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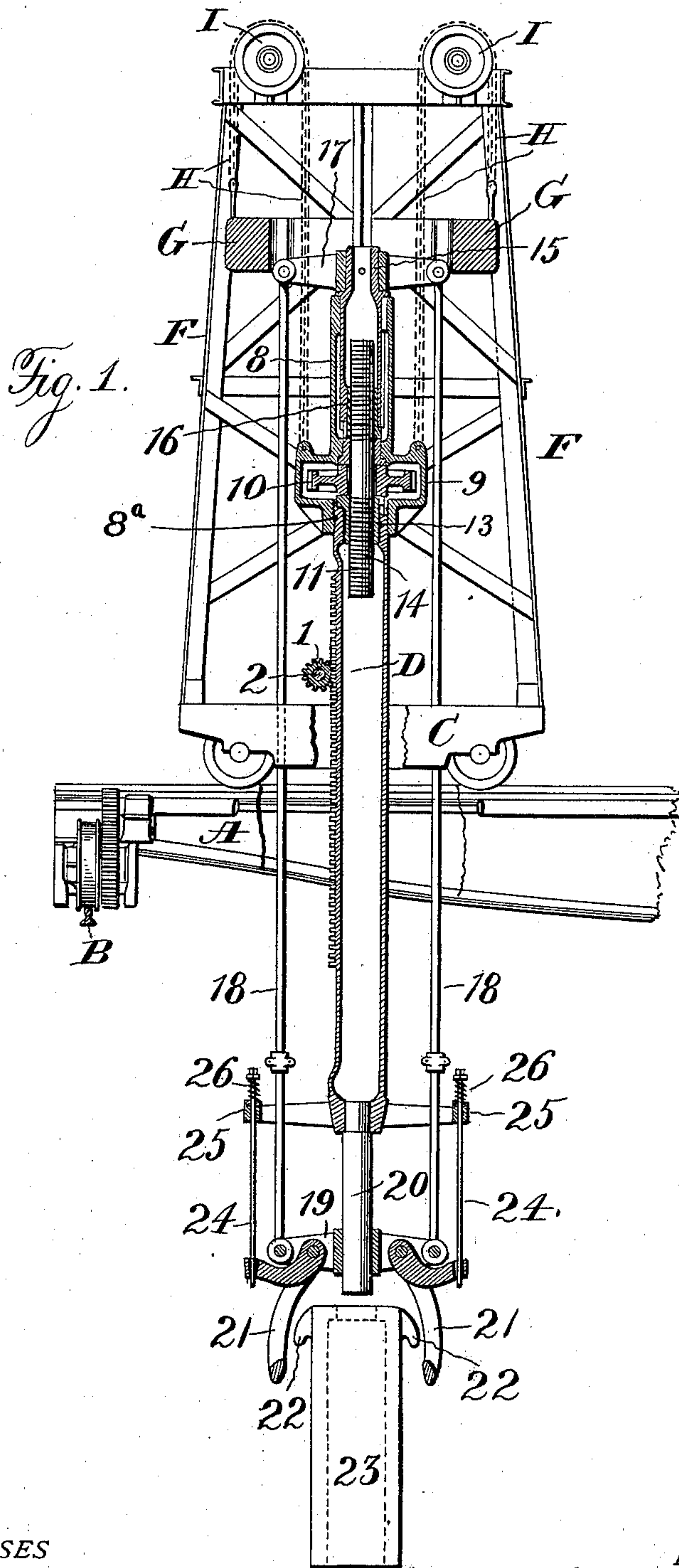
W. H. MORGAN & C. L. TAYLOR.

INGOT EXTRACTING APPARATUS.

