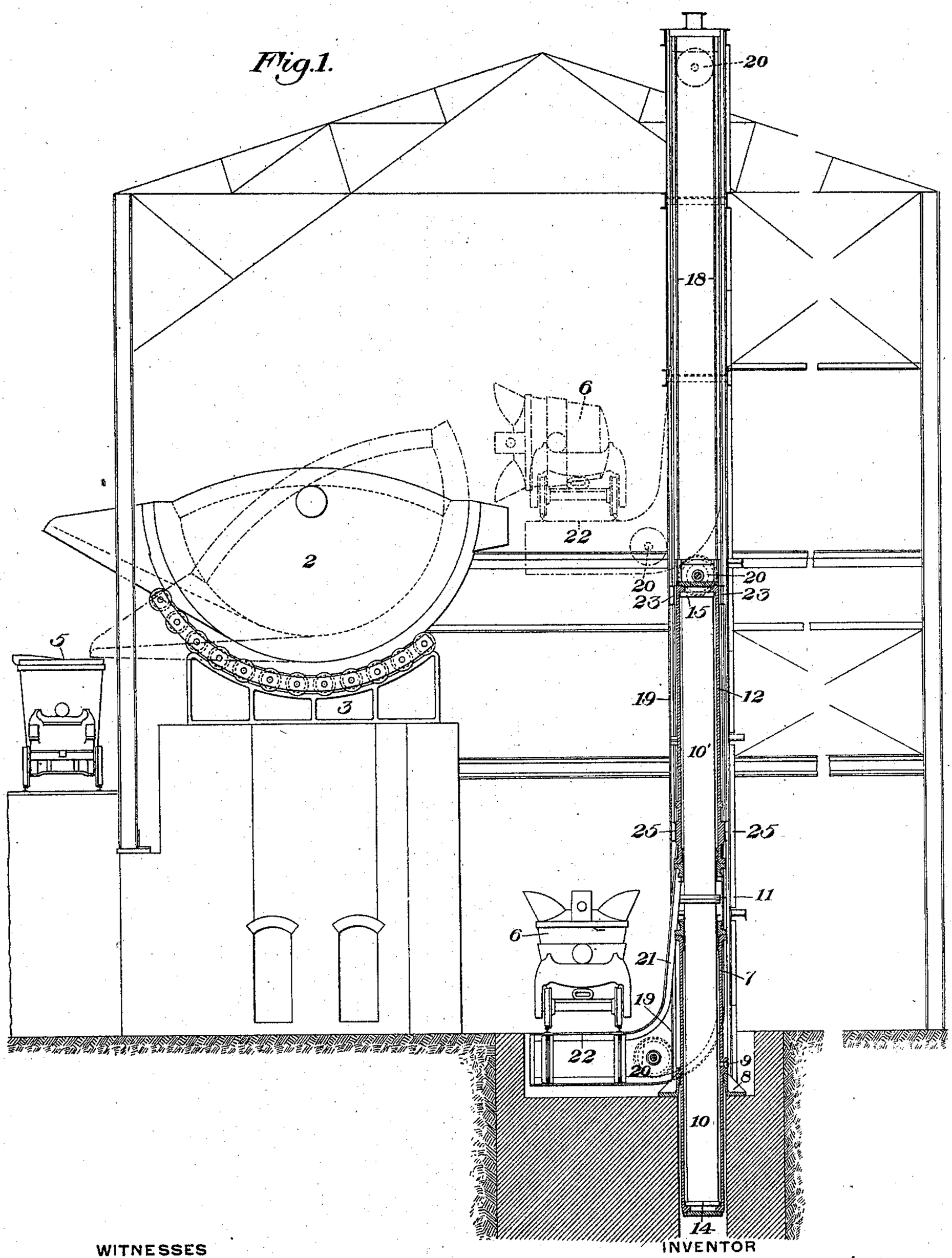
(No Model.) 3 Sheets—Sheet 1.

H. AIKEN.

HOISTING APPARATUS.

No. 574,127. Patented Dec. 29, 1896.

Fig. 1.



WITNESSES

Thomas W. Bakewell

L. A. Connery

INVENTOR

Henry Aiken

(No Model.) 3 Sheets—Sheet 2.

H. AIKEN.

HOISTING APPARATUS.

No. 574,127. Patented Dec. 29, 1896.

Fig. 3.

