection in the field.

We have adopted certain dimensions of leaders, which we call our standard, but will make them of any size the customer may desire.

We make the framework of pine or fir, headblock of oak or maple, ladder rungs of turned ash, wedged in, and rollers of maple or black gum; all bolted together, no nails being used.

It would be well to notice that on the larger sizes of leaders freight rates for long distances are liable to be prohibitory.

When it is desirable to ship leaders on one car, the longer timbers can be made in two parts, ship spliced, with reinforcement.

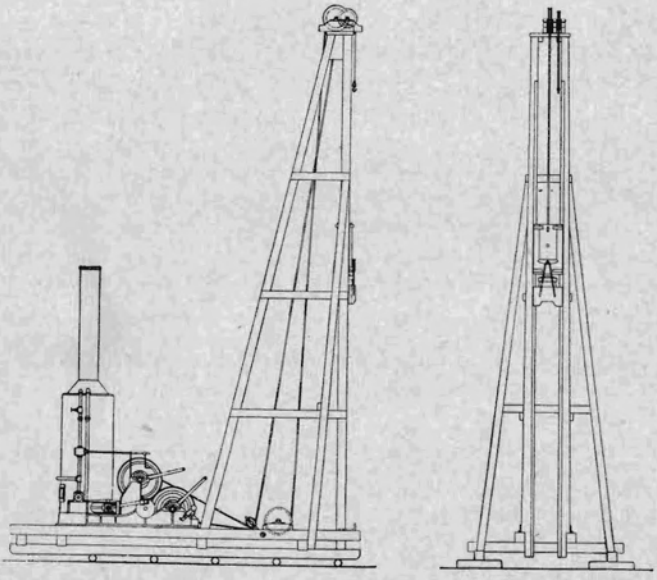
Prices include painting and delivery on car, "knocked down," Chicago.

We very seldom have call for leaders of structural steel, but can furnish them on receipt of specifications.

While only the "Joe Heaver," "Township" and "Fence Post" drivers are illustrated as being suitable for operation by horse power, we are occasionally required to arrange the larger sizes for that method of hoisting. This would, of course, necessitate the use of nippers for the hammer and tackle blocks for the hoisting line.

Ordinarily purchasers (contractors particularly) prefer to provide their own lines and blocks; if desired, however, we are prepared to furnish them, complete and ready for operation, either of manila or wire rope.

## STANDARD CONTRACTORS' PILE DRIVER



The cut illustrates a driver with extension sills, adapted to carry the engine. We make them either as shown or with shorter sills, for use when the engine is located elsewhere, and similar in appearance to cut on page 10.

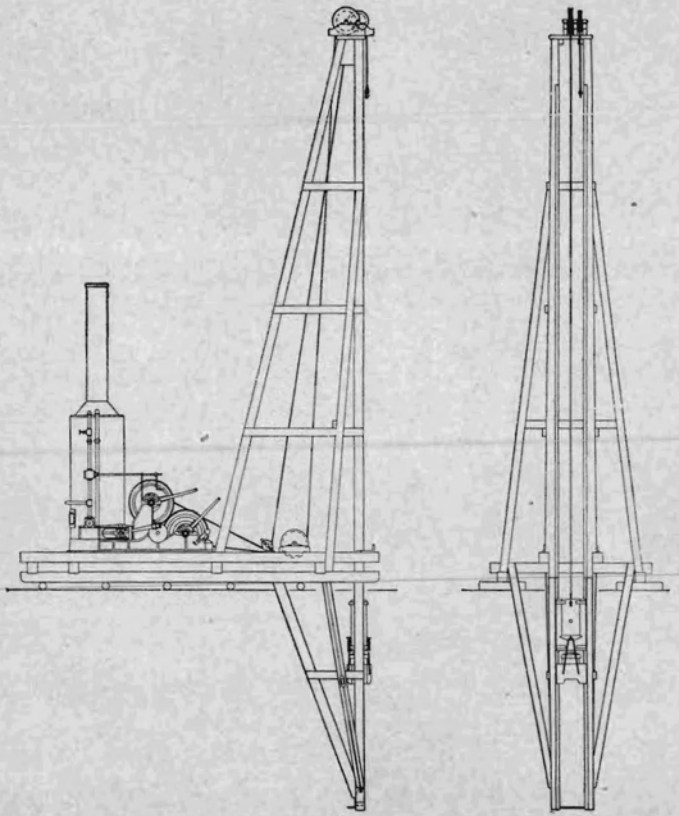
These Drop Hammer Outfits for Contractors' use range from 1,500 pounds weight upward (we have made them as heavy as 5,200 pounds). Of late years they are generally used with friction engines, requiring round pins in hammers.

A full set of iron work usually consists of the following: Hammer with steel pin fitted in; top sheaves, shafts, boxes and bolts; bottom sheave, shaft, boxes and bolts; one pair each of No. 1 and No. 2 toggles with bolts, and channel iron liners with bolts and washers. When, as shown in cut, a pile cap is used, toggles are not required.

A special form of this driver can be arranged by leaving out the small rollers under the sills and substituting the rigid roller bearings described on page 39. Four of these would be used, bolted directly to the lower sill, using either the 10-inch iron pipe or 10-inch oak rollers, the roller lying across the driver, instead of lengthwise as shown on page 6. Prices on this form quoted upon application.

See information in regard to wood work on page 3.

See price list for standard sizes and dimensions.



**CONTRACTORS' PILE DRIVER**

Fitted With

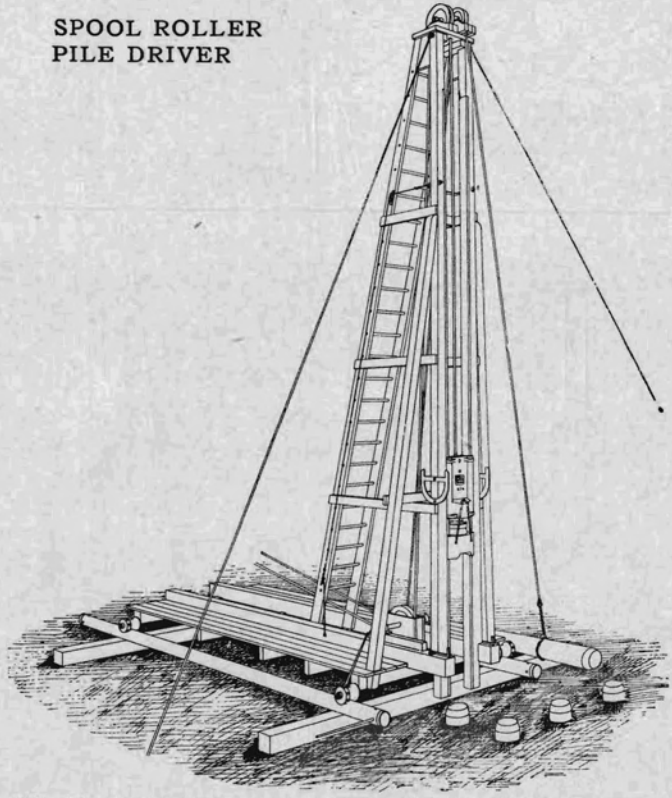
**RIGID EXTENSION LEADERS**

For use in Excavations.

This form can be used in certain special conditions, which should be carefully considered before deciding to order.

The lower part of leaders is detachable.

## SPOOL ROLLER PILE DRIVER



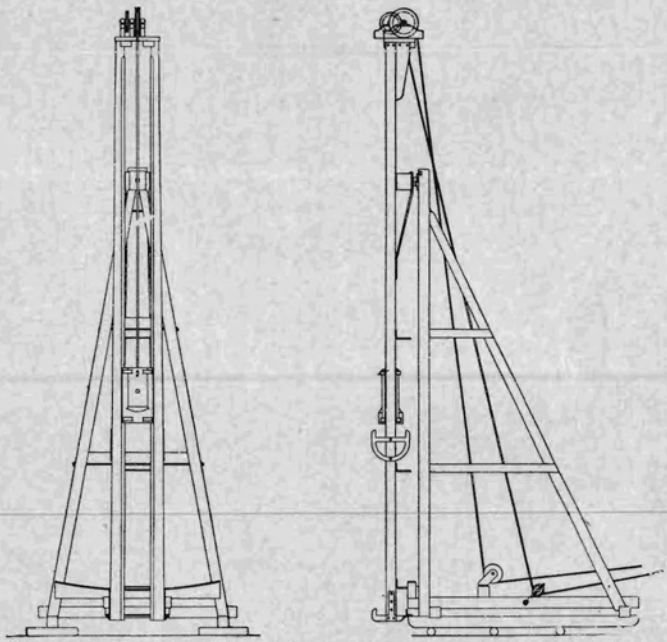
This driver rolls sideways and forward and backward. Does not turn nor swivel. Used with roller spools and axles, as shown, and also with the rigid bearings illustrated on page 39. Of late years wooden rollers are little used on account of the difficulty of securing long oak timbers of good quality; 10-inch common pipe is the ordinary form of roller.

A full set of iron work usually consists of the following: Hammer with steel pin fitted in; top sheaves, shafts, boxes and bolts; bottom sheave, shaft, boxes and bolts; one pair each of No. 1 and No. 2 toggles with bolts; channel iron liners with bolts and washers; four No. 1 roller spools and axles, or four rigid roller bearings; and two 10-inch by 26 feet banded oak rollers or two 10-inch common pipe rollers 26 feet long, or as long as may be procured.

When a pile cap is used with drop hammer or a steam hammer is used, the toggles are not required.

See information regarding wood work on page 3.
See price list for standard sizes and dimensions.

## BATTER LEADER PILE DRIVER



This is designed for driving piles on an angle, such as required for trestle-work. It will drive either perpendicular, or at any angle on either side up to its limit in width. It consists of a rigid framework secured to the sills, and from the top of which are suspended the leaders. The foot of the leaders can be held at any position by means of two pins which secure one of the leader yokes to the gauge-frame or "moon-beam."

The above cut illustrates the application of the swivelling bottom sheave described on page 36.

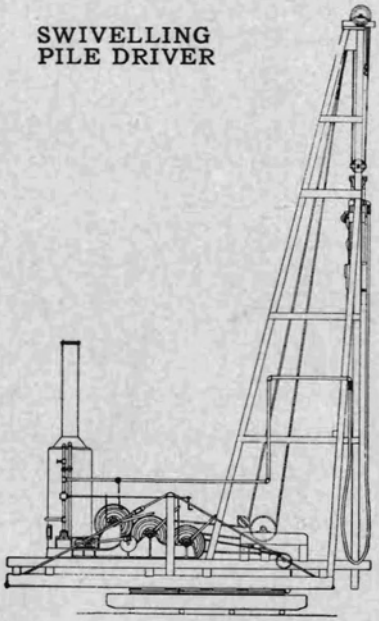
A full set of iron work usually consists of the following: Hammer with steel pin fitted in; top sheaves, shafts, boxes and bolts; bottom sheave (not swiveling), shaft, boxes and bolts; one pair No. 1 toggles and bolts; channel iron liners with bolts and washers; pivot castings, center-pin and suspension device, with bolts and washers; two plain leader yokes, bolts and washers; "moon-beam" liner with bolts and washers; "moon-beam" yoke, bolts and pins; bottom leader yoke and bolts, and two long tension rods for ladder.

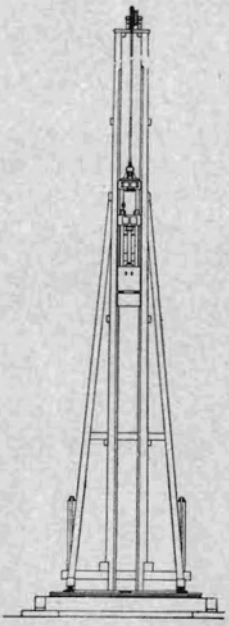
When a pile cap is used the No. 1 toggles are not required.

See information regarding wood work on page 3.

See price list for standard sizes and dimensions.

## SWIVELLING PILE DRIVER





This is the ideal and most efficient driver for foundations or other work which requires a number of piles to be driven in a limited area. With this machine driving can be accomplished anywhere within a circle described by the leaders, by using the three modes of moving: First, by swinging to the right and left; second, by rolling forward and backward; and third, by changing the rollers and moving sideways, the cross-sills of the bed frame being flush on the underside with the side-sills.

For this driver we recommend and list the No. 1 turntable outfit, which is fully described on page 31. Though, of course, either the No. 2 or No. 3 turntable can be used, as illustrated and described on pages 32 and 33.

As a steam hammer is decidedly advantageous in work of this nature, we list these drivers with longer leaders than the other forms.

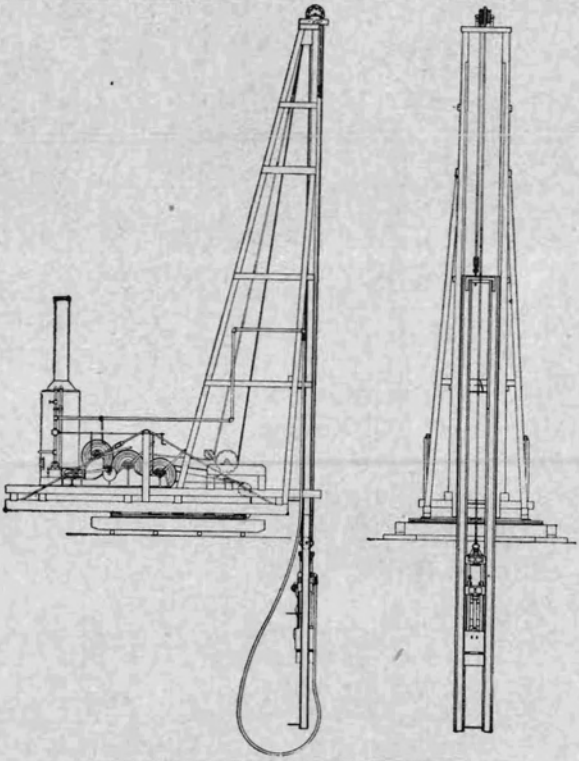
For a drop hammer outfit a full set of iron work would comprise: Hammer with steel pin fitted in; top sheaves, shafts, boxes and bolts; bottom sheave, shaft, boxes and bolts; one pair each of No. 1 and No. 2 toggles and bolts; channel iron liners with bolts and washers; No. 1 turntable outfit complete; two turnbuckle truss rods, washers and post caps and a set of long through rods and washers for bed frame and sills.

Should a pile cap be used, toggles are not required.

In case a steam hammer is to be used, omit the drop hammer and toggles.

See information regarding wood work on page 3.

See price list for standard sizes and dimensions.



