

(No Model.)

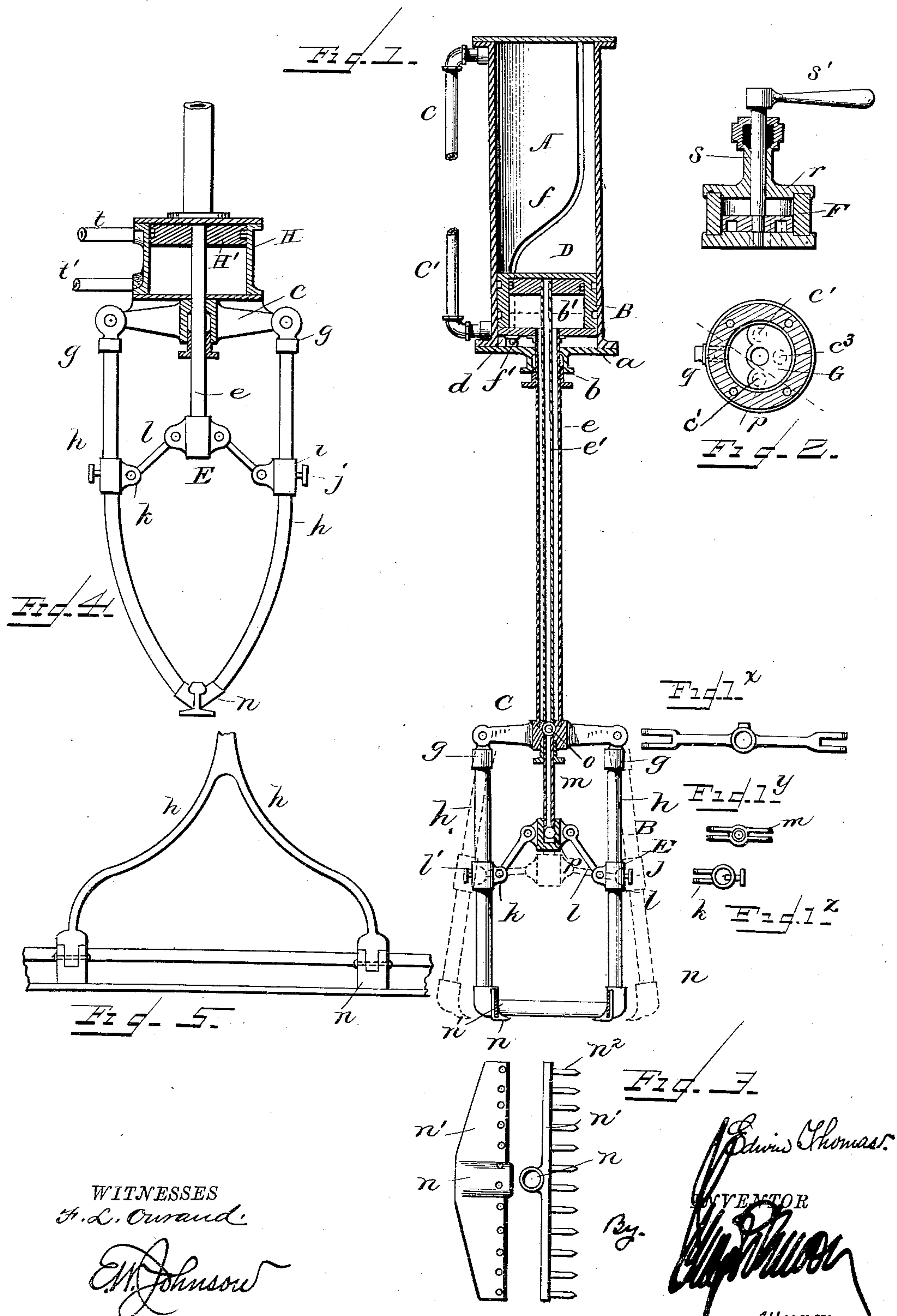
2 Sheets—Sheet 1.

E. THOMAS.

DEVICE FOR LOADING PIG IRON.

No. 344,222.

Patented June 22, 1886.



