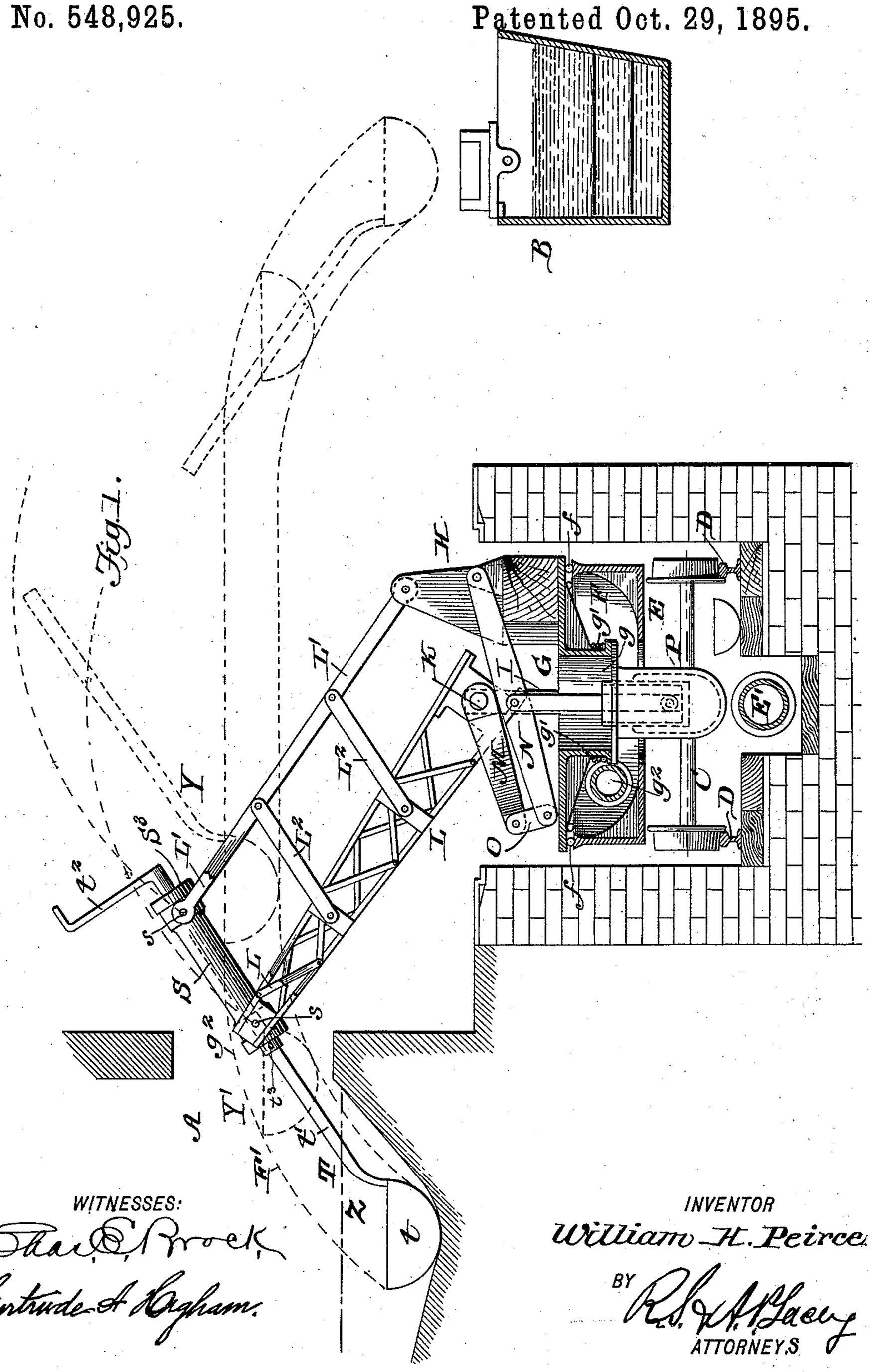
(No Model.) 3 Sheets—Sheet 1.

W. H. PEIRCE.

LADLE.

No. 548,925. Patented Oct. 29, 1895.

Fig. 1.



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(No Model.)