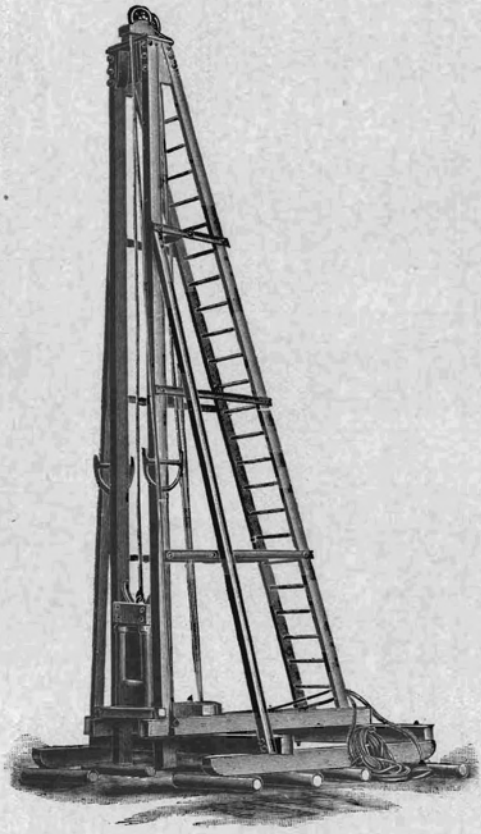
**SWIVELLING PILE DRIVER**
Arranged With
**TELESCOPE LEADERS**

For driving below reach of rigid leaders, in trenches, dams, caissons, foundations, etc.

The telescope leaders are raised and lowered by a separate line, hence adjustable to depth desired.

The combination of swivelling driver, rollers (which allow moving fore and aft and sideways) and the telescope leaders, makes a highly efficient machine—especially if a steam hammer be used. When work suitable is extensive enough to warrant, we think one of these machines will be found to be a good investment.

## TOWNSHIP PILE DRIVERS



**Usually Operated by Horse-Power, for Hammers That Weigh from 500 to 1,200 Pounds.**

## TOWNSHIP PILE DRIVERS

In order to meet the demand for a Pile Driver for use on small bridges and other light driving, at reasonable cost, we are building them as represented in the engraving. We make them of different capacities, from 500 pound hammer up to 1,200 pounds.

The hammer is usually raised by horse-power, the smaller sizes being hoisted direct, that is, without a purchase block, and the larger sizes have one end of the line fastened to a suitable post, driven into the ground, while the other end is passed through a tackle-block which is fastened to the main hoisting line and leads to the whiffletree direct. Sometimes contractors use a winch, which is bolted to the ladder. It, of course, will do the work, but is very slow. The belt-driven hoist described on page 58 can also be applied. Tackle-blocks can also be used, instead of sheaves at top and bottom, on smaller sizes, when so desired.

The Pile Driver complete, in addition to the iron work below, consists of the framing as shown, fastened together with bolts so as to be readily taken apart for transportation, having turned ladder rungs, turned maple or black gum rollers, and a nipper block, but not including lines or adjustable trip. Prices include painting and delivery on car, "knocked down," Chicago.

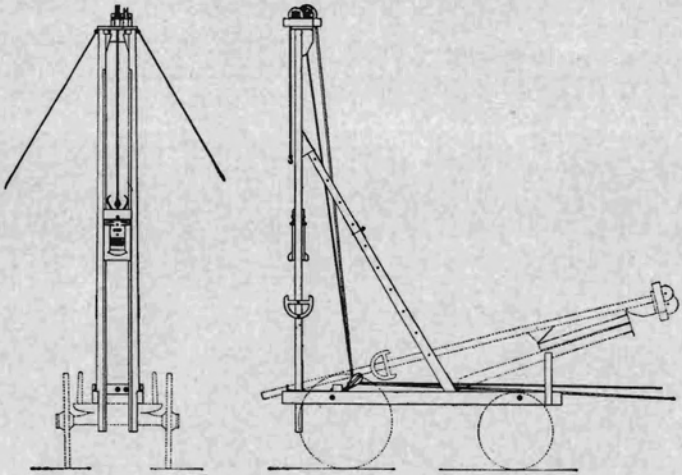
A full set of iron work usually consists of a hammer with steel die fitted in; nippers; top sheaves, shafts, boxes and bolts; one pair of No. 1 toggles with bolts; one pair No. 2 toggles with bolts; channel-iron liners, with bolts and washers; together with working drawings of wood work when desired.

Swivelling sheaves (page 36) or snatch blocks, at the bottom, should be used for horse-power.

See price list for standard sizes and dimensions.

## No. 1 STYLE FENCE-POST DRIVER

### FOR END DRIVING



Folding Leaders

This outfit is designed for use with the ordinary farm or mountain wagon, the framework of the driver being arranged to set on the wagon bolsters between stakes. The leaders are placed sufficiently to the rear to admit of backing up to an existing fence, as would be required in repair work. When building new fence the wagon is simply taken along the proposed line, leaving the fence behind it.

The hammer is raised by horsepower direct, an extra horse being used solely for that purpose.

The leaders and back braces are provided with hinge joints, to admit of folding down over the wagon when going to and from the work—the down position being shown in the cut by dotted lines. The leaders are 20 feet high.

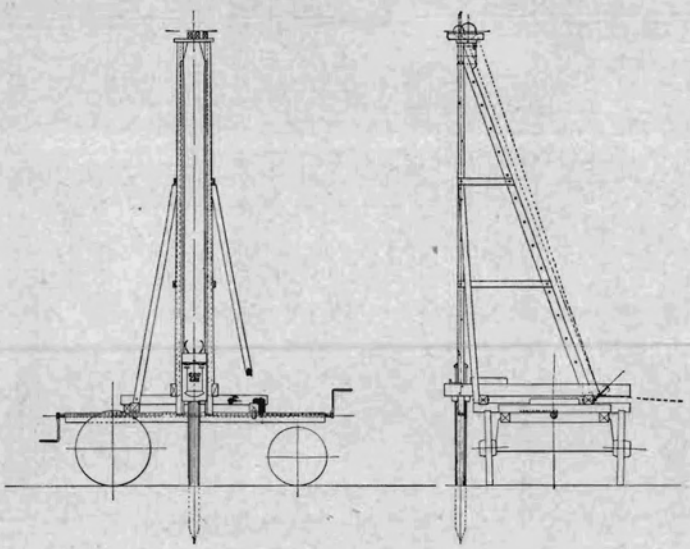
A full set of iron work consists of a 600-lb. drop hammer with triangular die; nippers with block; one pair of top sheaves, shafts and boxes with bolts; one pair No. 1 toggles, with bolts; one pair No. 2 toggles, with bolts; 4-inch channel iron liners, with bolts; one pair of heavy forged hinges, with bolts, for foot of leaders; one pair of locking devices for back braces, including working drawings of wood work when desired. The three pairs of hinges on back braces are the ordinary 12-inch strap hinge.

A hand-power winch can also be furnished for hammer hoist should it be thought preferable. See also the belt-driven hoist on page 58.

The outfit can also be furnished complete, with all framework, ready to attach to wagon.

## No. 2 FENCE-POST DRIVER

### FOR SIDE DRIVING



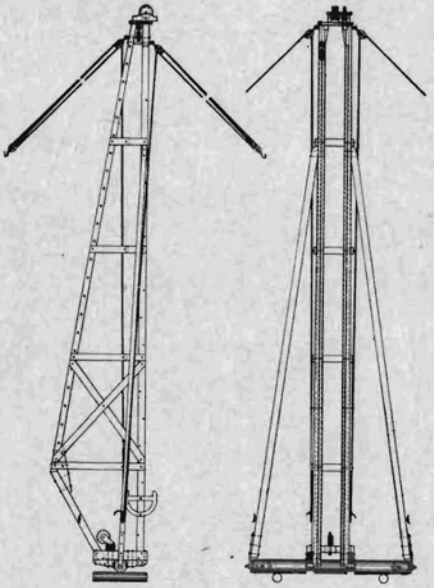
**Rigid Leaders**

Some ranchmen prefer this form of post driver for the reason that as the driving is done at the side of the wagon there obtains an especial facility for replacing old posts. The framework is arranged to rack in and out on top of the wagon, being racked out to drive the post and racked in again to enable the wagon being drawn straight ahead, clear of and past the post. The leaders are 20 feet high. They may be mounted at any time on either side of the wagon. A special, wide-track wagon is required for this outfit—7-foot track being preferable. A full set of iron work consists of a 600-lb. drop hammer with triangular die; nippers, with block; one pair of top sheaves, shafts and boxes with bolts; one pair of No. 1 toggles with bolts; one pair of No. 2 toggles, with bolts; 4-inch channel iron liners, with bolts, and the racking-out device complete, with shaft, cranks, pinion, gears, racks, boxes and ratchets, with bolts for holding in place, together with drawings for wood work when desired.

A hand-power winch can also be furnished for hammer should it not be desired to operate with a horse. See also the belt-driven hoist on page 58.

This outfit can also be furnished complete, with or without wagon, and including wood work.

## "JOE-HEAVER" PILE DRIVER



This driver was designed for use on railroad construction, where the piling is driven in advance of the track.

It is complete but simple, requires but very little timber for its movement and is very easily transported, set up and taken down.

Forward and backward movement is accomplished with the large transverse roller, which, while free to revolve, is secured to the sills and side braces. Sideways movement is permitted by placing the smaller roller under the larger one.

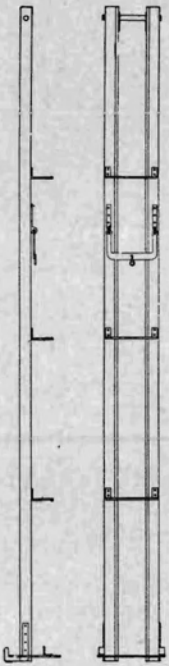
The driver is maintained in a vertical position solely by adjustment of the nead guys. These are 1-inch manila and are all handled from, and made fast to cleats at, the foot of the driver.

The driver can be operated on the level, on the side of a hill, or can be backed up an embankment or "fill," driving piles for each bent while being backed up.

The driver is, of course, operated by horsepower only, and is usually transported to the work by wagon with the hammer and lower end at the rear. When raising the lower end is allowed to rest on the ground where it is secured and a team with block and tackle pulls the driver up off the wagon.

See information in regard to wood work on page 3.

When asking for quotation, inform us as to diameters and lengths of piles, size of drop hammer to be used and whether the iron work only is required or iron work and wood work complete.



## HANGING LEADERS

For suspension at end of boom of derrick; bottom braced from deck of driver, or guyed. Can, of course, be swung to drive batter, sideways, forward, or backward. Fitted with channel liners, back braces and hammer stop. Arranged at top to fit derrick.

State requirements as to length, size of hammer and width of derrick boom.

A swivelling hanger can be placed at the top of leaders to permit of alignment when driving sheet piling.

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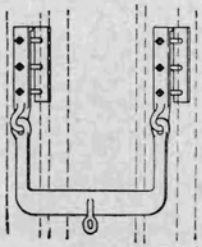


## HAMMER STOP

All forged—no castings used.

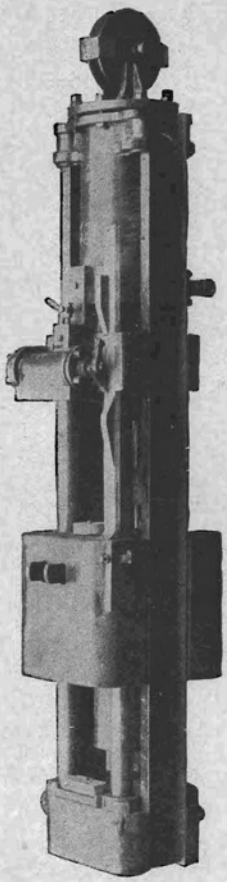
Dropped to form a stop, or rest, and pulled back to allow hammer to operate.

Made in the following sizes:

For 1000 to 1200-pound drop hammers.
For 1500 to 1800-pound drop hammers.
For 2000 to 2500-pound drop hammers.
For 3000-pound and upward drop hammers.
For No. 1 steam hammer.
For No. 2 steam hammer.
For No. 3 steam hammer.

## WARRINGTON

### PATENTED IMPROVED STEAM PILE HAMMER



The experience of these Works in the making of automatic steam pile hammers extends backward to the year 1875, when their manufacture was begun under the patent of Mr. T. T. Loomis, who employed the main features of the old English Nasmyth hammer, with an improved valve gear. The success of the Loomis hammer led to an improved form under the patents of Mr. Thomas M. Skinner, in which the number of parts was greatly reduced and the valve actuated by steam. This form was manufactured for several years and earned an excellent reputation. Difficulty was found occasionally, however, with the steam-moved valve, as well as with some minor features, and the outcome of it was the designing and patenting of the Warrington hammer.

This hammer, a conspicuous success from the start, has received still further improvement, and we have good reason to believe is to-day unequaled in **effectiveness, strength, simplicity and positiveness of action.**

**Its chief characteristics are:**

First—A very simple and positive valve gear.

Second—A short steam passage, avoiding waste of steam.

Third—Quick, and wide opening of exhaust, avoiding back pressure during the drop (a very important matter).

Fourth—Turned columns connecting the cylinder and base, and serving to guide the ram. The guide holes in the ram are accurately bored by the use of a "jig," and unfair strains on the piston rod are avoided.

Fifth—The piston is forged on its rod. Channel bars are attached on each side to enable the hammer to drive below the bottom of the leaders.

The slide bars are now made with improved fastening in ram and of forged steel, instead of steel castings as heretofore.

Every improvement suggested by an experience of over forty years in the manufacture of three distinct forms has been made upon these hammers to produce a simple and **thoroughly reliable** machine, **easy of operation** and **free** from vexatious breakdowns.

The action is regular and continuous. Any kind of pile can be used, hard or soft, straight or crooked, and driven without injury to the head of the pile, in the hardest kind of driving, sand or hard pan. The most ordinary kind of timber, such as spruce, bass and pine, can be thus driven **without the use of bands.**

The hammer is operated by being raised in the leaders (the only duty of the engine aside from hoisting the pile) and allowed to rest its full weight upon the pile. Steam is turned on and the hammer pounds automatically until the pile is driven to the required depth.

**We furnish with each hammer:**

A steam hose of the best quality that can be bought. For the No. 0 size, 50 feet of 2½-inch 8-ply; for the No. 1 size, 40 feet 2-inch 6-ply; for the No. 2 size, 35 feet of 1½-inch 6-ply; for the No. 3 size, 30 feet 1¼-inch 5-ply, and for the No. 4 size, 25 feet 1-inch 5-ply. It is advisable for the purchaser to wrap the hose to prevent chafing. The hose is fitted with heavy malleable iron couplings and nipples.

An eye-bolt to insert in piston head, to draw it out when needed and wrenches.

The No. 0 is used for 18-inch and 20-inch wooden piles and for 16-inch to 20-inch square or round concrete piles. In driving these latter a cast steel driving head should be used, as it holds a wooden block to receive the impact of the hammer. (See page 52.)

The No. 1 is used for 14-inch to 16-inch wooden piles and for general foundation work.

The No. 2 is used for 12-inch and 13-inch wooden piles and for general railroad work.

The No. 3 is used for 9-inch to 10-inch wooden piles and largely for wooden sheeting.

The No. 4 is used for driving fish stakes for pond nets along the shore and in connection with sheeting cap, for small wooden sheeting.

For driving wood or steel sheeting all the hammers are used with the sheeting caps shown on pages 44 to 51.

We are now equipping these hammers with three different forms of bases, all of which are interchangeable.

1. The regular, or solid, form, shown on page 16, which has a conical recess to fit over and rest on the head of the pile and which is used for all ordinary requirements in driving, and in connection with sheeting caps.

2. The open end base, shown on page 19, for sheet piling.

3. A special form, shown on page 20, known as the McDermid base, from its patentee.

All hammers are fitted with the regular base, unless otherwise ordered.

The open end base can be fitted to the No. 1, 2, 3 and 4 sizes.