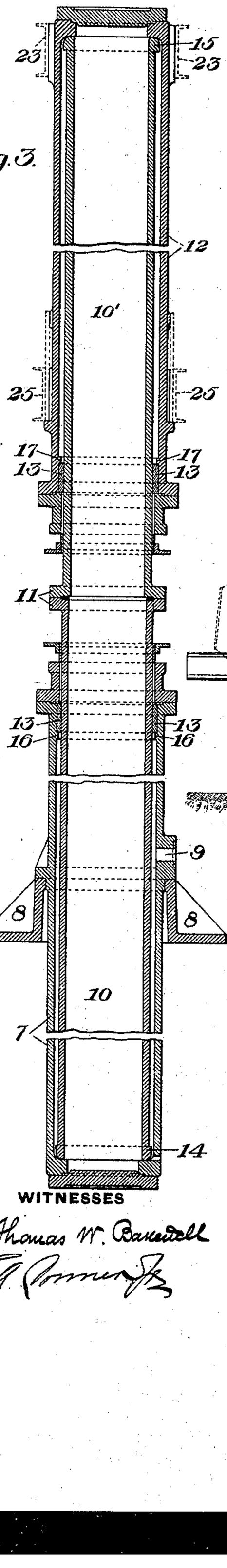
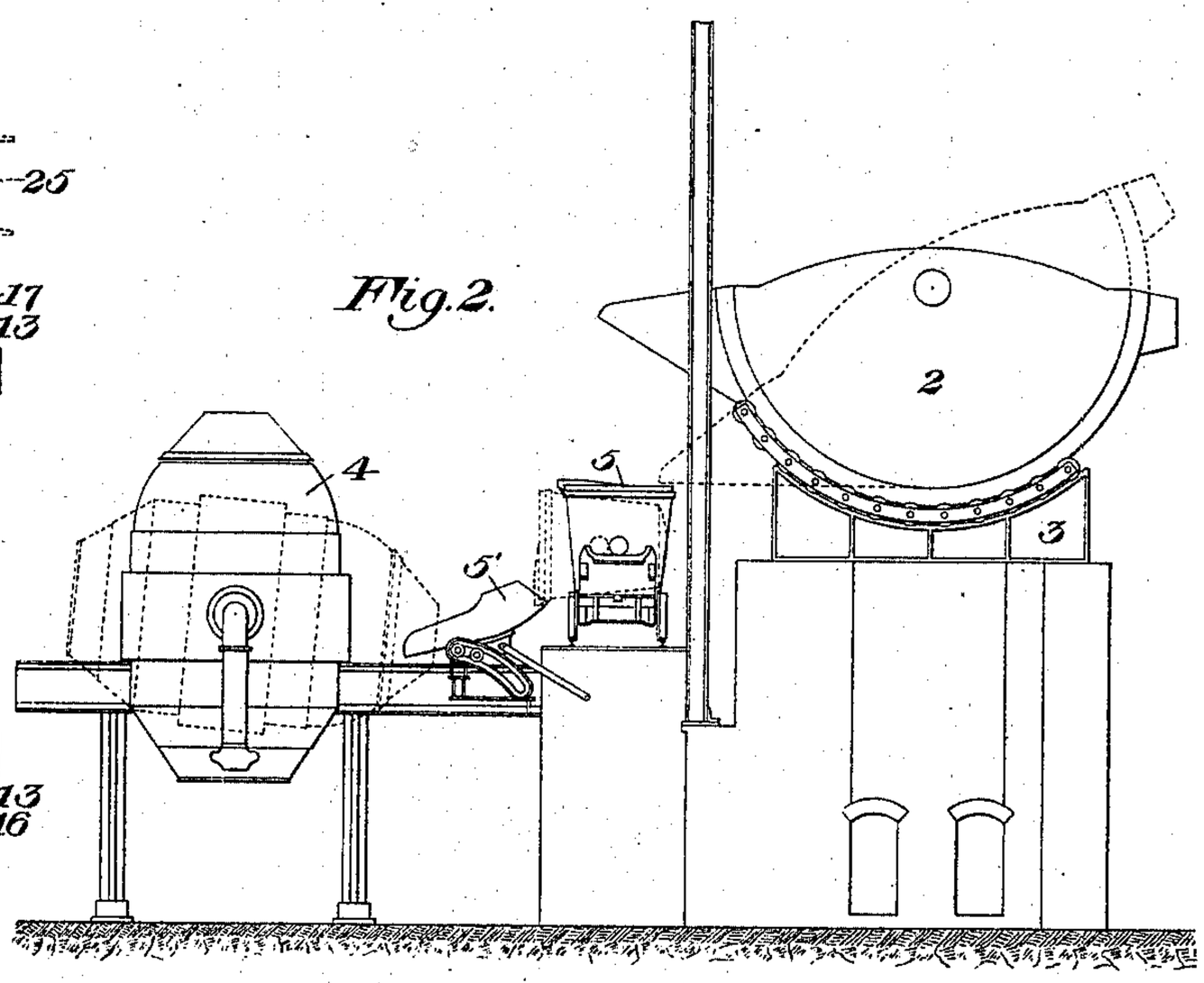


Fig. 2.