3 Sheets—Sheet 2.

W. H. PEIRCE.

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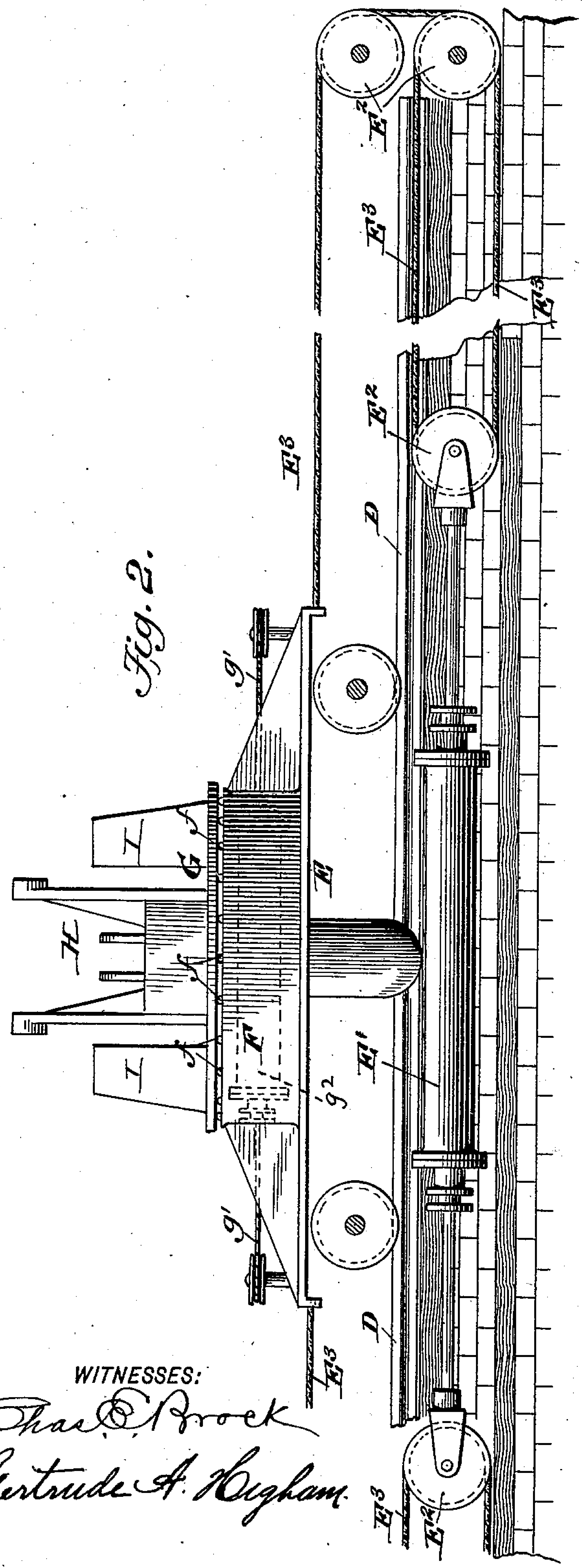

Fig. 2.