The McDermid base is made for the No. 1 and No. 2 sizes of hammers only.

We list below the five sizes we manufacture, with the leading dimensions:

TABLE OF WARRINGTON STEAM PILE HAMMERS

| No. | Shipping Weight, on Skids, Pounds | Length, Feet | Diameter Cylinder, Inches | Normal Stroke, Inches | Weight of Striking Parts, Pounds | Distance Between Jaws, Inches | Width of Jaws, Inches |
|---|---|---|---|---|---|---|---|
| 0 | 17,000 | 15 | 16½ | 48 | 7,500 | 26 | 9¼ |
| *1 | 10,350 | 13¼ | 13½ | 42 | 5,000 | 20 | 8¼ |
| 1 | 9,900 | 13 | 13½ | 42 | 5,000 | 20 | 8¼ |
| *2 | 6,800 | 12 | 10½ | 36 | 3,000 | 19 | 7¼ |
| 2 | 6,700 | 11½ | 10½ | 36 | 3,000 | 19 | 7¼ |
| 3 | 3,800 | 9½ | 8 | 30 | 1,800 | 18 | 6¼ |
| 4 | 1,450 | 7 | 4 | 24 | 550 | 14 | 4¼ |

*McDermid base.

When fitted with an open end base the lengths and weights are about the same as with the regular base.

The No. 3 size and larger hammers are fitted with a sheave in a cast steel cylinder head.

The No. 0 size is always fitted with twin sheaves.

The Nos. 1, 2 and 3 sizes are regularly fitted with single sheaves, which are preferable because of the greater length of bearing. If desired, however, we will fit the Nos. 1 and 2 sizes with thin twin sheaves.

The sheaves can be furnished for either **wire rope or manila line,** so in ordering **advise** which kind is desired; price is the same either way. As regularly supplied with hammer, they are bronze bushed.

The boiler capacity required to operate these hammers, and which we recommend, is as follows. Smaller boilers have been used, but it is advisable to have ample capacity:

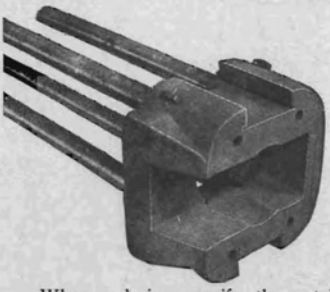
| | No. 0 | No. 1 | No. 2 | No. 3 | No. 4 |
|---|---|---|---|---|---|
| Square feet of grate surface, about | 24 | 16 | 10 | 7 | 3 |
| Square feet of heating surface, about | 700 | 500 | 300 | 210 | 90 |
| Horse-power, usual rating | 60 | 40 | 25 | 18 | 8 |

Sizes of lines required for steam hammers will be found on page 36.

**For information regarding force of blow and bearing power of piles, see pages 64 to 67.**

## WARRINGTON PATENT OPEN END BASE
### FOR STEAM HAMMERS

This form has been devised for driving wooden sheet piling, such as is used for trenches and coffer-dams. It is interchangeable with the other two styles of base on any hammer. The recess is rectangular, slightly tapering toward the bottom, and one end is left open to permit of driving all piles to the same level.



The greatest thickness of pile for which the base can be made is as follows:

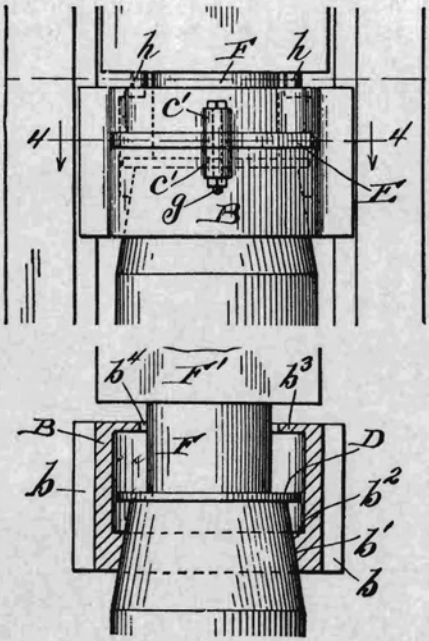
| | |
|---|---|
| No. 1 hammer | 9½ in. |
| No. 2 hammer | 9 in. |
| No. 3 hammer | 7 in. |
| No. 4 hammer | 5 in. |

When ordering specify the outside rectangular dimensions of pile and state whether open end is to be toward or away from the driver.

This form is now very seldom called for, having been superseded by Sheeting Caps, page 44.

## McDERMID FORM OF BASE

### FOR STEAM HAMMERS




This base, designated B in the illustration, is interchangeable with the regular or solid base, the only difference being that in this a recess is provided in which is placed a steel plate, D. This plate rests on the pile and on it the driving is done; it is inserted through an opening in the side of the base, which opening is covered with a door, E, held in position by a bolt through lugs, C.

This form of base is exceedingly advantageous and desirable when the pile is soft, when the driving is very hard and an excessive number of blows is required to be given a pile. In addition to this, the plate forms a stop, bringing the pile to the proper point and preventing piles smaller than the opening from coming through.

## PLATES FOR McDERMID FORM OF BASES

### (McDERMID PLATES OR BEATER PLATES)

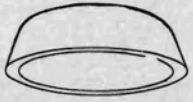
The McDermid base is made for the Nos. 1 and 2 sizes of steam hammers.

We now make the plates for McDermid bases forged from steel billets only, having given up the manufacture of rolled plates.

They are 1⅜ to 1½ inches thick for both hammers, machine finished on the edge to secure proper size.

## PLATES FOR SOLID OR STANDARD BASES

These are used with the regular or solid base and can be furnished for the Nos. 1, 2 and 3 sizes of steam hammers. For the Nos. 1 and 2 sizes we make them of hammered steel 1⅜ to 1½ inches thick, and for the No. 3 hammer about 1⅛ thick. All are machine finished on the edge to proper size and are provided with a hole in the center, countersunk on both sides, by means of which they may be spiked to the pile.




## DISHED PILE HEAD CAP

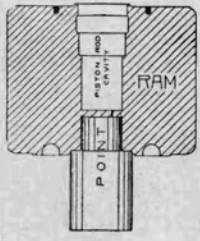
For protecting pile heads. Used with Steam Pile Hammers which are fitted with the regular or cone-shaped base. Not required when hammer has a McDermid base.

This form is preferred by many to a plate with or without a spike hole for nailing on pile.

These are hammered from steel billets.

State size of hammer with which to be used.

## REPAIR POINT FOR RAM OF STEAM HAMMER




#0 — 997
1 — 713
2 — 921
3 — 919
4 —

This is a very satisfactory method of repairing a ram when the point has become so worn as to need replacing.

The repair point is of cast steel, machined to the proper size.

It is necessary to send the ram to the shop to have the point applied, as the old point must be turned off, a cavity bored into the ram and the point forced in with hydraulic pressure.

# LIST OF PARTS
## OF
# THE WARRINGTON STEAM PILE HAMMER

This list refers to all hammers of sizes Nos. 0, 1, 2 and 3 (and of size No. 4, subsequent to hammer with shop No. 649).

When ordering repair parts, state their name and number as below, and ALWAYS GIVE SHOP NUMBER OF HAMMER, which is cast on the front side of cylinder in large figures.

1. Cylinder with Studs and Nuts.
2. Cast Steel Cylinder Head (used on all hammers except the No. 4 size).
3. Sheave. (Specify whether wire or manila rope; whether single or twin; whether solid bore or bronze bushed.)
4. Sheave Guard.
5. Sheave Pin.
6. Sheave Oil-pipe.
7. Cylinder Head Bolts.
8. Pipe Flange.
9. Upper Wedge.
10. Lubricator.
11. Upper Column Key Blank (See note below).
12. Drain Cock.
13. Trip.
14. Trip Key.
15. Open Steam Chest Head.
16. Blind Steam Chest Head.
17. Valve Stem.
18. Gland (is fitted with bushing No. 21).
19. Lower Wedge.
20. Side Channel, with bottom plate riveted on.
21. Gland Bushing.
22. Slide Bar (including wedges Nos. 9 and 19 riveted on).
23. Piston and Rod (fitted with piston rings No. 35).
24. Column. (See note below.)
25. Upper Rubber Bumpers.
26. Key Block.
27. Junk Ring.
28. Slide Bar Key.
29. Slide Bar End Block.
30. Ram Key. (See note below.)
31. Ram with Studs and Set Screw.
32. Lower Column Key Blank. (See note below.)
33. Solid or Standard Base. (For round piles, all sizes of hammers.)
34. Valve.
35. Piston Rings.
36. Ram Key Ring.
37. Split Bushing.
38. Ram Plate.
39. Ram Cushion. (See paragraph 7, page 24.) Wooden block.
40. Lower Bumpers.
41. Cylinder Head with Staple. (Now made on No. 4 hammer only. Head No. 2 is interchangeable with this on other hammers.)
42. McDermid Base. (Made for Nos. 1 and 2 only, and is interchangeable with other bases.)
43. McDermid Plate.
44. McDermid Door.
45. Open End Base. (Made for all sizes of hammers and interchangeable with other bases.) When ordering repairs give pattern number, cast on base, as well as hammer number.
46. Steam Hose.
47. Steam Hose Spud and Nipple.
48. Steam Hose Nut.
49. Steam Hose Clamps
50. Steam Hose Stem.
51. Piston Eye Bolt.
52. Double-end Wrench.
53. Single-end Wrench.
54. Steam Pipe.

The columns are not all the same. When ordering, call the column at the slide bar No. 1; then count to the left 2, 3 and 4.

See that the KEYS in the Ram, Base and Cylinder are ALWAYS TIGHT. In a new hammer these should be watched very closely and tightened at frequent intervals.

With orders for repair bases Nos. 33, 42 and 45 we furnish four lower column key blanks No. 32, partly machined, which should be carefully fitted into place by a machinist. Always replace old keys with new ones when the old ones are worn.

SKIDS 380-#2
381-#3
916

EXPORT SKIDS 0-917
1-822
2-808
3-805

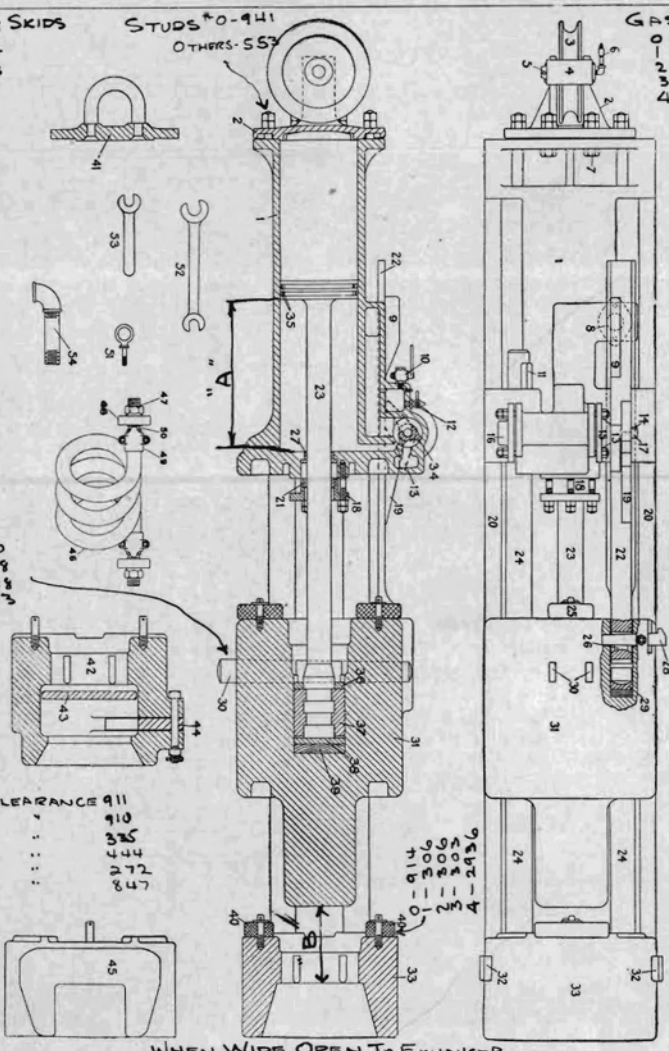
VALVE SETTING FOR CUSTOMER A-33



CYLINDER SKIDS
1-854
3-953

STUDS #0-941
OTHERS-553

GASKETS
0-915
1-547
2-547
3-912
4-912




A= 0 - 3 3/4" AT POINT OF CUT OFF
1 - 2 9 5/8"
2 - 2 7 3/4"
3 - 2 3 5/8"
4 - 1 8 7/8"

WHEN WIDE OPEN TO EXHAUST B=
1-2'-7 1/2"
2-2'5 5/16

## DIRECTIONS FOR OPERATING
## THE WARRINGTON STEAM PILE HAMMER
### NEW STYLE

1. See that the side channels have one-half inch play between the leaders and one-quarter inch play between the flanges, so that there may be no danger of binding.

2. When the hammer has a sheave in the top cylinder-head the hoisting line should be made fast to the under side of head-block, then passed down through the hammer sheave, up over the head-block sheave, then down to the engine. If hammer has twin sheaves, which necessitates, of course, twin sheaves also in the head-block, the same directions are followed but the line is reeved double.

3. To put the hammer into standing leaders, first spread the leaders at the bottom, then raise the hammer and swing it in, with the valve toward the inside.

4. When convenient the steam pipe should extend nearly half way up the leaders in height, so as to save length in the hose. There should be an elbow in the end of the pipe, with the outlet leading down. The hose connects to this elbow and passes around and outside of the leaders to the cylinder.

5. When ready for driving raise the hammer to the top of the leaders and block it; swing in the pile and lower the hammer upon it. The pile should enter the base to the shoulder. Slack off the hammer line entirely and turn on steam. To strike easy blows go slowly; to strike full blows speed up, but do not allow the hammer to dance upon the pile; just before this point is reached the hammer has developed its maximum efficiency for that particular driving and steam pressure. With a hard pile in hard soil a greater number of blows per minute will be obtained than with a soft pile in loose soil.

6. The full weight of the hammer should rest upon the pile while driving. The hammer line should be entirely slack.

7. See that the keys in the ram are always tight. The wooden cushion block becomes gradually compressed when first put to work.

8. During **COLD WEATHER**, when not in use, be careful to **OPEN DRAIN COCK IN OIL BOX**, to avoid danger of bursting.

## No. 5 STYLE
## SHEETING HAMMER FOR STEAM OR AIR

### FOR DRIVING WOODEN PLANKING AND STEEL SHEET PILING

Constructed on the style of the air drill (double-acting), with heavy base to rest on pile.

Very efficient on sewer work and coffer-dams.

Very much superior to hand mauling and drop-hammer driving.

The piston and ram are of steel, forged in one piece.

The base of the hammer is hollowed out to receive the striking bar or anvil. This latter is a forging, with a tee-shaped head at bottom, to rest upon the pile, and upon the upper end of which the ram delivers its blow. This striking bar is made in such a manner that while it is free to travel down some distance with the pile when struck, still it cannot drop out of the machine.

In operation, the hammer is suspended from the boom of a derrick or similar device, no leaders being used. The hammer is lowered on top of pile until it rests its full weight upon the striking bar. Steam or air is then turned on, and as the pile and hammer descend the tackle line is slackened off just fast enough to maintain the hammer in a vertical position.