WITNESSES

Thomas W. Bakewell

L. A. Pommer Jr.

INVENTOR

Henry Aiken

(No Model.) 3 Sheets—Sheet 3.

H. AIKEN.

HOISTING APPARATUS.

No. 574,127. Patented Dec. 29, 1896.

Fig. 5.

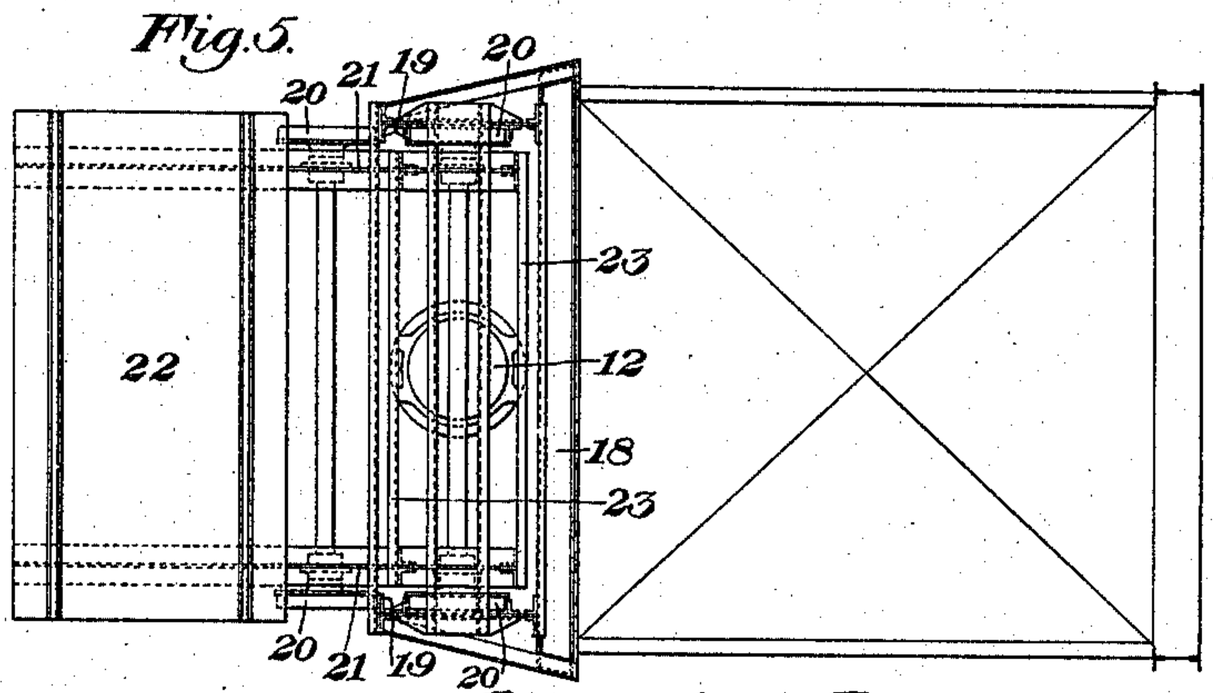
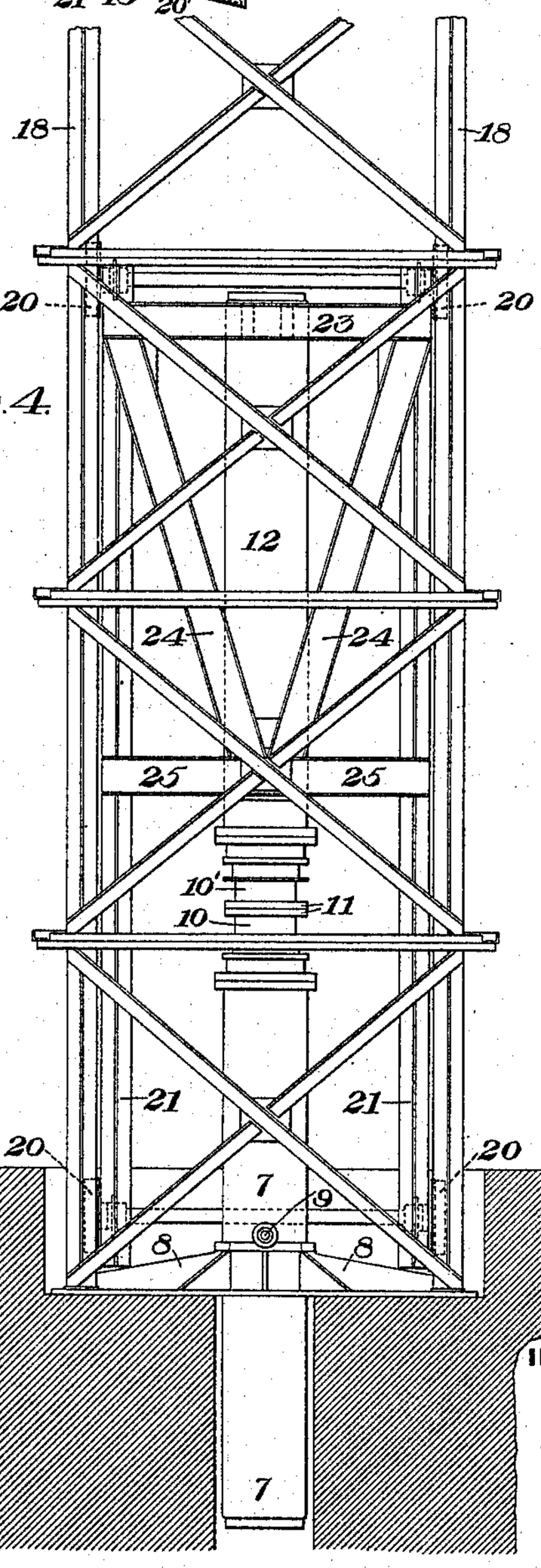