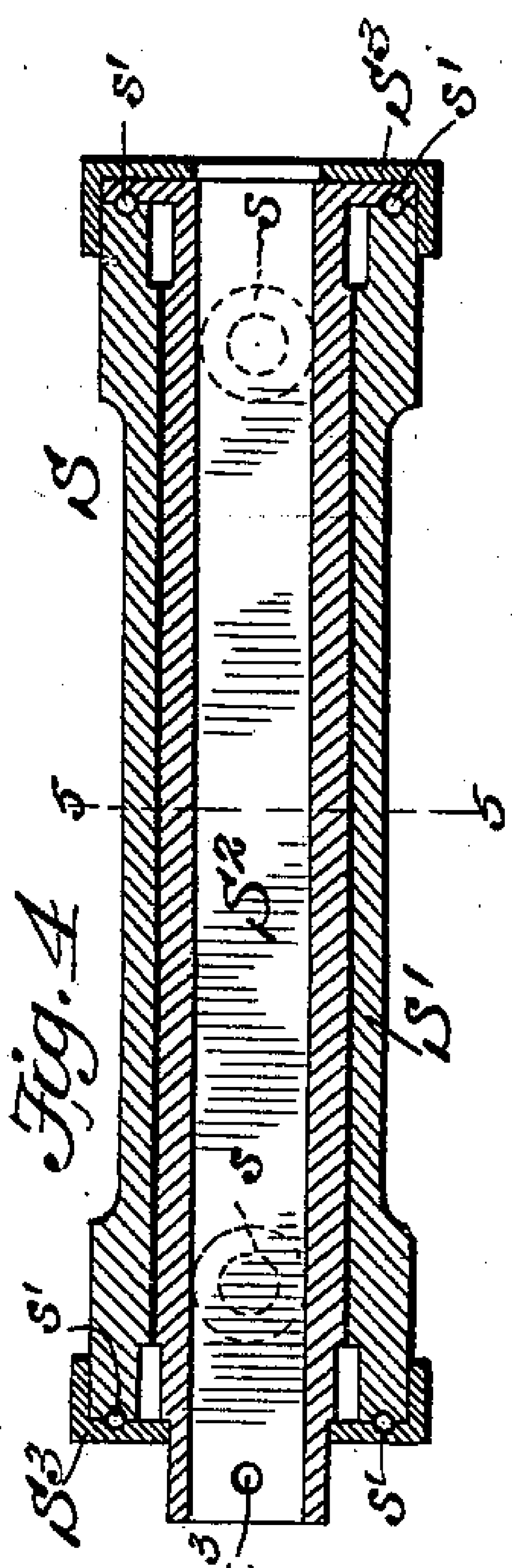

Fig. 4.

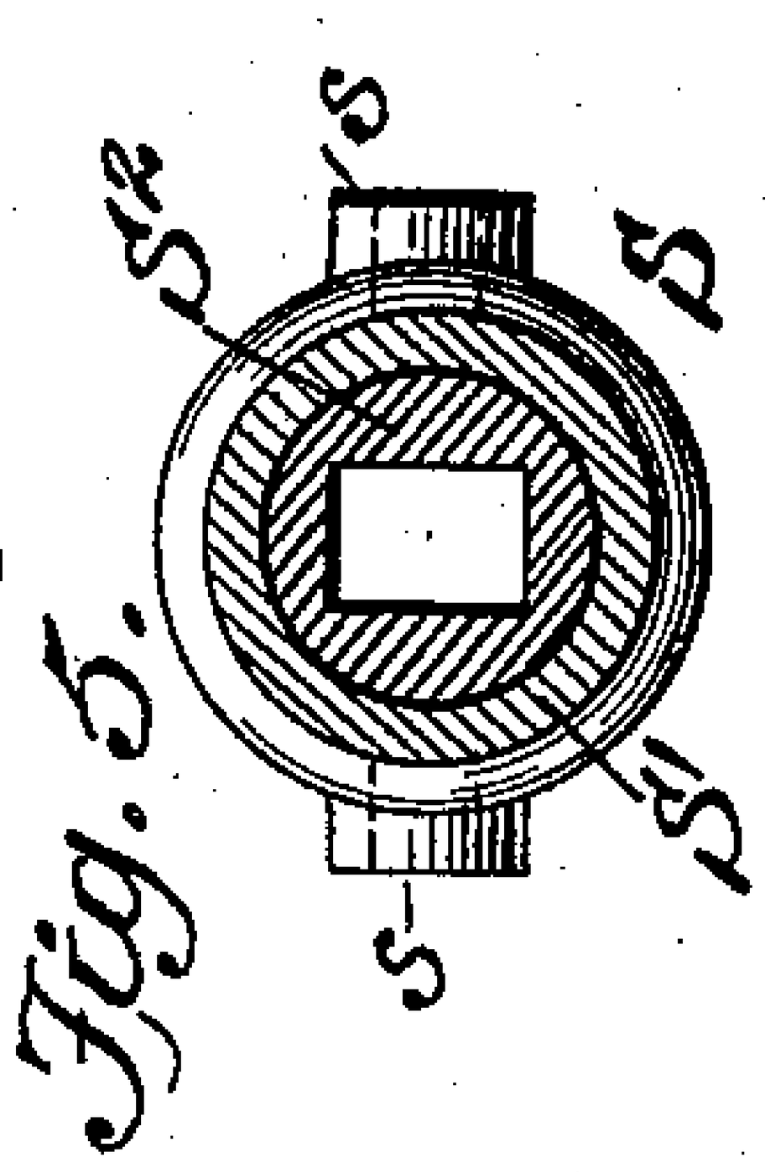

Fig. 5.