With the hammer are provided the piping shown, throttle valve and lubricator with handles for same.

The hose required is 1-inch diameter, five-ply.

The cylinder is 4 inches diameter; its stroke from seven to eight inches.

The length of hammer over all is five feet eight inches.

Shipping weight, boxed, about 850 pounds.

The jaw in base is four inches wide, three and three-quarters inches deep vertically, and is ten inches long—this being the width of the base casting.

A ten horse-power boiler will supply the hammer with steam.

The number of strokes per minute is about 125.

## LIST OF PARTS
### OF
## No. 5 STYLE, SHEETING HAMMER

When ordering repair parts, state their names and numbers as given below, and **ALWAYS GIVE SHOP NUMBER OF HAMMER,** which is cast on the cylinder in large figures.

1. Cylinder.
2. Cylinder Head.
3. Eye Bolt.
4. Spring.
5. Upper Gasket.
6. Cylinder Cushion Block.
7. Piston. (Fitted with piston rings No. 8)
8. Piston Rings.
9. Lower Gasket.
10. Piston Guide and Stuffing Box (in two pieces, with studs and bolts, and including brass bushing No. 10a).

10a. Brass Bushing for Piston Guide.

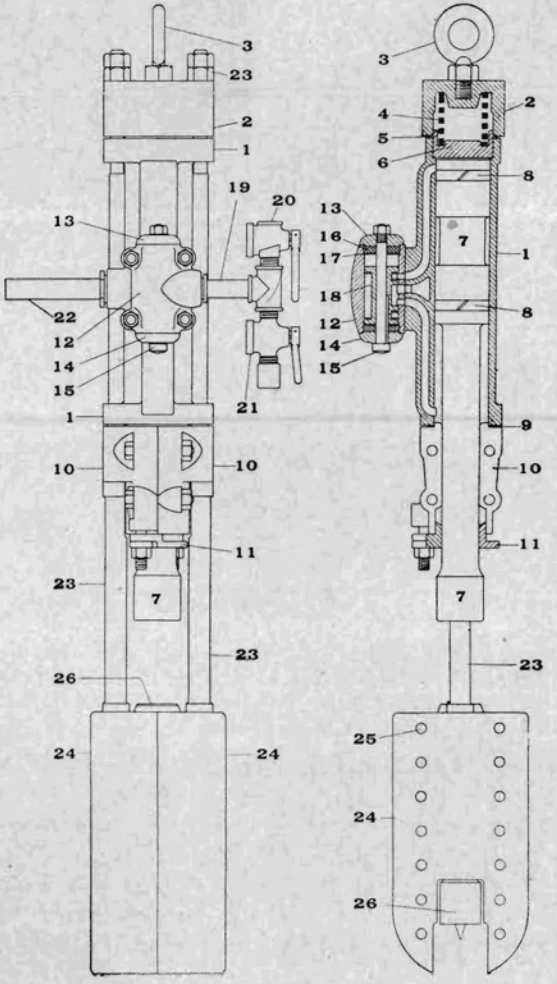
11. Gland (in two pieces).
12. Steam Chest.
13. Upper Steam Chest Cover.
14. Lower Steam Chest Cover.
15. Steam Chest Bolt.
16. Valve Bumpers (two required).
17. Valve Bumper Washer (two required).
18. Valve.
19. Steam Pipe.
20. Lubricator.
21. Throttle Valve.
22. Exhaust Pipe.
23. Side Rods.
24. Base (in two pieces, must be riveted up in field if No. 26 is not ordered).
25. Base Rivets (fourteen required, are "headed up" cold).
26. Anvil.

## DIRECTIONS
### FOR OPERATING No. 5 SHEETING HAMMER

Fifty-five pounds steam or air pressure is enough to operate the hammer. When the hammer commences to dance on the pile its capacity has been reached; any greater rapidity would be destructive on itself, and liable to break gland and stuffing box.

One-inch, five-ply hose is furnished with the hammer when ordered, but generally contractors have their own hose. At least, one informed us he had used successfully ¾-inch hose. Be careful to put a drain cock or valve at lowest point of hose which supplies steam and open same when starting up to avoid filling cylinder full of water, which requires time to get rid of; also, for the first few blows, open the drain cock on the cylinder. Keep well oiled, using good quality of oil. One hammer was returned to us, the steam chest entirely gummed up, of course, unworkable.

During cold weather, be careful to drain out all water.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26

## DROP HAMMERS


We aim to get the best form of hammers suitable for the purpose and have given careful attention to three points, viz:

First—To get as much of the weight in the bottom of the hammer as possible.

Second—To have the hammer as long as the size of the leaders will permit. This gives longer bearing in the guides.

Third—To have as little play as possible between the hammer and the leaders. This is required to obviate as much as possible the jar on the leaders at the time of striking the pile.

Instead of the old-fashioned strap at the top we recess the pin in the body of the hammer, so as to take advantage of all the height of the leaders possible.

All corners are rounded.

Bottoms when made concave are only slightly so—not over five-eighths of an inch. When pile caps are used, however, there should not be any concave. The old-fashioned idea of having a very deep concave is now, we think, entirely out of date.

If customers have any preference for flat or concave bottoms, it would be well, in ordering, to state which is wanted.

The Dies or Pins are made in three different styles.

First—Triangular Die of hammered steel, fitted in the hammer, and stationary.

Second—Rolling Die; a hammered steel triangular die rotating on a turned pin, which is fitted tightly in the hammer.

The above forms are used with nippers.

Third—A Turned Steel Pin, to which the hoisting line is attached direct. This form is used where driving is done by friction. The hole in hammer is also finished, that is, bored out, to make a close fit.

The following dimensions for the different sized hammers appear to us to be about right. While we would like to keep standard dimensions, yet, as a matter of fact, many of those we send out are made to suit existing leaders, so that there is often more or less labor required to alter the pattern, **which is included in our price.**

As channel-iron liners are universally used one-quarter of an inch play, that is, one-eighth of an inch on each side appears to be sufficient.

| Weight of Drop Hammer, Pounds | Distance between Jaws, Inches | Width of Jaw, Channel-Iron Liners |
|---|---|---|
| 500 and 600 | 13 | 4¼ |
| 700 and 800 | 14 | 4¼ |
| 1,000 and 1,200 | 16 | 5¼ |
| 1,500 to 1,800 | 18 | 6¼ |
| 2,000 to 2,500 inclusive | 19 | 7¼ |
| Over 2,500 | 20 | 8¼ |

Sizes of lines required for drop hammers will be found on page 36.

## TURNTABLES FOR SWIVELLING PILE DRIVERS

In this issue of our catalogue we have amplified our former line of Turntables, and now present three different forms, having added a good design of the roller style, which we have designated as No. 2—our old No. 2 style becoming now known as the No. 3. While we have called attention for some years past to the very evident superiority of the "sliding contact" Turntable over the "roller" Turntable, we occasionally find a customer who prefers the "roller" form, and it is to meet his views that we have adopted our present No. 2 style.

It is generally agreed that the substitution of sliding contact for rollers, or wheels, is a very important improvement in modern swivelling pile drivers. With wheels there is a liability, should the driver frame be out of level, of turning very abruptly and unexpectedly, oftentimes occasioning great inconvenience and delay. A sliding contact, while theoretically (not always practically) somewhat more difficult to move, is much safer.

Of the three forms we illustrate, the No. 1 type possesses certain inherent and decided advantages:

First—It is self-contained on the frame. It is not necessary to lead ropes to stakes or other holdfasts outside of the frame.

Second—It is under instant control of the operator.

Third—The driver is held at any point, even if inclined.

Fourth—Requiring no king-pin through the center castings, an advantage possessed by no other Turntable is obtained, as lines for moving the bed frame may be led up through the large holes in center castings, to the engine. These lines passing, as they do, up through the axis of revolution are not affected or misplaced by the turning motion of the superstructure.

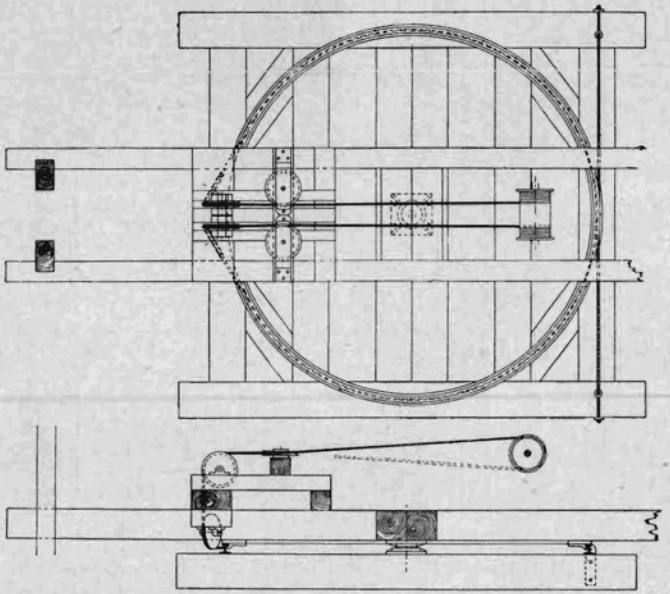
For these reasons the No. 1 form has been very generally adopted by contractors whose ambition has been to make every move count.

The No. 2 form also is self-contained, but, depending upon a king-pin to hold the whole apparatus in perfect relation, moving lines cannot be brought up through the center castings, as with the No. 1 style. We have made a number of king-pins hollow for water connection to boiler.

The usual method of operating the No. 3 form is to carry a line from the winch-head through a snatch-block to some convenient stake, tree or other holdfast. This is a cheap form and has been quite largely used, but is fast becoming obsolete.

## No. 1 TURNTABLE

FOR SWIVEL PILE DRIVER LATEST FORM RAIL CIRCLE



See "Turntables" on page 30.

This outfit consists of a sixty-pound rail bent to a circle of 10, 12, 14 and 16 feet, in halves, spliced on under side and provided with countersunk bolts to hold down; six wrought iron shoes, made in two pieces, riveted together, the upper part acting as a sliding piece on the top of the rail and the lower part as a clamp under the head of the rail; top and bottom (pintle and socket) central castings with large central through holes; four sheaves, shafts and boxes for leading the rope; two sheaves in wrought iron frames, on deck, to keep rope fair. When lines are connected up, as shown in the illustration, an engine with reversing drum should be used or a reversing engine with an extra drum.

The rope is fastened to the opposite sides of the bed frame, in the rear, with long threaded bolts (to allow of taking up the stretch of the rope), led around the rail under the head, then through the sheaves to the drum. The ropes, if manila, can, of course, be taken to the winch-heads.

We make the sheaves either for ¾-inch wire rope or 1¼-inch manila rope.

The diameter of the circle will depend on the weight of the hammer and the height of the leaders.

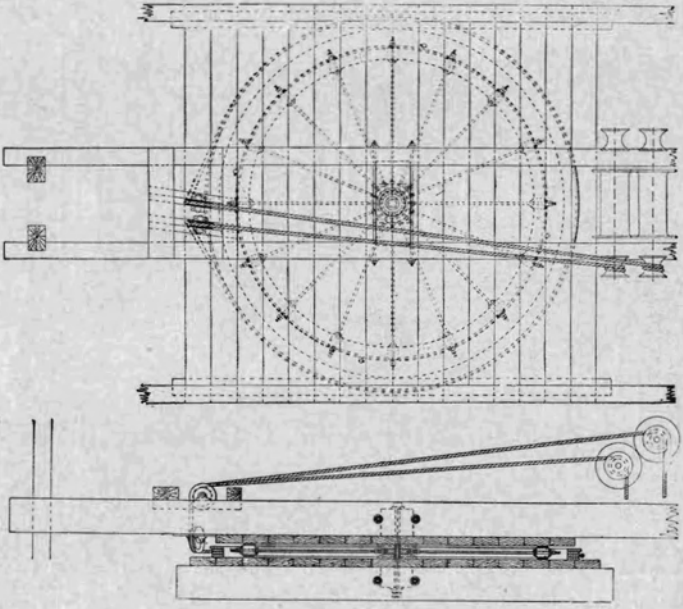
When ordering, specify which style of sheaves is desired; also, if for leaders of which we do not supply the drawing, the thickness of timber through which the several bolts pass, as we supply bolts to fasten all pieces furnished by us.

When the customer desires we can provide a pair of rollers in a cast frame, for placing under the lower timbers to lead the moving lines out from under the bed frame; the frame takes the same bolts which pass through the lower center casting.

This apparatus is not included in the price for the regular outfit.

## No. 2 TURNTABLE

### FOR SWIVEL PILE DRIVER ROLLER FORM—FLAT IRON CIRCLE



See "Turntables" on page 30.

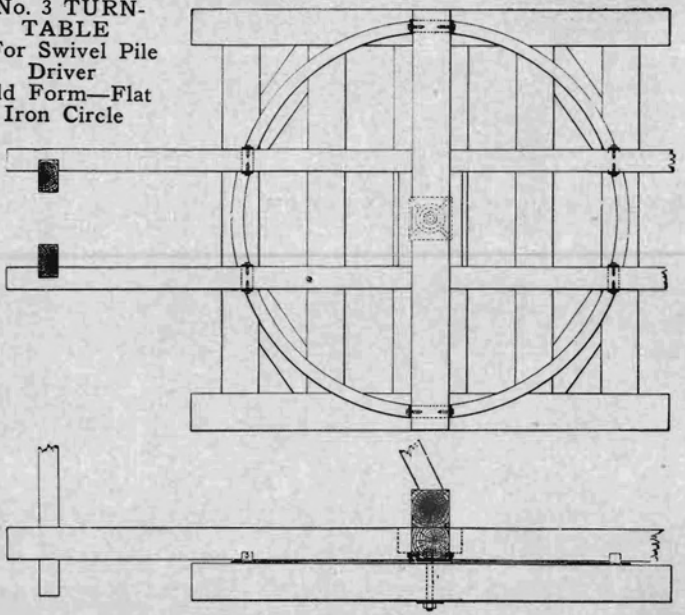
This outfit consists of sixteen cast iron rollers, revolving between two flat iron circles which are made of 10, 12, 14 or 16 feet diameter, according to weight of hammer and height of leaders. The circles are spiked to the decking on bed frame and under side of superstructure. The rollers are held in circumferential relation by means of a containing ring, through which are placed the outer ends of the spider rods which hold the roller endways.

The whole arrangement, of course, depends upon a substantial king-pin to hold all in perfect relation. The manila swinging rope is led, endless, around a wooden drum (this drum is made up of wood segments spiked to the decking on bed frame) and is brought up over the leading sheaves to the winch-heads.

A full set of iron work consists of: One pair of flat center castings for top and bottom, with bolts; one king-pin, with washers and nut; one spider center; one spider ring; sixteen spider rods, with nuts; sixteen rollers, 5 inches diameter by 6 inches face; one containing ring, in four pieces, with bolts; two circles of 5 inches, by ¾-inch flat iron, each in two pieces, with countersunk spikes, and four leading sheaves, with shafts, boxes and bolts.

When ordering, we must, of course, be informed as to the thicknesses of the upper and lower planks and also the timbers above and below the center castings, so that we may make the king-pin and the bolts of the proper lengths. The height occupied by the table is the distance from under side of lower circle to upper side of top circle, which is 6½ inches.