Fig. 4.



WITNESSES

Thomas W. Bakewell

L. A. Pommerehl

INVENTOR

Henry Aiken

UNITED STATES PATENT OFFICE.

HENRY AIKEN, OF PITTSBURG, PENNSYLVANIA.

HOISTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 574,127, dated December 29, 1896.

Application filed March 25, 1896. Serial No. 584,786. (No model.)

To all whom it may concern:

Be it known that I, HENRY AIKEN, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Hoisting Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 shows in side elevation, partly in vertical section, my improved stock-hoist in connection with a metal-receiver and the ladle by which molten metal is carried from the receiver to the converter. Fig. 2 shows in side elevation the receiver in connection with a receiving-ladle and the converter. Fig. 3 is a vertical sectional view of the novel lifting mechanism of the stock-hoist. Fig. 4 is a rear elevation of the stock-hoist, and Fig. 5 is a plan view.

My invention relates to a new construction of hoists for use in metallurgical plants, &c., for lifting materials from a lower to a higher level.

Figs. 1 and 2 show the relative arrangement of the parts of the plant. 2 represents a tipping metal-receiver for receiving and storing molten metal after it has been tapped from the blast-furnaces and preliminary to its transfer to the converters. This receiver is set on an elevated foundation 3, so as to be above the level of the converters 4. A ladle-car 5 runs upon a track at a level between the receiver and the converter, and is adapted to receive molten metal poured into it from the receiver, to carry it on the track to one of the converters, and then to be tipped to pour the metal into the converter through a runner 5′, all as illustrated by dotted lines in Fig. 2. Metal is carried to the receiver by a tipping ladle 6, which is elevated by a stock-hoist or elevator, Fig. 1, to the level of the receiver, and is there tipped, so as to discharge the molten metal thereinto. By thus elevating the molten metal to a point above the converter-ladle and converters and then pouring it in step-fashion successively from the receiver into the ladle and from the ladle into the converter, I effect a great economy in the operation of the plant, as will be understood by those skilled in the art.

The novel construction of the hoisting device which I employ is shown in Figs. 1, 3, 4, and 5. For the purpose above indicated the distance of vertical lift in carrying the metal to the receiver is very considerable, and to secure the same by means of an ordinary crane or cylinder-hoist having a single cylinder and plunger would be impracticable or at least undesirable, because of excessive cost of construction. The requirements demand a very powerful lifting device, for the ladles when charged with molten metal often weigh as much as forty tons and are too heavy to be handled by an ordinary crane.

My improved device is simple and compact and can be made very cheaply and with ordinary machine-shop appliances.

The lifting device comprises a lower upright stationary cylinder 7, supported on a foundation-plate 8 and having a water-inlet 9, controlled by a valve, so that water under pressure may be admitted to, shut off from, or exhausted from the cylinder as desired.