(Application filed Sept. 1, 1899.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES

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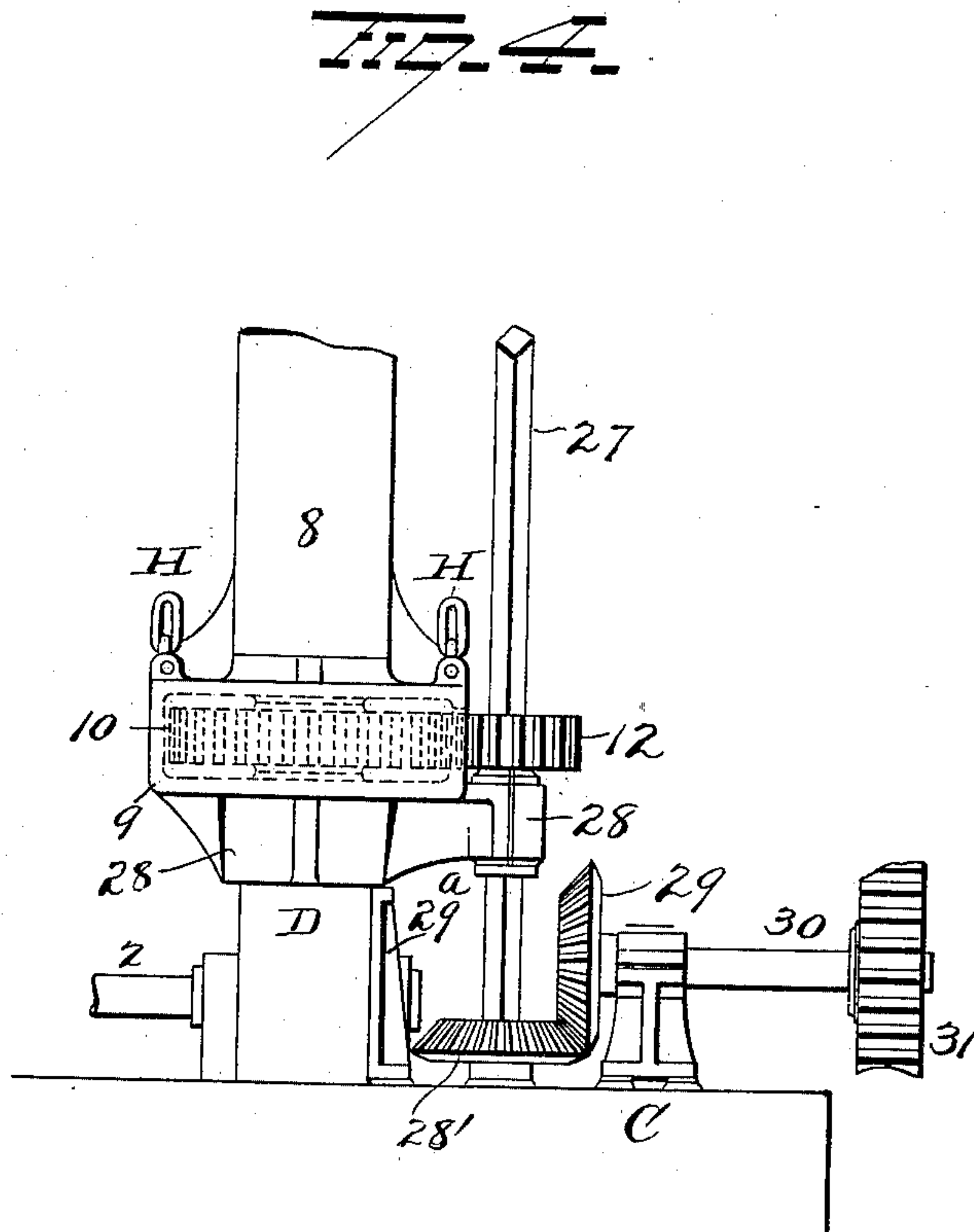
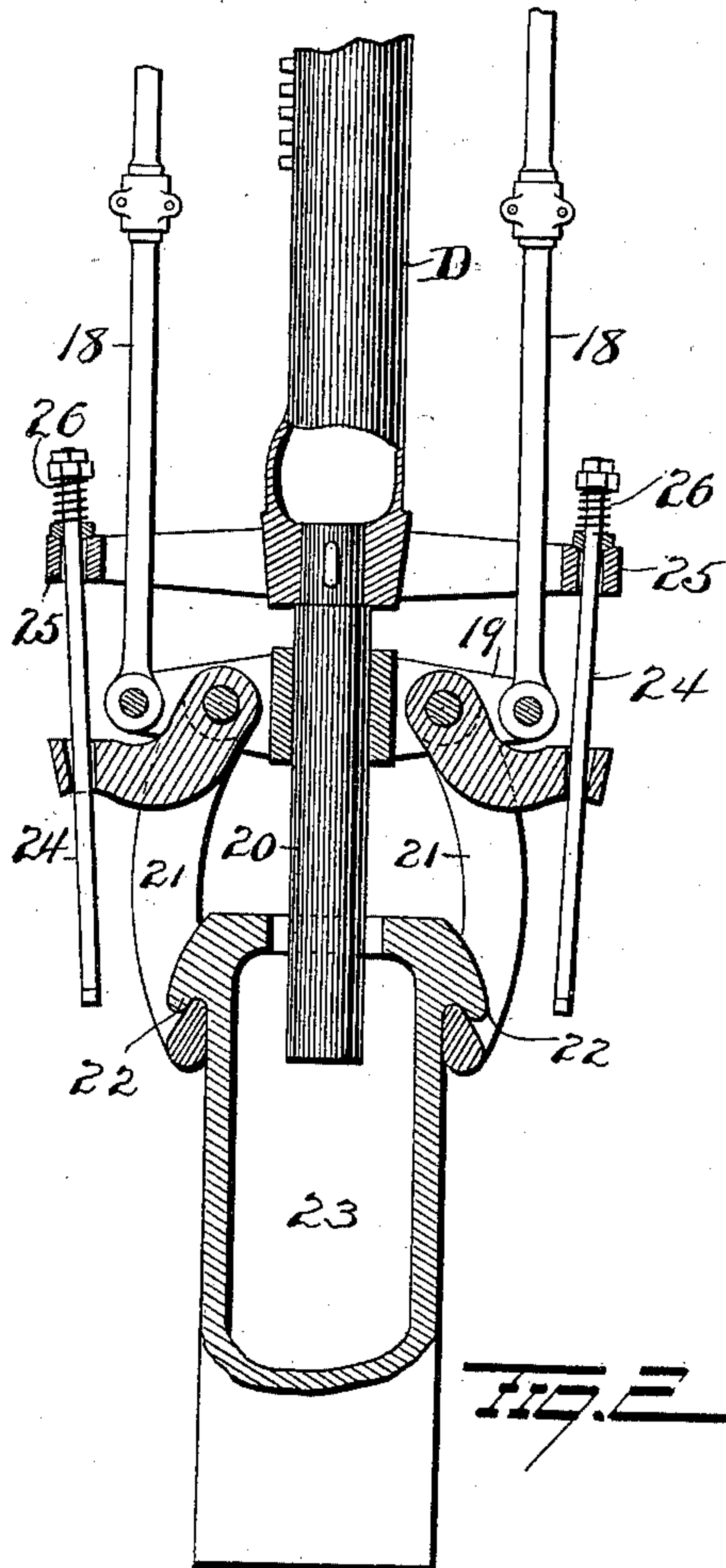
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