**No. 3 TURN-TABLE For Swivel Pile Driver Old Form—Flat Iron Circle**



See "Turntables" on page 30

This consists of the usual top and bottom center castings, with a king-bolt to keep the upper frame from leaving the track; a circle made of 4-inch by ½-inch or ⅝-inch iron or steel, bent to circle of 9, 10, 12, 14 or 16 feet diameter, as weight of hammer and height of leaders may require; the circle is fastened down with countersunk bolts or drift bolts; shoes of same sized iron bent up at the ends and fastened to sides of sills with lag screws, so as to slide on the lower circle.

When ordering, we must, of course, be informed as to the different thicknesses of wood, so that we may make the shoes, king-pin and all bolts of the proper lengths.

## NIPPERS

With Block

Without Block

The general use of friction engines for driving piles has done away, to a large extent, with the demand for Nippers. The larger sizes are seldom called for. We have added to our list a smaller size for very light hammers. Our Nippers are forged out under a steam hammer, and have machine-finished hinges and hardened steel points. We set the arms to suit width between the leaders, which should be sent us.

The Nipper Blocks are of oak, well bolted.

No. 1 Nippers, for hammer 2,500 lbs. and over.
No. 2 Nippers, for hammer 1,800 to 2,200 lbs.
No. 3 Nippers, for hammer 1,000 to 1,600 lbs.
No. 4 Nippers, for hammer 500 lbs. to 800 lbs.
No. 5 Nippers, for hammer 300 lbs. and under.

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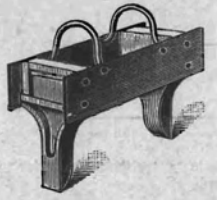


## ADJUSTABLE TRIPS

The Adjustable Trip is used for striking light blows, such as needed for a pile of small diameter, or for pile very near its destination. It is raised or lowered in the leaders by means of a small line, with suitable sheave at the top. The sides are of plate iron, the striking plates, at the ends, of cast iron, to give the necessary weight, while the bail is of wrought iron. We make them of four sizes, of the dimensions to suit leaders.

Adjustable Trip No. 1, for hammer 2,000 lbs. and over.
Adjustable Trip No. 2, for hammer 1,500 to 1,800 lbs.
Adjustable Trip No. 3, for hammer 1,000 to 1,200 lbs.
Adjustable Trip No. 4, for hammer 500 to 800 lbs.

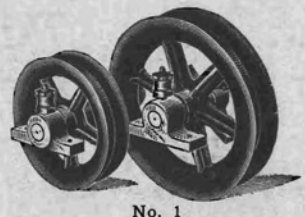
## STANDARD SHEAVES

Our sheaves are made from new patterns, grooves smoothed out, and pressed tightly on shafts, as it has been found advisable to put the wear on bearings. The "Top sheave" boxes are made in two styles:

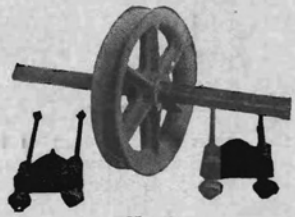
First—Solid, bored out, with oil holes on top. Some people like grease cups or oil cups, screwed into these oil holes to save trouble of going up and down too frequently. Cups are an extra charge.

No. 2

Second—Open, to receive oiled waste, as shown in cut, babbitted on lower half.



No. 1



No. 3

The "Bottom sheave" runs loose on shaft, which extends from sill to sill, to allow of a lateral movement between the sills to accommodate the rope as it winds on the hoisting drum. It may be provided with a wooden box, or housing, to prevent the line from jumping off when slack.

We can furnish, from stock, any of these sheaves for wire rope, of approximately the same diameter as specified for manila rope and at the same prices.

### DIMENSIONS OF STANDARD SHEAVES AND SHAFTS FOR EITHER WIRE ROPE OR MANILA LINE

| | 500 to 800 lbs. hammer | 1,000 to 1,800 lbs. hammer | 2,000 lb. hammer and over |
|---|---|---|---|
| BOTTOM Sheave | 12-inch | 16-inch | 20-inch |
| BOTTOM Sheave Shaft | 2 3/16-inch | 2 7/16 inch | 2 15/16-inch |
| HAMMER Top Sheave | 9-inch | 12-inch | 16-inch |
| HAMMER Top Sheave Shaft | 1 1/8-inch | 1 15/16-inch | 1 15/16-inch |
| PILE LINE Top Sheave | 6-inch | 9-inch | 12-inch |
| PILE LINE Top Sheave Shaft | 1 1/8-inch | 1 1/8-inch | 1 15/16-inch |

The largest rope which will run in above sheaves is as follows:

| | 6-inch | 9-inch | 12-inch | 16-inch | 20-inch |
|---|---|---|---|---|---|
| Manila Rope | 1-inch | 1 1/4-inch | 1 3/4-inch | 2-inch | 2-inch |
| Wire Rope | 1/2-inch | 5/8-inch | 3/4-inch | 3/4-inch | 3/4-inch |

All sheaves are measured at the BOTTOM OF THE GROOVE and have specially DEEP FLANGES. They are designed for this service and are more substantial than sheaves ordinarily sold.

All orders are filled with standard manila sheaves and solid boxes (without cups) unless otherwise specified; our complete pile drivers, pages 3 to 15, are also regularly fitted with the same.

We carry in stock a large quantity of sheaves, shafts and boxes separately for repairs.

## SPECIAL SHEAVES

The "Steam Hammer Top Sheaves" were designed to better accommodate the lead of line to a steam hammer having a sheave in top head. Cut No. 4 shows this with wire rope hammer sheave and manila pile sheave, though we can furnish wire or manila sheaves for either or both. The shaft is to be located directly over the center of the leaders. See cut on page 8 and paragraph 2 of page 24.

No. 4

No. 5

The "Twin Sheaves," No. 5, are listed to meet the occasional demand for two sheaves of the same size on one shaft. Either manila or wire rope sheaves can be furnished.

The "Swiveling Bottom Sheave," Cut No. 6, is for use at the bottom of leaders for hoisting line. At present made in two sizes, about nine and twelve inches diameter at bottom of groove, for either wire rope or manila line. When ordering state what line is used. It will follow the lead of the line and is well adapted for horse-power or whenever the hoisting line cannot be led in line with a rigid sheave. When ordering state the thickness of timber through which the bolt is to be placed.

No. 6

We recommend and furnish the following:

### SIZES OF LINES FOR DROP HAMMERS

| | Hammer Line | | Pile Line | |
|---|---|---|---|---|
| | Manila | Wire | Manila | Wire |
| Weight 500 lbs. | 7/8-inch | ..... | 3/4-inch | ..... |
| Weight 800 lbs. | 1 -inch | ..... | 7/8-inch | ..... |
| Weight 1,000 lbs. | 1 1/8-inch | ..... | 1 -inch | ..... |
| Weight 1,200 lbs. | 1 1/8-inch | ..... | 1 -inch | ..... |
| Weight 1,500 lbs. | 1 1/4-inch | 7/16-inch | 1 1/8-inch | 5/16-inch |
| Weight 1,800 lbs. | 1 3/8-inch | 1/2-inch | 1 1/8-inch | 3/8-inch |
| Weight 2,000 lbs. | 1 1/2-inch | 9/16-inch | 1 1/4-inch | 7/16-inch |
| Weight 2,500 lbs. | 1 3/4-inch | 5/8-inch | 1 1/2-inch | 1/2-inch |
| Weight 3,000 lbs. | 2 -inch | 3/4-inch | 1 3/4-inch | 5/8-inch |

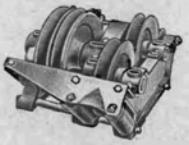
### STEAM HAMMERS REQUIRE

| | Hammer Line | | Pile Line | |
|---|---|---|---|---|
| | Manila | Wire | Manila | Wire |
| No. 0 Size | ..... | 3/4-inch | ..... | 3/4-inch |
| No. 1 Size | 2 -inch | 3/4-inch | 1 1/4-inch | 5/8-inch |
| No. 2 Size | 1 3/4-inch | 5/8-inch | 1 1/4-inch | 1/2-inch |
| No. 3 Size | 1 1/2-inch | 3/8-inch | 1 -inch | 5/16-inch |
| No. 4 Size | 1 -inch | 5/16-inch | 3/4-inch | 1/4-inch |

Smaller sizes of manila can be used, but, of course, are not so durable.

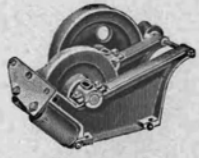
## THE PERFECT HEAD-BLOCK FOR PILE DRIVERS

### LINDSLY'S PATENT



No. 0

This is a development of long experience with the troubles incident to the ordinary headgear arrangement of pile drivers and has been found extremely satisfactory in actual use.



Nos. 1 and 2

It is complete and self-contained; can be bolted down on the driver frame in a few minutes, and, being built on the interchangeable system, any part meeting accidental damage can be readily replaced.

It is durable and easy-running, as the sheaves are fast on steel shafts running in babbitted boxes.

The inclined guide rollers permit the pile line to lead out in any direction without extra friction or wear, and the entire Head-block is so constructed that the lines cannot run against any sharp angles, nor can they be displaced from the sheaves in service.

The Head-block is now made in three sizes:

The No. 0 special, for No. 0 steam hammer only, which hammer weighs 16,000 lbs.

The No. 1, for drop hammers of 2,000 lbs. weight and over.

The No. 2, for drop hammer of 1,800 lbs., weight and under.

We also make to order, special Nos. 1 and 2 sizes with an extra pile line sheave on the opposite side, requiring four frames.

The Nos. 1 and 2 are the sizes ordinarily used, and as the hoisting line falls centrally in the leaders they are especially suitable for drop hammers. They can, of course, be used with steam hammers also, but when the hammer is raised to the top of the leaders, the line will not be entirely fair. This can be partially avoided by moving the Head-block forward.

### SIZES OF SHEAVES AND LINES

| Size | Hammer Sheave | Hammer Line | | Pile Sheave | Pile Line | |
|---|---|---|---|---|---|---|
| | | Wire | Manila | | Wire | Manila |
| No. 0..... | 16 inches | ¾-inch | ..... | 12 inches | ¾-inch | 1½ inches |
| No. 1..... | 16 inches | ¾-inch | 2 inches | 12 inches | ¾-inch | 1½ inches |
| No. 2..... | 12 inches | ¾-inch | 1½ inches | 9 inches | ⅝-inch | 1¼ inches |

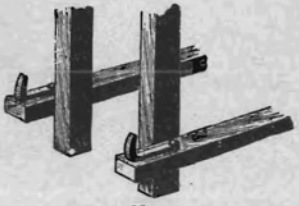
All measurements of sheaves are at the bottom of the groove.

The sizes of lines given above are the largest which the sheaves will accommodate; smaller lines can, of course, be used.

In ordering specify size of headblock and state whether sheaves are required, one or both, for wire or manila rope.

## TOGGLE IRONS

No. 1



No. 2

| Weight of Drop Hammer | No. 1 Toggles, Opening | No. 2 Toggles. Center of Leaders to Hook |
|---|---|---|
| 500 to 800 lbs | 13 inches | 6½ inches |
| 1,000 to 1,200 lbs | 18 inches | 9 inches |
| 1,500 to 2,500 lbs | 22 inches | 11 inches |
| Over 2,500 lbs | 26 inches | 13 inches |

## LINER IRONS

In order to prevent the grinding action of the hammer on the leaders it is necessary to protect them with iron wearing-pieces known as "Liner Irons."

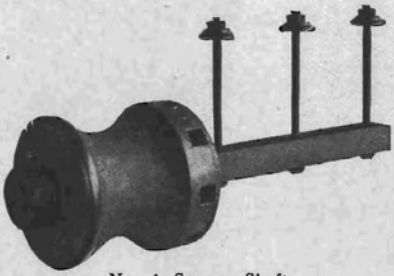
The modern method, and one which has been generally adopted, consists of a Channel-iron Liner, protecting the entire face and corners of the leaders. These channel-irons are obtained in full lengths, avoiding joints, require few bolts, and their use adds materially to the strength of the leaders, as well as affording a perfect protection to the woodwork.

We can often furnish them as long as 60 feet, but not always. It is well to avoid joints if possible, but the necessities of shipping require us to cut them into short pieces, say 20 feet and upward, depending on sizes of cars, whether box or flat cars, etc., and joining them together with splice-plates.

We make the bolts of varying lengths, to suit the taper of leaders, hence the height and thickness at top and bottom of leader timbers should be sent when ordering.

Price of Channel-iron liners, drilled and countersunk, includes countersunk-head bolts, nuts and washers. See also "Bolts and Washers" on page 59.

## ROLLER SPOOLS AND AXLES



No. 1 Square Shaft

No. 2 Round Shaft

Spool machine-finished; to run on 10-inch wooden or 10-inch iron pipe roller. Of late years we have not been able to furnish wooden rollers. Operators who can obtain them should turn them to 10 inches diameter.

Pipe rollers are considered superior to wood but would have to be ordered from the mill with indefinite delivery.

The size of pipe roller is larger than 10 inches diameter, so that spools when ordered should be specified as for iron or wooden rollers.

Four roller spools and two rollers make one set. Either the No. 1 or No. 2 style may be used for the driver illustrated on page 6.

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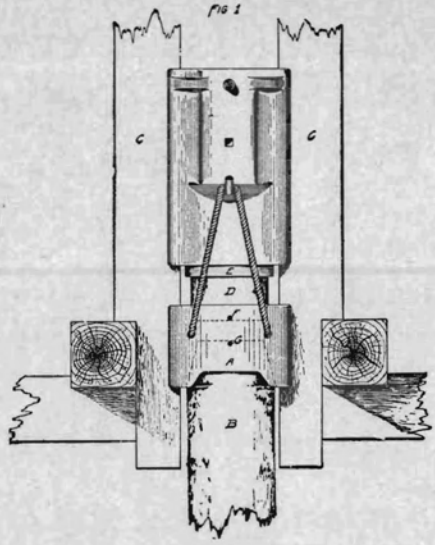
## RIGID ROLLER BEARINGS

These are plain castings to take the place of the spool rollers above. Instead of rolling they slide on the long rollers. With pipe rollers they are also satisfactory. Our pattern is for 10-inch pipe about 10¾-inch diameter, and also for 10-inch diameter oak roller. Specify when ordering which is to be used. Regarding application of these bearings see pages 4 and 6.

**Wm. T. Casgrain's**

## IMPROVED CAP FOR PILE DRIVING

(Do Not Confuse This with Follower Cap on Page 42)




In connection with drop hammers we call attention to our improved Pile Caps, as shown in the engravings. In the operation of pile driving it frequently happens that the piles are either split or broomed on their tops by the concussion of the hammer. To overcome this difficulty recourse is had to pile bands. The expense of taking off these bands, to say nothing of broken ones and the consequent delays, were such that it became necessary to adopt a protecting cap that would prevent the head of the pile from splitting or brooming.

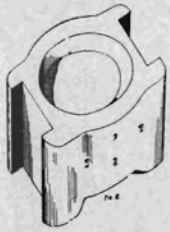
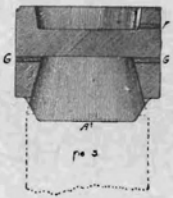


Fig. 1 shows the cap in place just when the operation of driving is completed, while Figs. 2 and 3 show the cap detached.