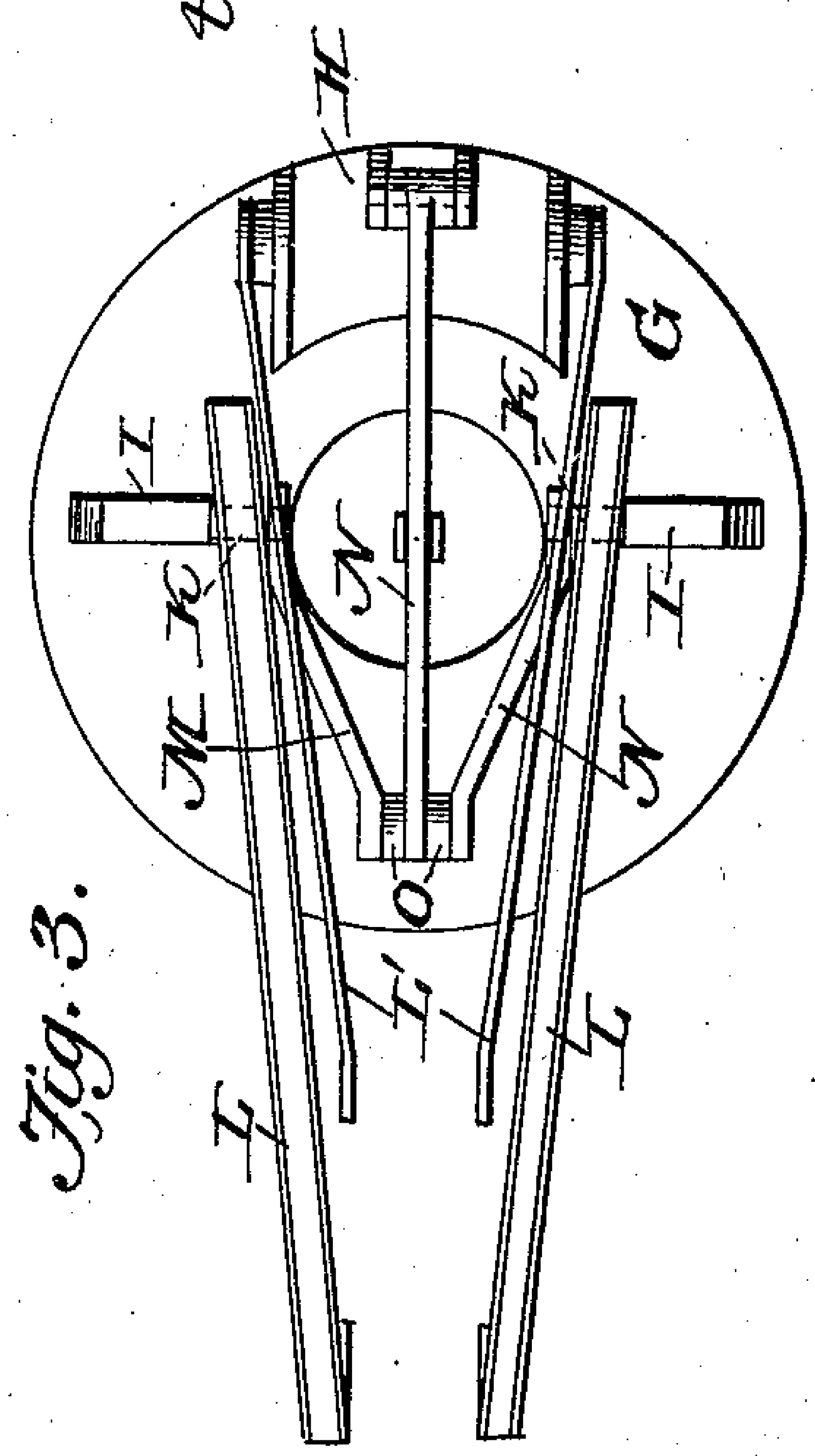

Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

W. H. PEIRCE.

LADLE.

No. 548,925. Patented Oct. 29, 1895.