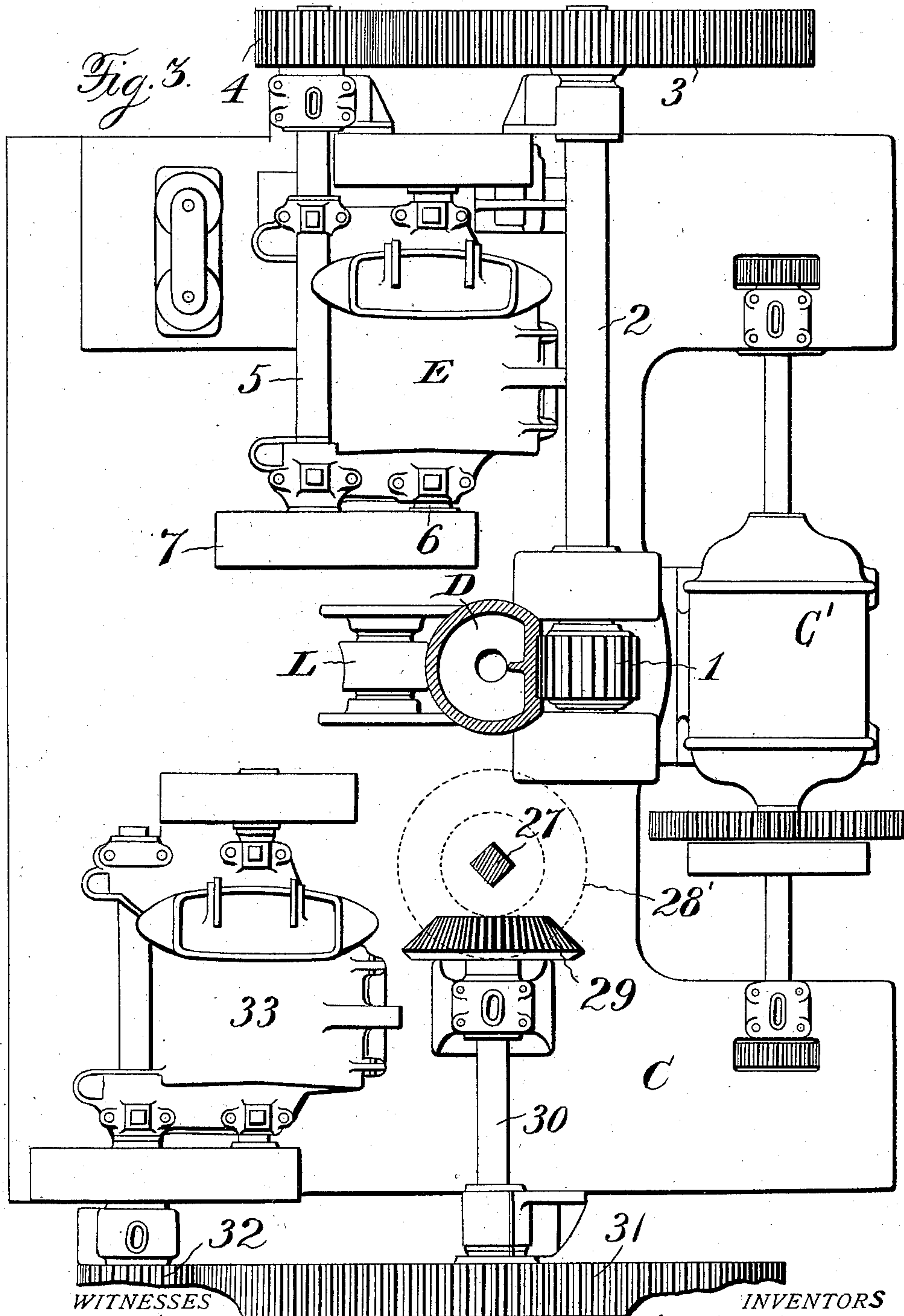
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WITNESSES