Briefly described, it consists of a cast-iron cap with tapered recesses above and below, the chamfered head of the pile fitting the lower one, and the wooden block "D" fitting the upper one. Suitable jaws, similar to those on the hammer, engage the leaders and form a movable toggle-iron, steadying the pile as it is being driven. As the hammer descends it strikes the timber or cushion-block set in the upper cavity and the pile is forced down by the blows. When the pile is driven the ropes on either side of the cap are connected to the hammer by means of pins in the sides of the hammer, and both hammer and cap are hoisted up and secured for another operation. The value of these caps has become so well known that prominent contractors throughout the country have provided themselves with them. While they save the end of the pile, the blocks, of course, are badly used. We ordinarily put a band, 1x2½ inches around the top of the block. Some claim to have had better results with a short block without a band, and others think better of a block hammered down close to the iron and covered from time to time with worn-out rope, picked loose.



We make the caps to suit the **dimensions of customers' leaders,** which must always be sent us.

The cap should properly be the same width of jaw and distance between jaws as the hammer with which it is used.

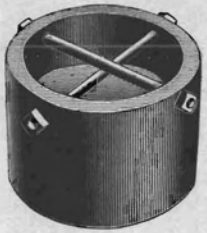
When ordering, **state precisely whether the dimensions are those of the cap or of the leaders,** thereby avoiding confusion and consequent delay.

The cap complete consists of a cap-casting block and band, and also pins in hammer when we furnish it, or for putting in hammer by customer.

## FOLLOWER CAP

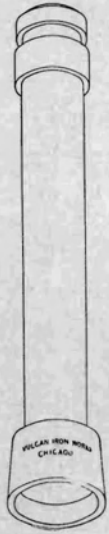
(Do Not Confuse This with Pile Caps on Page 40)

In foundation work piles are required to be driven below the surface, sometimes 20 feet. When driven to the end of the leaders a follower has to be used for the remaining distance. The Follower Cap here shown is recessed on the bottom, the same as the pile cap, to fit over the pile. In its upper end the operator inserts and bolts a pile of the requisite length, with its upper end trimmed to fit into the pile cap or steam hammer. We make this in three sizes; bolts are included.



No. 1

| Size No. | Largest Diameter of Pile | Diameter of Upper Recess | Length Over All |
|---|---|---|---|
| A | 10 inches | 10 inches | 10½ inches |
| B | 12 inches | 12 inches | 12 inches |
| C | 16 inches | 14 inches | 15 inches |



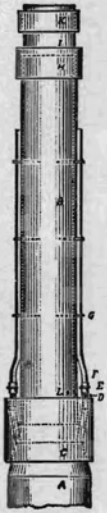

## PLAIN PIPE FOLLOWER

This is an improvement on the Cap with wooden follower illustrated above, and is of advantage when a great amount of work is to be done. It is made in two sizes, using 10 inch and 12 inch extra strong pipe (of length to suit the work) cast into the follower base; this method having been found much superior to bolting the parts together.

We provide a turned oak or black gum stick (to be driven into the pipe by the operator) also an oak or black gum driving block which can be readily replaced when worn out. Hammered iron bands are shrunk around the upper ends of pipe and driving block.

This Follower differs from Kearns' Patented Pile Follower in that this is without any provision for releasing the Follower from the pile by forcing in air or steam. The material driven into will determine which style is required.

The smaller Follower is used for 10 to 12 inch, and the larger for 14 to 16 inch diameter of piles.



## THOMAS A. KEARNS'

## IMPROVED PIPE PILE FOLLOWER

### FOR DRIVING PILES BELOW THE SURFACE OF THE GROUND

This consists of a cast iron cap, "C," in which is a recess to receive the pile, and a wrought iron pipe, "B," of the length to suit the depth required. This pipe is cast into the follower cap. The pipe is filled by a turned oak or black gum timber, which we provide, but to be hammered in by the operator. A heavy hammered iron band, "H," is shrunk on to the pipe, leaving a recess of about 1½ inches to receive a short block, "I," having a hammered iron band, "K." Two steam pipes run down either side to release the follower from the pile. These pipes are held to the larger pipe by staples driven through the pipe into the wood.

The great advantage of this follower becomes apparent in sticky soils, when the driving is below the surface of the ground, as by means of the small pipes steam or air under pressure may be introduced on top of the driven pile when it is desired to withdraw the follower.

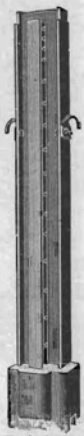
We make this in two sizes of pipe—10-inch and 12-inch, extra strong—of length to suit the work. The smaller is for piles from 10 to 14 inches diameter, and the larger for piles 14 to 18 inches diameter.

Plain

## I-BEAM FOLLOWERS

### FOR DRIVING STEEL SHEETING

The upper end is prepared for insertion in special sheeting caps (pages 46 to 50). The recess on the lower end fits over the sheeting. The I-beams are cast in the base. These are made in two forms—plain, for light work, and reinforced, for heavy work. Prices listed are for 8 feet in length. Prices for different lengths on application. Specify what kind and size of sheeting is to be used.



Reinforced

## FOLLOWER BANDS

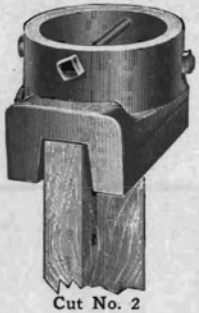
Single Flare

In some driving there is not room for a cast iron cap, so that a wrought iron band has to be used. We can make either single or double flare, to any size required; 12-inch and 14-inch inside diameter will meet all ordinary requirements. Diameter is in narrowest part of band.

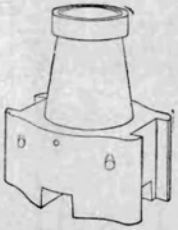
Double Flare

## OPEN END FOLLOWER CAP

This is similar to follower casting for round piles shown on page 42, arranged for driving wooden sheeting. When ordering specify the outside rectangular dimensions of pile.

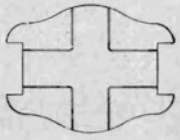


Cut No. 2



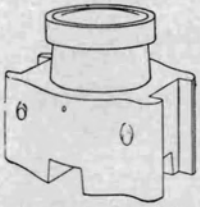
## PILE CAP FOR WOODEN SHEET PILING

This is a modification of the Casgrain Cap (shown on page 40) and is used in the same manner, but only for rectangular shapes. The grooves are made to suit the thickness of the plank, which can be placed either of two ways in the same cap. A long block is provided for steam hammer work or the ordinary short block for drop hammer work. Price includes cap casting, block, band and pins for hammer.

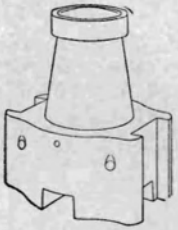


When ordering follow instructions at foot of page 41 and also specify the rectangular sizes of plank and the kind or size of hammer with which cap is to be used.

## DRIVING BLOCKS



**Turned from Black Gum Logs for Pile Caps and Sheeting Caps.**



For several years we have been using white oak for making driving blocks, but have experienced considerable trouble, and frequent loss, from checking of the timber and blocks; besides we have had trouble at times in getting the material.

We are now making these blocks of Black Gum logs from Louisiana. Black Gum does not appear to check, even when kept in a dry room, in fact, it seems to be the ideal wood for this purpose.

We have had two comparative reports only, as follows: U. S. Reclamation Service, Putnam, Montana, L. V. Branch, Engineer: "The five Black Gum cushion blocks shipped us were most excellent blocks. Any one of these five blocks was the equal of the very best oak block and did the same service as two of the poorer oak blocks. The Black Gum blocks were more uniform in quality than the oak blocks and as an average I would estimate that two Black Gum blocks were equal to three oak blocks." James Black Masonry & Contracting Co., St. Louis, Mo.: "The oak cushion blocks stood (12) feet of driving; that is, one pile driven 12 feet. The Black Gum cushion blocks lasted for 7 piles at a depth of 35 feet each or 245 feet of driving. Enclosed find our order 24138 for 24 Black Gum cushion blocks for No. 2 Warrington steam hammer."

Many contractors use waste ends of piles, which, of course, is the cheapest way to do where piles suitable for the purpose are being used, but in many parts of the country where timber is very poor, these blocks may be found a good purchase. We heretofore have aimed to sell blocks only in connection with caps, that is, send one out with each cap, but are now offering them for regular use. We keep in stock:

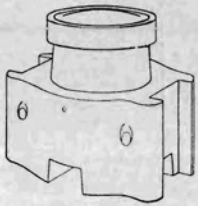
**Short blocks for drop hammer.**

**Long blocks for No. 1 Warrington steam hammer, about 20 inches long.**

**Long blocks for No. 2 Warrington steam hammer, about 20 inches long.**

**Long blocks for No. 3 Warrington steam hammer, about 15 inches long.**

## PILE CAPS FOR STEEL SHEET PILING



These are of the same form and general design as our Casgrain cap for wooden piles and are used in the same manner.

To fit over and toggle the pile into position the bottom face of cap is provided with two slots or grooves at right angles, either of which may be used, enabling the driver to straddle the line of sheeting or work at right angles to it.

To provide the proper toggling effect the grooves are made to conform as closely as is consistent with the shape and thickness of the steel piling so that each make and size of sheeting requires a different groove in the cap.

When used with a drop hammer the cap is provided with the standard block, as is regularly used in the Casgrain cap. When used with a steam hammer a longer block is required and the band is made to fit the hammer base.

We illustrate and list herewith the different forms of steel piling for which we have cap patterns. As fast as the mills prepare new shapes of sheeting we make cap patterns to suit. We carry in stock a large number of caps for most of the styles of sheeting, having jaws to suit our standard hammers. We can make caps to suit the dimensions of customers' leaders, when they vary from our standard, without additional charge. These dimensions must always be sent us; the cap should properly be the same width of jaw and distance between jaws as the hammer with which it is used.

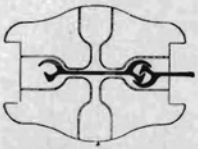
**State precisely whether the dimensions sent are those of the cap or of the leaders,** to avoid confusion and delay.

When ordering, state the make, number and size of steel piling to be driven, the size of leaders (see the previous paragraph) and the kind and size or weight of hammer with which cap is to be used.

The cap complete consists of the cap casting, block and band, and also pins in drop hammer when we furnish it, or for insertion in old hammer by the customer.

## LIST OF STEEL SHEET PILES FOR WHICH WE HAVE CAP PATTERNS

THE ILLUSTRATIONS SHOW THE BOTTOM FACE OF CAP

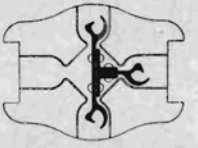


### LACKAWANNA

**Straight Web**

No. . ½ in. thickness of web; 12¾ in. centers of joints.
No. . ⅜ in. thickness of web; 12¾ in. centers of joints.
No. . 7/32 in. thickness of web; 8½ in. centers of joints.
No. . ¼ in. thickness of web; 7 in. centers of joints.

This pattern is the better cap to use for straight work on this make of pile. It is not for corners or junctions.

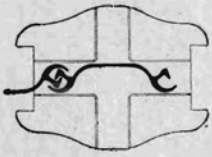


### LACKAWANNA

**Straight Web**

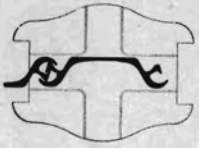
No. . ½ in. thickness of web; 12¾ in. centers of joints.
No. . ⅜ in. thickness of web; 12¾ in. centers of joints.
No. . 7/32 in. thickness of web; 8½ in. centers of joints.
No. . ¼ in. thickness of web; 7 in. centers of joints.

Designed primarily for corners and junctions, but can be used on straight work, though less advantageously than the one shown above.



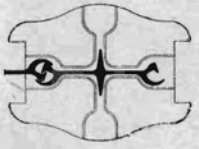
### LACKAWANNA

14-inch arched web.



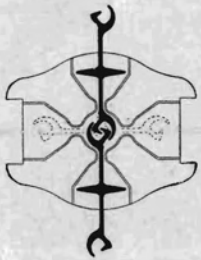
### LACKAWANNA

15-inch arched web.



### LACKAWANNA

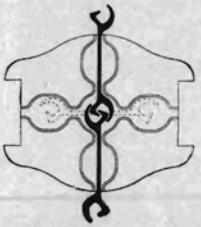
15-inch center flange.



## LACKAWANNA

(No. 3, Lackawanna Steel Co. Bulletin 108)

Can be used for driving the 15-inch center flange or the 12¾-inch straight web either single piles or two piles together.

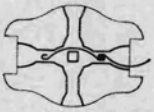


## LACKAWANNA

(No. 4, Lackawanna Steel Co. Bulletin 108)

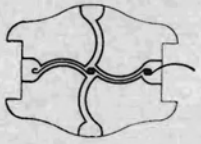
For driving straight web, either single piles or two piles together.

No. ½ in. thickness of web; 12¾ in. centers of joints.
No. ⅜ in. thickness of web; 12¾ in. centers of joints.
No. 7/32 in. thickness of web; 8½ in. centers of joints.
No. ¼ in. thickness of web; 7 in. centers of joints.



## LACKAWANNA

8-inch plate sheet. For driving single piles.



## LACKAWANNA

8-inch plate sheet. For driving two piles together.

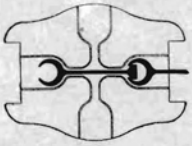
## LACKAWANNA

Bent Web Sections

These new forms of steel sheet piling have lately been made up by the Lackawanna Steel Co. They are made in the 7, 8½ and 12¾-inch sizes and in varying angles from 6 to 90 degrees.

The Rotative and Adjustable Sheeting Caps shown on page 51 are well adapted for driving these sections.

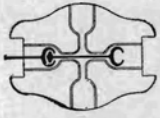
Style of sheeting and degree of angle should be specified.



## UNITED STATES

Carnegie Steel Co.

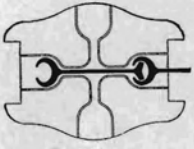
M 102 12-inch. 40 pounds.



## UNITED STATES

Carnegie Steel Co.

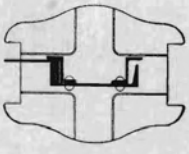
M 103 9-inch. 16 pounds.



## UNITED STATES

Carnegie Steel Co.

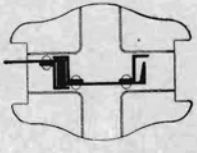
M 104 12½-inch. 38 pounds. ⅜-inch web.
M 105 12½-inch. 43 pounds. ½-inch web.



## FRIESTEDT

Carnegie Steel Co.

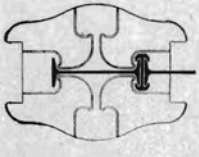
No. 1 12 in. x 33 lbs. No. 3 15 in. x 38 lbs.
No. 2 12 in. x 38 lbs. No. 4 15 in. x 44 lbs.
For straight work only. For corners use the plain face cap.



## CARNEGIE SYMMETRICAL

Carnegie Steel Co.