10 is a hollow plunger which projects upwardly from the cylinder 7 and is preferably of somewhat more than twice the length of said cylinder. This plunger I prefer to make in two parts 10 and 10′, bolted together through flanges 11. A second inverted cylinder 12 is set on the upper end of the plunger and is substantially of as great area as is the lower cylinder 7. I do not mean by this that it is of precisely the same area as the lower cylinder, for I prefer to make it somewhat smaller in order to compensate for the greater weight of the superincumbent parts which are carried by the latter. The cylinders 7 and 12 are provided with suitable packings 13 at their inner ends, the upper end of the cylinder 7 and the lower end of the cylinder 12, and for purposes hereinafter explained the plunger has at its ends external flanges or stops 14 and 15, and the cylinders have internal flanges or stops 16 and 17, adapted to be engaged by the flanges on the plunger. The load to be lifted is applied to and carried by the upper cylinder 12 in the manner hereinafter described. To raise the upper cylinder to the full end of the stroke of the hoist, water is admitted into the lower cylinder through the port 9, and passing up through the hollow plunger its first action is to lift the upper cylinder 12 on the plunger without

lifting the plunger itself. When the upper cylinder rises far enough for its internal flange 17 to engage the flange 15 on the plunger, the cylinder will continue to rise, but will lift the plunger with it until the flange 14 at the base of the plunger engages the flange 16 of the lower cylinder. The hoist is then at the end of its stroke, the plunger being projected at full length from the lower cylinder, and the upper cylinder being raised to the top of the plunger. To lower the hoist, the water is exhausted and the upper cylinder and the plunger move in the reverse direction.

As shown in Figs. 1, 4, and 5, the upper cylinder is guided in its vertical motion by a vertical mast or guide-frame 18, having rails 19, against which wheels or antifriction-rollers 20 bear and travel. These wheels are journaled in a frame 21, which is secured to and suspended from the upper cylinder 12, (see Fig. 3,) and extends downwardly in the vertical plane of the cylinder, terminating in a platform 22, which projects out horizontally and is so situate that when the hoist is at its lowest position (shown by full lines in Fig. 1) the platform shall be at the ground-level and in proper position to receive the ladle-car 6. The frame 21 has at the top of the upper cylinder horizontal cross-beams 23, by which the weight of the frame is carried, and diagonal braces 24 extend downwardly from the ends thereof to cross-beams 25, which are supported at a lower point by said cylinder. This makes a very strong and steady construction.

The operation of the hoist when thus constructed will be readily understood from the foregoing description. The ladle is run upon the platform 22, and by admitting water to the lower cylinder the upper cylinder and the platform are lifted, as shown by dotted lines in Fig. 1, so that the ladle may discharge its contents into the receiver.

Within the scope of my invention as defined in the broader claims of this application, many changes in the form and relative arrangement of the parts may be made by the skilled mechanic. Thus it is within the scope of the invention, broadly considered, to make the plunger (the connecting part which connects the upper and lower cylinder and is itself movable) to fit upon the cylinders externally thereto, though this construction for many reasons would not be so desirable as that which I have illustrated.

I claim—

1. The combination of a stationary cylinder, a second movable cylinder of substantially as great area in line with it and connected with a common fluid-supply, and a connecting movable plunger; substantially as described.

2. The combination of a stationary cylinder, a second movable cylinder of substantially as great area in line with it and connected with a common fluid-supply, and a connecting movable hollow plunger; substantially as described.

3. The combination of a stationary cylinder, a second movable cylinder of substantially as great area in line with it and connected with a common fluid-supply, and a connecting movable plunger contained within the cylinders; substantially as described.

4. A fluid-motor composed of a series of three vertical cylindrical parts interfitting with each other, the two upper cylindrical parts being movable and the middle part fitting both the others on the same side as distinguished from fitting outside one part and inside the other part.

5. The combination of a stationary cylinder, a second movable cylinder of substantially as great area in line with it and connected with a common fluid-supply, a connecting movable plunger, said cylinders being set in upright position, a guide-frame or mast, and a platform carried by the upper cylinder; substantially as described.

6. The combination of a stationary hydraulic cylinder, a second movable cylinder in line therewith, a connecting-plunger which is also movable, said cylinders being set in upright position, and a frame carried by and depending from the upper cylinder and having a projecting platform; substantially as described.

7. The combination of a stationary hydraulic cylinder, a second movable cylinder in line therewith, a connecting-plunger which is also movable, said cylinders being set in upright position, a guide-frame or mast, and a frame which is carried by the upper cylinder and comprises a cross-beam fixed to the upper end of said cylinder and diagonal braces extending therefrom to a lower portion thereof; substantially as described.

In testimony whereof I have hereunto set my hand.

HENRY AIKEN.

Witnesses:
THOMAS W. BAKEWELL,
LENDELL A. CONNER, Jr.