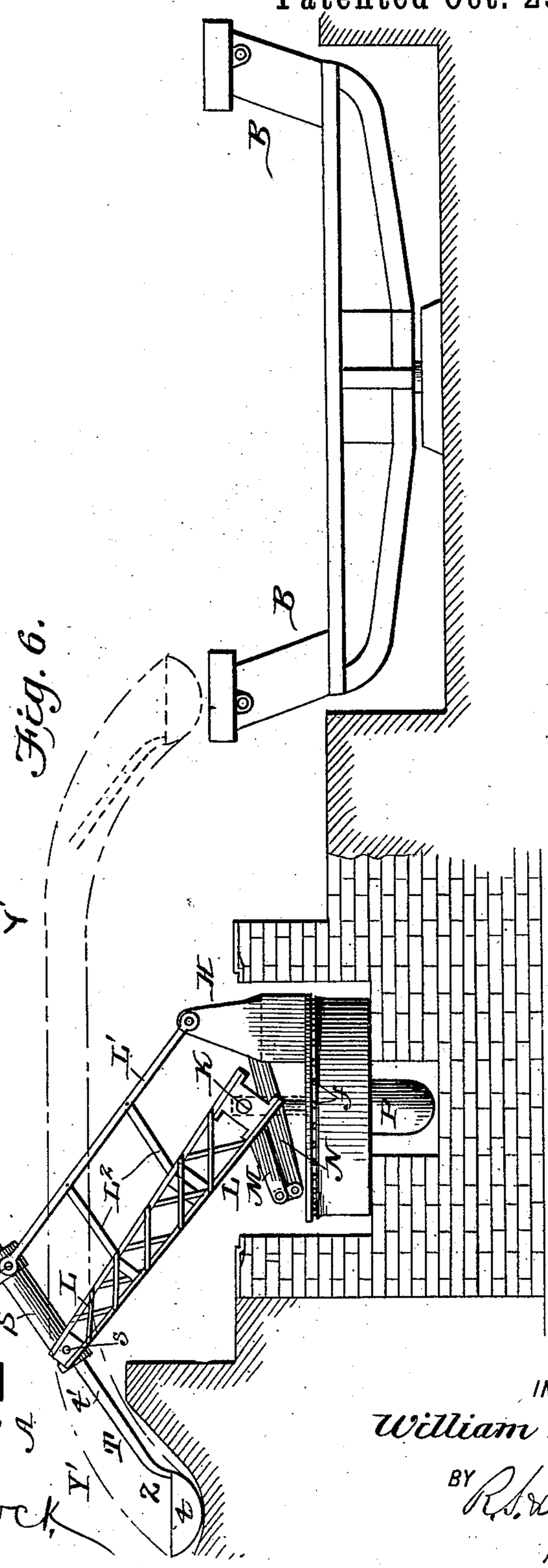

Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM H. PEIRCE, OF BALTIMORE, MARYLAND.

LADLE.

SPECIFICATION forming part of Letters Patent No. 548,925, dated October 29, 1895.

Application filed May 2, 1895. Serial No. 547,934. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. PEIRCE, of Baltimore, in the State of Maryland, have invented an Improved Machine for Operating Ladles, of which the following is a specification.

This invention is a machine for mechanically ladling copper or other molten metal from a furnace and transporting it to the molds.

Heretofore the general practice has been to remove the metal from the furnace by means of hand-ladles, each man carrying a ladle, which as a rule will not hold more than forty pounds. This method is very expensive on account of time and labor, and is also very slow and unsatisfactory. To avoid this difficulty, certain mechanical apparatus have been devised for carrying the ladle; but so far as I am aware these ladles have been made upon a small scale and the machines applied merely to assist in the transportation thereof, and each man was compelled to operate his own ladle.

The object of my invention is to provide a mechanical apparatus which is capable of ladling a large quantity of molten metal from the furnace at one time, one that will automatically withdraw said ladle from the furnace and maintain the same automatically in a level position to prevent spilling, one that can be moved by power to transport the ladle at any desired point within reasonable working limits, and one that can be discharged wherever desired, and all under the control of one man.

With these and such other objects as will appear hereinafter my invention consists, first, in combining a ladle with a supporting-frame or derrick capable of being moved vertically, longitudinally, and transversely, and at the same time maintaining the body of the ladle in substantially a level or horizontal position; secondly, in combining a ladle with a supporting-frame or derrick composed of a series of parallel members, whereby when the frame is raised or lowered the body of the ladle will be maintained in a level position, said frame or derrick being mounted upon a platform capable of movement, whereby the supporting-frame or derrick can be transported to the desired position; thirdly, in combining a ladle with a supporting-frame composed of a series of parallel members connected with a revoluble platform or stand, together with means for raising and lowering the supporting-frame, and means for moving the platform or stand, and also the means for moving the complete apparatus whenever desired.

My invention consists, also, in certain details of construction and combination of parts, all of which will be fully described hereinafter, and pointed out in the claims.