No. 1 10 in. x 28 lbs. No. 4 12 in. x 39 lbs.
No. 2 10 in. x 34 lbs. No. 5 15 in. x 39 lbs.
No. 3 12 in. x 34 lbs. No. 6 15 in. x 45 lbs.
For straight work only. For corners use the plain face cap



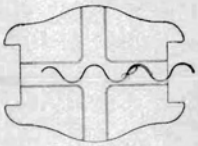
## JONES & LAUGHLIN

| | | |
|---|---|---|
| No. 0 | 12 x 4¼ inches. | Web 0.335 inch. |
| No. 00 | 12 x 4¼ inches. | Web 0.375 inch. |
| No. 000 | 12 x 4¼ inches. | Web 0.415 inch. |
| No. 1 | 12 x 5 inches. | Web 0.34 inch. |
| No. 2 | 12 x 5 inches. | Web 0.37 inch. |
| No. 3 | 15 x 6 inches. | Web 0.37 inch. |
| No. 4 | 15 x 6 inches. | Web 0.44 inch. |
| No. 5 | 15 x 6 inches. | Web 0.50 inch. |

This can be used for corners.

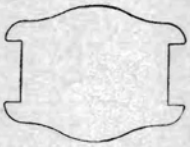
## WEMLINGER

| No. | Type | Inches Thick | No. | Type | Inches Thick |
|---|---|---|---|---|---|
| 1 | A | 1/16 | 11 | B | 7/64 |
| 2 | A | 7/64 | 12 | B | 1/8 |
| 3 | A | 1/8 | 13 | B | 5/32 |
| 4 | B | 7/64 | 14 | B | 3/16 |
| 5 | B | 1/8 | 15 | C | 3/16 |
| 6 | B | 5/32 | 16 | C | 1/4 |
| 7 | B | 3/16 | 17 | C | 5/16 |
| 8 | C | 3/16 | 18 | D | 3/16 |
| 9 | C | 1/4 | 19 | D | 1/4 |
| 10 | C | 5/16 | 20 | D | 5/16 |

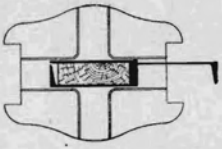


## PLAIN FLAT FACE CAP

NO GROOVES

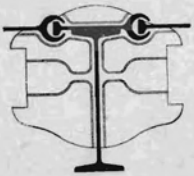


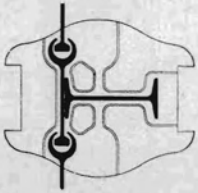
To be used for driving United States, Friestedt and Carnegie Symmetrical corners—may also be used for Jones & Laughlin corners and Lackawanna corners and junctions.



## GOULD

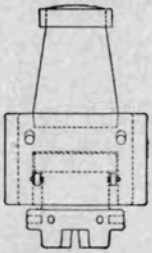
12-inch Standard Channel.
15-inch Standard Channel.





## COMBINATION SHEETING CAPS

We are prepared to make pile caps to suit any combination of structural shapes, and illustrate above two recent forms. When these are required we must be fully informed as to all details of the shapes making up the pile and also as to whether all piles in the row are the same design.



## ROTATIVE SHEETING CAP

We illustrate a sheeting cap readily adjustable to drive round caissons with the ordinary leaders. This form accomplishes the same result as the Adjustable Combination Pile Cap and Follower shown below, but is more readily placed to meet the different angles in driving.

This rotative cap may be used with either a drop or a steam hammer and requires no changes to be made in the hammer.

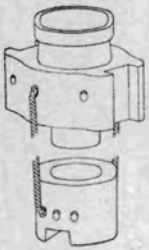
The upper casting or cap is formed with jaws to engage the leaders and an upper recess for a driving block (see page 45).

The lower casting or spool is inserted in the cap and secured by two steel bars. It may be rotated to any desired position. Its lower face is provided with a recess conforming to the sheet piling which may be of wood or steel and any make or size. Spools can be furnished at any time for different makes of sheet pile.

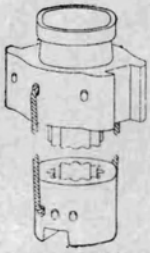
When ordering, follow instructions on page 46.

## ADJUSTABLE COMBINATION PILE CAP AND FOLLOWER

**Warrington Patent**



Plain



Corrugated

For driving steel sheeting or wooden planking when the line of driving is not in line or right angles to the pile driver. This consists of a pile cap (which term we apply to those caps that engage the leaders) having a pintle on the bottom which sets into a follower casting. This follower casting is recessed on the bottom to fit over steel sheeting or wooden planking, held up to the pile cap by ropes, which allow more or less flexibility, and further aided by three holes in the follower, for adjustment. The pintle is made in two forms, one form, round, which holds the piling in position vertically, but not in line (other methods of holding being required); and a second form, corrugated, which will hold the piling in all positions, the corrugations being so numerous as to permit of quite close adjustment. This combination cap and follower is of advantage with a swiveling driver with leads, keeping the piling in vertical position and permitting of adjustment to any angle required.

When ordering, follow instructions on page 46.

## CAST STEEL DRIVING HEAD FOR CONCRETE PILES

As it is not advisable to drive a concrete pile by allowing the hammer to drop directly upon the concrete, this pile cap or driving head is used to protect the pile and toggle. It also has the advantage of having a wooden block to receive the impact of the hammer.

The skirt or lower recess is made very deep and should conform rather closely to the shape of the pile, which may be either square, rectangular, octagonal or round. Can be furnished for any of our steam or drop hammers.

Inquiries should state kind and size of hammer to be used and sizes and shape of pile to be driven. The caps are made to order only.

## PILE PULLER

### FOR STEEL SHEET PILING

Made of steel in two sizes.

The large size for 9-inch U. S. piling.

The small size for 7-inch Lackawanna piling.

Gripping cams have hardened tool steel teeth.

The action of pulling increases the grip.

## PILE PULLER

### FOR WOOD SHEET PLANK

Made for 3-inch by 10-inch plank, but can be used for other widths and also for 2-inch planks.

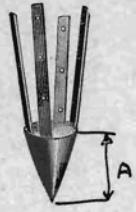
Steel forging with ½-inch chain and ring.

## PILE POINTS—OR PILE SHOES

Dim. A

| | | | Weight Pounds | |
|---|---|---|---|---|
| 6 | 4 in. x 4 in. square | 10 3/4 Strap | 15 | 2066 |
| 6½ | 5 in. x 5 in. square | 11 1/4 | 25 | 2069 |
| 7½ | 6 in. x 6 in. square | 12 3/4 | 36 | 2069 |

| | | Weight Pounds | |
|---|---|---|---|
| | 9 in. x 2½ in. | 17 | 2066 |
| | 9 in. x 3 in. | 27 | " |
| | 9 in. x 3½ in. | 33 | " |




| | | | Weight Pounds | |
|---|---|---|---|---|
| 8½ | 6 in. round | 12 3/4 | 36 | 2038 |
| 11 | 8 in. round | 15 | 75 | " |
| 11¼ | 10 in. round | | 140 | " |

All sizes are measured on the upper, or bearing, end.

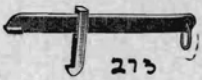
Of course, these sizes will do for piles of much larger size, as the piles should be tapered to fit in straps.

Spikes are included in prices.

## PILE BANDS

When driving piles in hard-pan, with a drop hammer, the head of the pile is liable to be broomed up by the repeated blows of the hammer. In such cases Pile Bands or Rings of wrought iron or steel are fitted to the pile and removed when driven. We make them only to order, ordinarily of ¾x3-inch material, but some prefer 1x2½-inch, 1x3-inch or 1x4-inch, so we give prices on all four weights.

For protecting heads of piles, bands are, of course, inferior to pile caps shown on page 40, but occasionally bands are used.



### PILE BAND PULLER
**Forged, Not Cast Steel**

Hook adjustable for different sizes of bands.

## PILE LIFTING CHAINS

These are for use at end of pile line, for winding around the pile and taking hold. They are made of different sizes of chain and different lengths. For 2000-lb. to 2500-lb. hammer, ½-in. chain by 8 ft. long is a quite popular size.

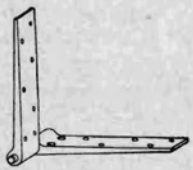
Care must be taken in ordering not to confuse these with the pile-pulling chains—page 59—which, of course, are very much heavier and with special hammered hooks.

## CAST IRON THIMBLE

To enable a drop hammer fitted with a triangular die, for horse-power, to be used for friction engine driving. The hammer thus supplied can be used either way.

State size of hammer and line with which it is to be used; also, if hammer is not our make, size of die.

## LEADER HINGES

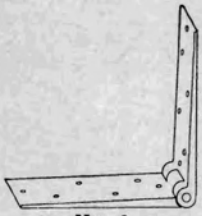


No. 1

Their usefulness lies particularly with swivelling drivers, doing foundation work, where the driver is frequently moved from one building site to another, through the streets, it being then necessary, on account of headroom, to lower the leaders and take them away separately from the bed frame. The hinges are used at the foot of the leader sticks, to hold them securely in place while lowering or hoisting. The leaders are, of course, lowered toward the front.

Three forms are illustrated. We make two sizes of each form—the larger size for a No. 1 steam hammer or a 3,000-lb. drop hammer; the smaller for a No. 2 steam hammer or a 2,000-lb. to 2,500-lb. drop hammer.

The pins are all readily removable.



No. 2

### No. 1 STYLE

The vertical leg is bolted against the front face of the leader sticks, the horizontal leg against the upper face of the sill timber. The two halves of a hinge are side by side, with a short pin through them.

The large size is 5 inches wide, each leg 3 feet long. 518

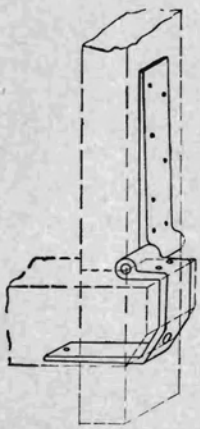
The small size is 4 inches wide, each leg 2 feet 6 inches long. 806

### No. 2 STYLE

The vertical leg is bolted against the back face of the leader stick, other leg on the sill. The joint of the two pieces is milled out so that they fit into each other, and the two pieces will fit into a parallel width from end to end.

The large size is 6 inches wide, each leg 3 feet long. 491

The small size is 5 inches wide, each leg 2 feet 6 inches long. 814



No. 3

### No. 3 STYLE

The lower half is made to fit the end of the leader sill or "horn" timber, and is provided with a large hole on the beveled face through which is inserted one of the superstructure truss rods. This last is the form most frequently used.

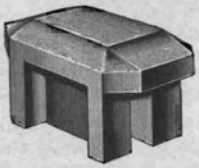
The large size is 5 inches wide, upper leg 3 feet long. Allowance is made for a 12-inch sill, setting out 8 inches in front of leader. 582

The small size is 4½ inches wide, upper leg 3 feet long. Allowance is made for an 8-inch sill, setting out 8 inches in front of leader. 716

The hinges when used are, of course, the permanent fastenings for the lower end of the leaders.

In the illustrations only the two parts of one hinge are shown. A pair of hinges is, of course, required for a driver.

## SHEETING CAPS FOR HAND DRIVING

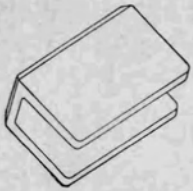


### CAST STEEL

Made in two forms.
One for 7-inch Lackawanna sheet piling. 851
One for 8-inch Lackawanna plate steel piling. 979

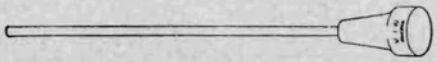
### CAST STEEL

For 2x6, 2x8 and 3x8 wooden sheeting. 676



### CAST STEEL

Double open end.
For 2x8, 2x12 and 3x8 wooden sheeting. 951



723

### POUNDERS

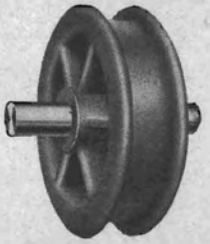
Bar cast in. Weight about 75 pounds.

Cast iron 70 #
Wrought Hdle 20 #

Spec. to hold 10 Ton
Weight each
Shaft 3 7/16 x 20
Cellar box only
Proud foot 8/18/18
Sketch A26

## DERRICK WHEEL

DOUBLE FLANGED—CHILLED TREAD



316
975

This is a very heavy and substantial wheel. It was originally designed for use under heavy traveling derricks, but it has been extensively used on the circular track of revolving derricks and excavators and is occasionally used under the framework of the pile drivers when necessary to straddle a trench or similar work.

The wheel is chilled on the tread and inside face of flanges.

It is 18 inches diameter on the tread; the flanges will accommodate as large as a 90-lb. rail.

The shaft is 2 7/16 inches diameter and is pressed into the wheel. We make three different forms of bearings for the shaft.

1st—A solid cast iron bearing bored out to fit the shaft.

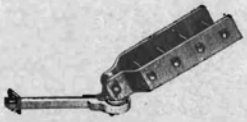
2d—Similar to the above but provided with a round bronze bushing forced into place and in which the shaft has a bearing.

3d—An oil cellar bearing which is bored out to fit the upper side of shaft only and has below the shaft a large oil cellar which can be filled from the side.

All bearings are provided with bolt holes and a "timber lug" to prevent movement on the woodwork of the machine.

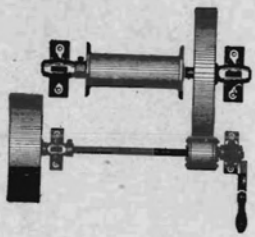
## BOOM FITTING

WITH SHANK TO FIT A DROP HAMMER



850

This is very convenient when it is desired to use the pile driver for light derrick work. The fitting is placed into the square hole of the drop hammer. It is made for a 10-inch boom and is of three tons nominal capacity.



## SINGLE DRUM FRICTION HOIST

A35

BELT DRIVEN

This machine is similar to those used for hoisting purposes in coal yards, for car pullers, etc., and is equally convenient for operating the hammer of a small pile driver.

It is belt driven from any convenient power, such as a traction engine, or a gasoline engine (the latter, of course, could be mounted on the pile driver framework). The machine consists of a drum, with iron and paper friction wheels, thrown into action by means of a lever and an eccentric bearing.

The eccentric bearing is at the friction end of the pulley shaft; the other bearing on this shaft and the two on the drum shaft are babbitted pillow blocks.

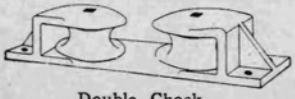
A pulley of the proper size is provided.

We do not furnish woodwork with this machine, as it is to be fastened to the pile driver.

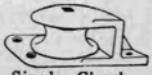
When asking for quotation inform us as to the horse-power and number of revolutions per minute of engine, the diameter and face of pulley from which the machine will be driven and the size of hammer with which to be used.

## SHEAVE CHOCKS—FOR MANILA ROPE

#3 DOUBLE A'78



Double Chock



Single Chock

No. 3 Single Chock

D 798 S 802 D 797 S 801 D A78 S 896

Both styles are made in three sizes and are furnished complete with bolts.

The No. 1 has a sheave 6 inches outside diameter and 3 inches face.

The No. 2 has a sheave 9 inches outside diameter and 5½ inches face.

The No. 3 has a sheave 11 inches outside diameter and 3 inches face.

All corners are well rounded to prevent chafing of lines.

When ordering, state the thickness of timber upon which the chock will be placed.

## BOLTS AND WASHERS

We maintain a stock of countersunk head machine bolts, in such lengths as are generally used in liner irons.

For 1000 lbs. driver and upward these are always ⅝ inch in diameter. Our stock lengths vary by ¼ inch from 5½ inches to 13¾ inches over all. They are provided with hexagon nuts and wrought washers.