WITNESSES  
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E. W. Johnson

INVENTOR

By-

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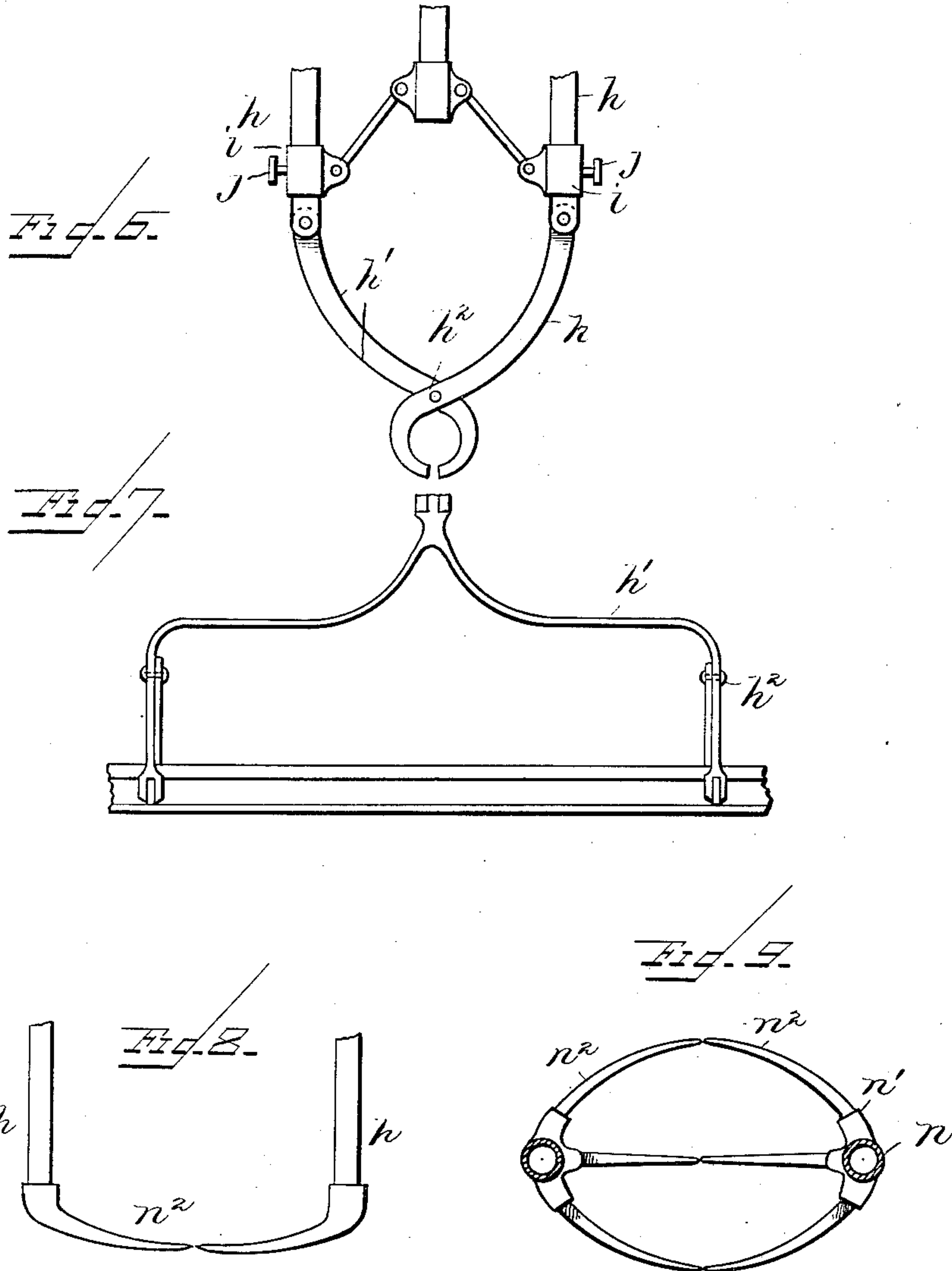
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F. L. Ouraud  
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Edwin Thomas

INVENTOR

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# UNITED STATES PATENT OFFICE.

EDWIN THOMAS, OF HOKENDAUQUA, PENNSYLVANIA.

## DEVICE FOR LOADING PIG-IRON.

SPECIFICATION forming part of Letters Patent No. 344,222, dated June 22, 1886.