In the drawings forming a part of this specification, Figure 1 is a view, partly in section, showing my improved apparatus as arranged in the pit between the furnace and bosh, the dotted lines indicating the path of travel of the ladle during the operation of the machine. Fig. 2 is a detail view of a car upon which the apparatus is mounted and moves, together with the means for moving said car, and also means for moving the platform mounted upon said car. Fig. 3 is a detail plan view showing platform, together with a portion of the supporting-frame or derrick which is attached to the said platform. Fig. 4 is a detail sectional view of a ladle-holding socket. Fig. 5 is a detail sectional view on the line 5 5 of Fig. 4; and Fig. 6 shows a somewhat modified form of construction, in which the ladle-support is made stationary and the molds movable.

In the practical application of my invention the ordinary form of reverberatory furnace A may be used, and the bosh B may be of the usual or of any improved construction.

Between the furnace and bosh I arrange a pit C, which is preferably walled and paved with stone, brick, or other suitable material, and upon the bottom of said pit is laid a track D, upon which my improved apparatus is moved throughout the length of the pit, said pit being preferably a little longer than the length of the bosh.

Traveling upon the track D is a car E, upon which are carried all the operative parts of my device, said car being moved back and forth in the pit by means of hydraulic ram E′, pulleys E^2, and cables E^3, said ram being arranged centrally of the pit, and the cables being connected to the opposite ends of the car, so that the same can be moved back and forth as desired. The car is formed with a central circular raised portion F, upon which rests a cir-

cular platform or stand G, antifriction rollers or balls *f* being interposed between the base and stand to enable said stand to readily revolve upon the base, and in order to so operate said platform or stand I provide the same with a depending drum-like portion *g*, around which is wound a cable *g'*, operated by means of a horizontal ram g^2, carried upon the car adjacent to the drum of the platform or stand.

The bifurcated standard H is arranged upon the platform G at one side, and at diametrical opposite points are arranged the standards I I, and in said standards I are journaled the stub-shafts or trunnions K, to which are rigidly attached the ends of the lower parallel members L of the derrick or supporting-frame, the upper parallel members L' of said frame being pivoted at their lower ends to the members of the standard H, said upper and lower members L and L' being connected by the parallel link-bars L^2.

The lever-bars M M are rigidly connected with the trunnions, to which the lower bars are fixed, the opposite ends of said lever-bars being connected with a lever N by means of the links O, said lever N being pivoted to the standard H midway between its members, and the central portion of this lever is connected with the piston of a vertical operating hydraulic ram P, carried by the car, said piston operating through the drum-like portion of the revolving platform or stand, and by raising or lowering said piston the lever N will be raised or lowered, and by means of its connection with the lever-bars M the lower bar L of the supporting-frame or derrick will be raised or lowered, and inasmuch as the upper and lower bars are connected by means of parallel links, and, furthermore, as their lower ends have fixed pivots, said bars will also move in unison, but parallel.

Between the upper ends of the bars L and L' is journaled a ladle-socket S, said socket having trunnions *s*, which are journaled in the ends of said bars, so that as said bars move vertically through the arc of a circle the ladle can be maintained in a level position.

The socket S consists of an outer shell S' and an inner tube S^2, the bore of which is polygonal in cross-section. The case and tube are held together by means of cap-pieces S^3 at each end, and, if desired, antifriction balls or rollers *s'* may be interposed between the shell and tube near each end in order to reduce the friction between said parts as the tube is turned in the case.

T indicates the ladle, comprising the bowl *t*, the shank *t'*, and handle t^2, said shank being polygonal in cross-section to fit the bore of the inner tube, and said ladle can be attached at any desired point by means of set screws or pins t^3 or any other form of fastening. By means of the handle the shank can turn longitudinally, carrying with it the inner tube, and by this means a bowl can be tilted to either side to either receive or discharge the molten metal.

In operation the machine is brought in front of the furnace-door and rotated so as to bring the ladle to position Y, and then by means of the ram P said ladle is lowered along the line Y' as far as the position Z, as the level portion of the bath justifies. During the operation the ladle has been automatically maintained in a level position by means of the parallel members of the frame or derrick, and by rotating the ladle by means of its handle it dips in a natural manner into the molten metal and is filled. The ram is now operated to raise the ladle along the line Y' to position Y, said ladle being always maintained in a level position, and then by operation of the ram g^2 the derrick carrying the ladle is revolved about its vertical axis to any desired point, and by operating the ram E' the entire machine can be moved along the pit until the desired mold is reached. The ladle is then lowered by lowering the supporting-frame or derrick and discharged by tilting said ladle by means of its handle. These operations are then repeated as often as desired.