We can also furnish ¾-inch and other sizes with the same style of head.

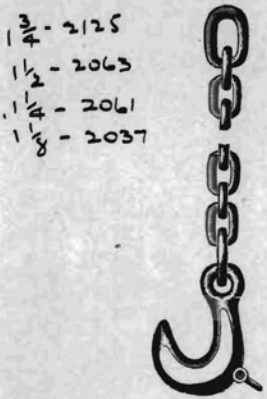
This will be found a great convenience to contractors who can anticipate their needs, as we can furnish a much superior article at less cost than can be made by a blacksmith on the work.

We also have in stock large quantities of wrought iron and standard cast iron washers, and the special widths and bevels of cast iron washers used with our own designs of pile drivers.

## TURNED WOODEN ROLLERS

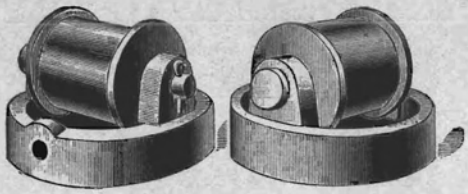
We list only the sizes ordinarily applicable to pile driver work, but of course can furnish others if desired, at proportionate prices. We paint the ends to prevent undue season cracks.

## PILE-PULLING CHAINS




## TIMBER OR DOCK CLAMPS

## ROLLERS WITH FRAME FOR PILE DRIVER LEADERS



### HANSCOM'S STYLE

First—Pile-Cap Rollers. It sometimes happens that in order to rush work on piers it is advisable to drive in advance of the timber capping. These rollers have open frames which are tapered to fit over the pile, and have a rope hole to fasten to pile to prevent loss. They are 5 inches in diameter and 5 inches between flanges.

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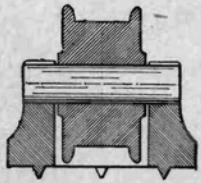
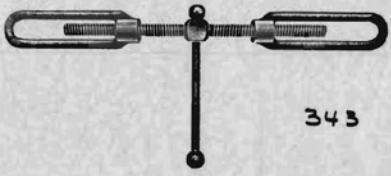


### ARNOLD'S STYLE

Second—Timber Rollers. These are similar to the Pile-Cap Rollers, arranged to use on timbers, having points to prevent moving. They are 8 inches in diameter and 3½ inches between flanges.

## PILE TURNBUCKLE

### WITH VISE HANDLE




This is a very convenient tool to straighten piles into position. It has 24-inch travel, 1¾-inch square threads, three per inch.

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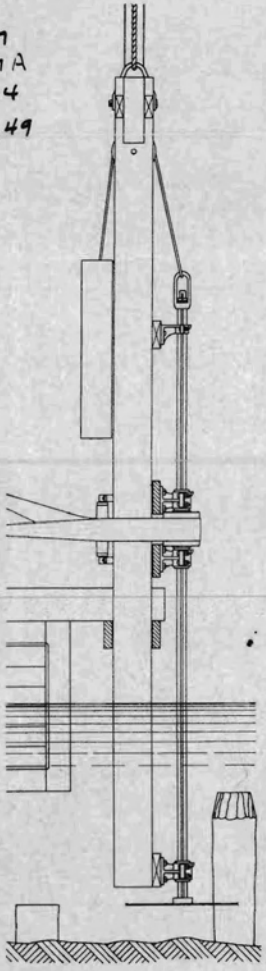
## TURNTABLE ROLLER AND FRAME


Some people prefer to swing turntables by rollers instead of by sliding shoes. These have babbitted bearings and loose caps held in place by a pin. Convenient and substantial. Made to order only; two sizes.

The larger has roller 8 inches diameter with 3½ inches face.

The smaller has roller 5 inches diameter with 3½ inches face.



## PILE SAW ARBOR
### FOR CUTTING OFF PILES UNDER WATER

These can be furnished to cut off piles at any required distance below the surface. We have made them for use at a depth of 30 feet.

To obtain the length of the arbor, we add, to the required depth of cut, an allowance of 8½ feet in length above the water.

The arbor is $3\frac{7}{16}$ inches in diameter, works its entire length upon a spline in the pulley and is readily adjustable for use at any depth within its range.

The upper and lower bearings are to be fastened to a timber, 9 feet longer than the arbor, and which by means of wooden chocks and guides is arranged to be raised and lowered in the leaders in place of the hammer. The two middle bearings are to be placed one above and one below the pulley and are fastened to the leaders. They serve not only to support the arbor but also to maintain the pulley in its proper position to receive the driving belt. When adjusting to required depth the timber and arbor move together, the arbor slipping through the pulley and middle bearings.

To compensate for minor fluctuations in water level after the saw has entered the cut, the arbor is counterbalanced.

The longer arbors are made in two parts, the upper part only being keyseated for the pulley spline. The lower part is detachable, leaving on the upper part a duplicate collar for attachment of saw.

Side rollers and frames are furnished, to be fastened to the inner face of leaders, to prevent chafing of the driving belt.

Our price includes the saw, arbor, bearings, ball bearing swivel hanger, pulley, side frames and rollers, clevis and pin for top of timber, sheave with pins for counterbalance and necessary bolts to fasten all to the woodwork, together with drawing for the woodwork and assembly of arbor parts.

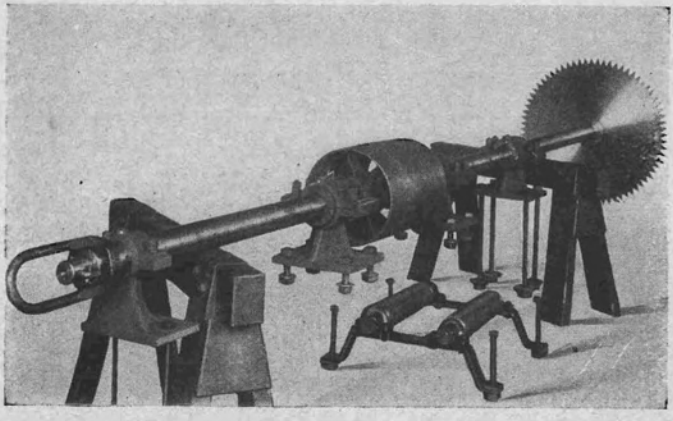
A 42-inch saw is usually sufficient as it will cut off 18-inch piles, but for very large piles the diameter would have to be increased.

We aim to carry in stock the 42-inch saws and all parts except the bare arbor.

Speeds and approximate horse-power required for saws is as follows:

42-inch saw, 600 R.P.M., 15 to 20 H.P.
48-inch saw, 525 R.P.M., 20 to 25 H.P.

It is usual to drive the saw with an 8-inch rubber belt from a pulley placed on the end of drum shaft of regular hoisting engine. However, to develop the requisite speed it may be necessary to place a countershaft midway between engine and arbor.



## SAFE BEARING LOAD FOR PILES

Numerous formulas have been devised for the bearing power of piles, but their several results have been conflicting and have frequently failed when tested by practice. Engineers, therefore, use them with caution.

It is held by Hering and others that, in order to be reliable, the formula should involve the set of the pile under the last blow; and, furthermore, this blow should be given after an interval of rest.

For the convenience of our customers we give below the formula devised by the late A. M. Wellington, and originally known as the "Engineering News" formula. It is reproduced from the treatise on "Piles and Pile Driving," published by the Engineering News Publishing Co., of New York.

For drop hammers it is given as follows:

$$\text{Safe load in pounds} = \frac{2\,w\,h}{s+1}$$

For Steam Hammers:

$$\text{Safe load in pounds} = \frac{2\,w\,h}{s+0.1}$$

in which $w$ = weight of drop hammer, or striking parts of steam hammer in pounds:

$h$ = fall of hammer, or striking parts, in feet;

$s$ = set of pile under last blow, in inches.

The formula may be expressed in the form of a rule, as follows:

### FOR DROP HAMMERS

To find the safe load, in pounds, multiply twice the weight of the hammer in pounds by its fall in feet and divide by the set, in inches, under the last blow, plus 1 inch.

$$\text{Safe load in pounds} = \frac{\text{Twice the weight of Hammer in pounds} \times \text{Fall of Hammer in feet}}{\text{Set of Pile under last blow, in inches, plus 1 inch.}}$$

Concerning this constant, 1 inch, Wellington wrote in reference to Steam Hammers:

" * * * The constant 1 (in the formula for Drop Hammers) * * * which represents the extra initial resistance of getting the pile into motion again, should not be over 1/10 as great, if so much." Therefore,

## FOR STEAM HAMMERS

take the weight of striking parts, in pounds, instead of hammer, in rule above, and in the divisor use 1/10 instead of 1 inch.

$$\text{Safe load in pounds} = \frac{\text{Twice the weight of striking parts in pounds} \times \text{Fall of striking parts in feet.}}{\text{Set of Pile under last blow, in inches, plus 1/10 inch.}}$$

The assumed factor of safety is 6.

The formula is to be applied subject to the following limiting conditions:

The leader guides must be truly vertical and in good working order.

"The full fall must only be counted (1) when there is no sensible bounce after the blow, and (2) when the head of the pile is in good condition. * * * A broomed head will destroy from half to three-quarters of the effect of a blow, even if the brooming be only a half inch to an inch deep. * * * The remedy is to adze off or saw off the heads before giving the last blows * * *

"The proper value of $s$ can only be determined by taking the mean of the sets for a number of blows—not then, unless (a) the penetration has been at a reasonably uniform or uniformly decreasing rate, and (b) there is reasonable assurance that the penetration would continue uniform if driven several feet farther, * * * and (d) the penetration must be at a reasonably quick, as well as uniform, rate—not less than ¼ inch for a 3000-lb. hammer falling 30 feet.

"There is nearly always an increase of resistance and a decrease of set per blow as an effect of an interval of rest, permitting the earth to settle around the pile. * * * This effect is usually more pronounced in the firmer, soft and wet earths and least pronounced in coarse gravel and sand * * * and the mean penetration for the first few blows, after such an interval of rest, should be taken as the value of $s$ (set of pile in inches.)"

## ILLUSTRATION

Assuming a No. 2 steam hammer and the pile to have been driven a foot in the last ten blows, the weight of the striking parts is 3000 pounds and the fall about 3 feet. The mean set is 12 inches divided by 10, or 1 2/10 inches. Substituting numerical values in the formula, we have:

$$\text{Safe load in pounds} = \frac{2 \times 3000 \times 3}{1.2 + 0.1} = \frac{18000}{1.3} = 13{,}846 \text{ pounds.}$$

The table below gives the safe load for a pile driven by a steam hammer and using the above formula:

## SAFE BEARING LOAD FOR PILE IN POUNDS

| Set in Inches | STEAM HAMMERS | | | | |
|---|---|---|---|---|---|
| | No. 0 | No. 1 | No. 2 | No. 3 | No. 4 |
| 0.0 | 600,000 | 350,000 | 180,000 | 90,000 | 22,000 |
| 0.1 | 300,000 | 175,000 | 90,000 | 45,000 | 11,000 |
| 0.2 | 200,000 | 116,666 | 60,000 | 30,000 | 7,333 |
| 0.3 | 150,000 | 87,500 | 45,000 | 22,500 | 5,500 |
| 0.4 | 120,000 | 70,000 | 36,000 | 18,000 | 4,400 |
| 0.5 | 100,000 | 58,333 | 30,000 | 15,000 | 3,666 |
| 0.75 | 70,588 | 41,176 | 21,176 | 10,588 | 2,588 |
| 1.0 | 54,545 | 31,817 | 16,363 | 8,181 | 2,000 |
| 1.5 | 37,500 | 21,875 | 11,250 | 5,625 | 1,375 |
| 2.0 | 28,571 | 16,666 | 8,571 | 4,285 | 1,047 |
| 2.5 | 23,076 | 13,461 | 6,923 | 3,461 | 846 |
| 3.0 | 19,354 | 11,290 | 5,806 | 2,903 | 709 |

## FORCE OF BLOW

We are often asked to give the force of the blow of our steam hammers. This depends upon the set and elastic compression of the pile under the blow; therefore no general answer can be given.

It may be well to state that the ram falls by gravity. Then, for both drop and steam hammers, the energy of the blow, usually expressed in foot-pounds, is the product of the weight of ram multiplied by its fall. The useful work in foot-pounds done upon the pile is the product of the resistance of the pile multiplied by its set under the blow. The ratio of these two quantities is the efficiency of the blow. This efficiency depends upon the proportion of work wasted. Work is wasted by bruising and shattering the pile; by the eastic rebound of the ram; by producing vibrations in

the pile; by generating heat, and possibly in other ways. The waste of work is greater the higher the velocity of ram at impact. Therefore, heavy rams with low fall give blows of higher efficiency than light rams with a high fall. This explains in part the superior efficiency of the steam hammer, the other factor being the rapid succession of its blows.

Concerning the relative efficiency of blows of steam and drop-hammers, we are without exact experimental results, but a comparison may be drawn from the data contained in the following letter from the Wilcoxon & Kearns Co.:

Pensacola, Fla., Jan. 18, 1900.

Vulcan Iron Works, Chicago.

Gentlemen: We have just finished a contest between the old-fashioned drop hammer and one of your No. 1 steam hammers, which no doubt will interest you. We are at present engaged in the construction of a large wharf and warehouse for the L. & N. R. R. at Pensacola, Fla., which requires seven thousand piles from sixty to eighty feet long. When we began driving here the chief engineer, superintendent of bridges and resident engineer had never seen a steam hammer work, and, of course, were a little afraid to risk it without a test of the drop hammer being first given. As the piles that had been driven had practically no broomage, the superintendent of bridges concluded that they had not given the resistance necessary to secure a good foundation. To satisfy him we changed the steam hammer for a 4,200-lb. drop hammer and started on a pile (half driven with the steam hammer) with a hood weighing 1,000 lbs. with a live oak cushion block. The hammer had a drop of 60 feet and the pile only showed 1¼ inch penetration to each blow. It completely mashed the live oak cushion block into pulp. We then drove a pile 75 feet long with the drop hammer, without the hood, which took 50 minutes' time after it was in the leads, and required 120 blows from the top of 75-foot leaders. On the next pile, the same length, 3 feet from the one driven, we used the steam hammer and drove it the same depth with 130 blows, in 90 seconds after it was in the leaders. This pile had no broomage, while the one alongside of it, driven with the drop hammer without a hood, was broomed over three feet. The piles are creosoted piles and cost forty cents per foot net, delivered at the work. This would make a saving of 21,000 feet of piling on this job, at forty cents per foot, amounting to $8,400.

* * * * * * * *

Yours truly,
WILCOX & KEARNS CO.

For the No. 1 steam hammer the energy of the blow is 5000 lbs. (weight of striking part) multiplied by 3½ (its fall in feet), or 17,500 foot-pounds.

For the drop hammer the energy of the blow is 4200 lbs. multiplied by 60 feet, or 252,000 foot-pounds.

The ratio is 1 to 14.4; therefore the efficiency of the blow of the steam hammer is, in this particular instance, 14.4 times that of the drop hammer. This value would indicate that the constant in the divisor of Wellington's formula should be less than he gives, viz.: 0.1; but it is not safe to generalize from one example.

# INDEX

## INDEX--Continued


# CHICAGO AND BUFFALO AWARDS

FOR

# PILE DRIVING MACHINERY