Application filed February 11, 1886. Serial No. 191,594. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN THOMAS, a citizen of the United States of America, residing at Hokendauqua, in the county of Lehigh and State of Pennsylvania, have invented certain new and useful Improvements in a Device for Loading Pig-Iron; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention has reference to devices for raising and lowering metal bars, rails, ingots, and like articles; and the said invention consists in the improvements hereinafter described and set forth.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical sectional view of an apparatus embodying my invention. Fig. 1<sup>x</sup>, Fig. 1<sup>y</sup>, and Fig. 1<sup>z</sup> are detail views, respectively, of the cross-head, the cross-bar, and one of the clamp-sleeves. Fig. 2 designates two views, in vertical section and sectional plan, of a valve device used in connection with the improved apparatus illustrated in Fig. 1. Fig. 3 designates detail views illustrating the construction of the grapples used in Fig. 1. Fig. 4 is another vertical section illustrating a modification. Fig. 5 is a side elevation of the lower portion of the grapples shown in Fig. 4. Figs. 6, 7, and 8 are views in elevation representing modified constructions of grapples, and Fig. 9 is a plan view of the form of grapple illustrated in Fig. 8.

By reference to Fig. 1 it will be noted that A designates a vertical steam-cylinder, supported or carried by any suitable means, and provided at its lower end with the head *a*, having a central stuffing-box, *b*.

C C' refer to steam-pipes, which communicate, respectively, with the cylinder A near its upper and lower ends.

B refers to a hollow annular piston, which plays within the cylinder A, and is provided on its under side with a plate, *d*, with which connects the upper end of a hollow piston-rod, *e*, the latter extending through the stuffing-box *b*, and having depending from its lower

end a cross-head, C. As will be noted, the annular piston B presents within itself an annular chamber, *b'*, within which plays the disk-piston D, with which is connected the upper end of a hollow piston-rod, *e'*, of smaller diameter than the rod *e* and extending down within the latter. The piston-rod *e'* passes down through the cross-head C, and is connected a short distance below the same to a cross-bar, E.

*f* designates a groove formed on the interior face of the cylinder, and extending as represented in Fig. 1—that is to say, commencing adjacent to the upper head of the cylinder, extending down a short distance therein in true vertical line, and then curving off spirally and horizontally in a downward direction and terminating adjacent to the lower head, *a*, of the cylinder.

*f'* refers to a projection carried by the plate *d* of the piston B, and extending into the groove *f*, above referred to.

Each outer end of the cross-head is perforated horizontally for the pivotal attachment of a depending socket, *g*, to each of which is connected depending rods *h h*, extending down parallel with each other, as shown in Fig. 1, and each carrying a sleeve, *i*, secured adjustable thereon by means of thumb-clamps *j*. The inner side of each sleeve is provided with horizontally-perforated ears *k*, to which is pivotally attached one end of a connecting-link, *l*, the other end of which is likewise pivotally connected to corresponding ears, *m*, on the cross-bar E. The lower end of this rod *h* enters the socket *n* of a horizontal plate, *n'*, the said plates *n'* being located relatively in parallel positions, and each being provided with a series of horizontal extending teeth, *n''*, which extend in the direction of each other.

*o* refers to a steam-port located in the cross-head, and *p* a corresponding steam-port located in the cross-bar.

The parts being in the position illustrated by the dotted lines, Fig. 1, steam is admitted by the port *o* to the interior of the piston-rod *e*, and ascending therein acts upon the disk-piston D and raises it to the position shown in full lines, Fig. 1, which movement causes the ascent of the cross-bar E, and the movement toward each other of the grapples of the



rods *h h*, causing them to grasp the material between them. The steam is then caused to travel through the pipe *C'* into the cylinder *A*, beneath the plate *d* on the piston *B*, causing the piston to ascend in the said cylinder to elevate both piston-rods together with their grapples loaded. As the piston *B* ascends, the pin *f'*, traveling in the groove, will gradually change from one vertical point in the cylinder to another, and thereby turn the piston about one-quarter of a complete revolution, and resulting in turning the frame formed upon the rods *h h* and their grapples to a position at right angles with that occupied by them in Fig. 1.

When the apparatus has been so operated that the weight has been elevated to a sufficient height and the whole structure moved to a point above which the weight is to be placed, the steam-supply through the pipe *C'* having been previously discontinued, steam is then admitted to the cylinder *A*, above the pistons *D* and *B*, through the pipe *C*, the action of the steam causing the piston *D* to descend in the chamber *b'* to the position it first occupied, and consequently resulting in operating the cross-bar *E*, so as to spread the rods *h h* and their grapples and drop the weight. The apparatus can be moved to its first position, and, upon the continued action of the steam above the pistons *D* and *B*, can be forced down in the cylinder, so as to turn the grapple-frame to its first position, after which the steam can be admitted again through the ports *p* and pipe *C'*, and renew the operation first described. Of course, upon the descent of the disk-piston *D* in the chamber *b'* of the piston *B*, it will be necessary to exhaust the steam from the said chamber *b'*, and for this purpose I have interposed an exhaust-passage, *o*, in the cross-head, which communicates through the rod *e* to the chamber *b'* to exhaust the steam.