Instead of employing a pit and moving the car back and forth along said pit I may make the car stationary and move the molds around said car, either by means of a turn-table or other suitable devices, and in Fig. 6 I have shown one modification, in which the molds B' are mounted upon a revolving turn-table, so that when one mold is filled the turn-table can be moved to bring the next mold opposite the point to which it is desired to move the ladle.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the ladle, adapted to turn upon its longitudinal axis for the purpose of dipping or discharging metal, the socket in which said ladle is held, and the support to which said socket is connected, said support being constructed and adapted to swing or vibrate vertically, whereby the ladle is introduced into or withdrawn from the furnace and provided with means for maintaining the ladle in a level position during such movements, said support being also pivoted on a vertical pivot, whereby the ladle can be moved laterally or transversely, substantially as shown and described.

2. The combination, of the ladle and the socket or support, carrying said ladle, said socket being provided with means for swinging or vibrating vertically to and from the furnace, for the purpose of introducing the ladle into the furnace or drawing the same therefrom, said socket being provided also with means for holding the ladle level during said movements, said ladle being movable within the socket to dip or discharge the metal, substantially as shown and described.

3. In a machine of the class described, the combination, of a ladle, arranged in a suitable socket, a supporting frame or derrick carrying said socket and ladle, said frame or derrick being composed of a series of parallel

members pivoted independently at their upper ends to the said socket and to a suitable support at their lower ends, whereby the ladle is maintained in a level position, and means for lowering and raising the frame and ladle, and means for moving the frame or derrick transversely and longitudinally, substantially as shown and described.

4. In a machine of the class described, the combination with the ladle and its socket, of the supporting frame or derrick, composed of the parallel members pivoted independently at their upper ends to the said socket, the revoluble platform or stand, upon which said frame or derrick is mounted, a car or carriage upon which the platform is arranged, means for lowering or raising the supporting frame, means for revolving the platform, and means for moving the car or carriage, substantially as shown and described.

5. In a machine of the class described, the combination, with the car or carriage, of the revoluble platform, the supporting frame or derrick, composed of the upper and lower parallel members, and connecting bars, the ladle socket, pivotally supported at the upper ends of said members, the lower ends of said members being connected to the platform, the ladle arranged to turn on its longitudinal axis in said socket, operating mechanisms carried by the car or carriage to raise and lower the supporting frame or derrick, and to rotate the platform, and means for moving the car or carriage back and forth, substantially as shown and described.

6. In a machine of the class described, the combination of a ladle, the bowl of which is normally held level, and means for swinging or vibrating said ladle vertically for the purpose of moving the same into the furnace, for the purpose of filling the same, and from the furnace for the purpose of discharging the same, said ladle being provided with means for holding the same level, during the operation of moving to or from the furnace, but adapted to be tilted to dip or discharge the metal, substantially as shown and described.

7. In a machine of the class described, the combination with the ladle, of the inner tube, and outer case, said case having trunnions thereon, the independent parallel members of the supporting frame or derrick, in which the said trunnions are journaled, and the revoluble platform to which the lower ends of the members are attached, substantially as shown and described.

8. In a machine of the class described, the combination, with the car or carriage, movable longitudinally, of the revolving platform or stand, pivotally arranged thereon, the supporting frame or derrick, pivotally mounted upon said platform, the ladle socket, pivotally supported at the upper end of said frame, the ladle arranged therein, the operating lever connected with the lower portion of the frame, the ram and intermediate connections for raising and lowering said frame or derrick, the ram drum and cable for revolving the platforms, and the ram and cables for moving the car or carriage, substantially as shown and described.

9. In a machine of the class described, the combination with a ladle, adapted to turn longitudinally to dip or discharge, a supporting frame or derrick to which said ladle is pivotally connected, said frame or derrick being constructed and provided with means for swinging said ladle to and from the furnace, said support or frame being pivoted to swing vertically whereby the ladle can be moved opposite to any desired mold, substantially as shown and described.

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

WILLIAM H. PEIRCE.

Witnesses:

EDWARD KELLER,

WILLIAM MAGER.