In operating the apparatus I have found it desirable to employ two valves, each being of the construction illustrated by the two views, Fig. 2. In said figures *F* indicates an annular steam-chamber, with which communicates, at one side, the steam-supply *q*. The cap *r* of the said steam-chamber is extended up centrally so as to form a bearing for a vertical spindle, *s*, to the upper end of which is connected a handle, *s'*, the lower end of said spindle extending down into the cylinder to carry and operate a cam-block, *G*. Three openings or ports are formed through the bottom of the chamber *f*. In the valve two of the openings, *e' e'*, establish communication through the pipes *C C'*, while the third opening, *e''*, forms an exhaust for said pipes. By changing the position of the cam-block steam may be caused to pass through the ports *e' e'*, and then by again moving said cam-block the opening *q* may be covered and the ports *e' e'*, and *e''* uncovered in order that steam may be exhausted through the ports *e' e'* into and through the port *e''*. A similar valve device is used for

furnishing and exhausting steam to and from the ports *o p*.

In Fig. 4 I have represented the modified form of the apparatus, in which figure the distinct operation of the pistons *D* and *B*, instead of being effected in one cylinder, are effected in different cylinders. For instance, the cross-head *C* carries on its upper side a cylinder, *H*, having steam-pipes *t t'*, communicating at its upper and lower portion, and containing a piston, *H'*, to which is connected a piston-rod, *e'*, which in this instance is solid.

The form of grapples employed in connection with the rods can be varied to suit the character of work. In Fig. 1 plain billets or bars are designed to be elevated, while in Figs. 4 and 5 the rods *h h* are bifurcated at their lower portions, and have removably connected thereto grapples *n*, designed more particularly to grasp railway-rails. In Fig. 6 the rods *h h* are represented as having pivotally connected thereto, below the sleeves *i i*, pivotal sections *h' h'*, which are crossed and pivotally connected at *h''*, in order to secure the short leverage adjacent to the grappling portions. Fig. 7 represents a side view of Fig. 6. In Figs. 8 and 9 I have represented the grapples as being each provided with a series of tines, *n''*, which jointly form a cradle.

From the foregoing it will be apparent that the apparatus described is both effective and positive in its operation, at all times under the complete control of the operator, and that its several parts are designed with a view of securing economy and durability of structure.

I claim—

1. The combination, in a loading and unloading device, of a grappling-frame having rods *h h*, a cross-bar, links pivotally connecting said cross-bar and rods *h h*, a rod connected to said cross-bar, a piston connected to said rod, and motive appliances for operating said rod to move the rods *h h* toward each other and elevate the grappling-frame, substantially as set forth.

2. The combination, in a loading and unloading device, of a grappling frame or jaws, a piston connected to said jaws for operating the same, an independent piston for raising and lowering said frame, and motive appliances for operating said pistons, substantially as set forth.

3. The combination, in a loading and unloading device, of a cylinder provided with a groove, *f*, a piston, *B*, having a projection traveling in said groove, a grappling-frame connected to said piston *B*, and a piston, *D*, connected to the grappling-jaws, substantially as and for the purpose specified.

4. The combination, in a loading and unloading device, of the grappling frame and jaws, hollow pistons *B* and *D*, connected to the same, and a valve device consisting of a chamber, *F*, having ports *q*, *e'*, and *e'* and *p*, and a cam-block, *G*, substantially as set forth.

5. The combination, in a loading and un-



loading device, of the grappling-frame having rods *h h*, a cross-bar, *E*, sleeves *i i*, embracing and adapted to slide vertically upon said rods *h h*, screws *j* for clamping said sleeves on  
5 said rods, and links pivotally connecting said cross-bar and sleeves, substantially as set forth.

6. The combination, in a loading and unloading device, of the grappling-frame hav-

ing the rods *h h*, a cross-bar, *E*, connected to said rods, and removable grapples *n'*, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN THOMAS.

Witnesses:

FRANK B. KEISER,  
CLEMENS JONES.