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WILLIAM HENRY MORGAN AND CLARENCE LANDFEAR TAYLOR, OF ALLIANCE, OHIO; SAID TAYLOR ASSIGNOR TO THE MORGAN ENGINEERING COMPANY, OF SAME PLACE.

INGOT-EXTRACTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 656,416, dated August 21, 1900.

Application filed September 1, 1899. Serial No. 729,247. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM HENRY MORGAN and CLARENCE LANDFEAR TAYLOR, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Ingot-Extracting Apparatus; and we 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.

Our invention relates to an improvement in ingot-extracting apparatus; and it consists in the parts and combinations of parts, as will be more fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in elevation, partly in section, of our improved apparatus, showing simply the bridge, trolley, rack-bar, and mechanism for actuating the mold-grasping levers, the motors and gearing being omitted. Fig. 2 is a view of the lower end of the extractor, showing the grappling-levers in a position to engage the ingot-mold. Fig. 3 is a plan view of the trolley, showing the motors and the square shaft and rack; and Fig. 4 is a view showing the gearing connecting the square shaft and rack-bar.

A represents an overhead traveling bridge mounted at its ends on rails B and carrying the traveling trolley C, the latter having flanged wheels which travel on rails secured to the upper faces of the bridge-girders. This trolley C is propelled by the motor C' and suitable gearing connecting the armature-shaft of the motor and two of the flanged track-wheels. The bridge travels lengthwise the shaft and the trolley lengthwise the bridge, so that rack-bar D, carried by the trolley, practically takes in the entire floor-space of the mill in which the bridge is located. The rack-bar D is carried by the trolley and is actuated vertically by the pinion 1 on shaft 2. This shaft is mounted in suitable bearings on the trolley C and carries at its outer end the gear 3, meshing with the smaller pinion 4 on shaft 5. This shaft 5 carries a gear meshing with a smaller pinion on the armature-shaft 6 of the motor E, the

pinion on the armature-shaft and the pinion meshing therewith being inclosed by the gear-case 7. This motor E and the gearing above referred to operate to move the rack-bar vertically, the bar being guided and supported against the pressure of the pinion 1 by the roller L. (Shown in Fig. 3.) The rack-bar is, as shown in Fig. 3, in the form of the segment of a circle and is hollow, while the upper end thereof, which is cylindrical, is provided with male threads 8^a for the attachment of the casing 8. This casing is hollow throughout its length and is provided near its lower end with a cylindrical enlargement 9, forming a casing for the pinion 10, mounted on the right and left hand screw-shaft 11, the casing being open at one side for the engagement of the pinion 12 (shown in Fig. 4) with pinion 10 on the screw-shaft 11. Secured to and within the upper open end of bar D is the bushing or bearing 13, which latter is screw-threaded internally to receive the lower screw 14 of the double screw 11, and as this bushing or bearing 13 is keyed to rack-bar D it will be seen that as the screw is turned it rises or falls in bearing 13, the direction of movement being dependent on the direction of rotation of pinion 10.

Mounted in the upper open end of the casing 8 is the hollow nut or sleeve 15. This sleeve is keyed to casing 8, so as to prevent its rotation therein, and carries at its lower end the female threaded bushing 16, the latter being keyed to sleeve 15, so as to be held against rotary movement therein. With this construction it will be seen that as the pinion 10 is rotated it turns screw-shaft 11, and as the latter is coupled up to the pinion by a spline and groove the screw is elevated, thus lifting sleeve 15. The screw, however, is turned in the screw-threaded bushing 16, and as the latter is keyed to the sleeve 15 it follows that the sleeve 15 will also move longitudinally by the screw action on the bushing 16, thus imparting to the sleeve 15 the combined longitudinal movement of the screw in its bushing 13 and the movement of the bushing 16 on the screw. When the screw is rotated in the opposite direction, the movement

of the sleeve 15 is necessarily in the opposite direction.

Secured to the upper end of sleeve or nut 15 is the cross-head 17. This cross-head projects from opposite sides of the nut or sleeve 15 and carries and supports the rods 18, which latter support the movable cross-head 19. Cross-head 19 is provided centrally with a hub which embraces the ingot-holding plunger 20 and carries the bell-crank mold-stripping levers 21, each of which is provided with a looped lower end adapted to receive the ears 22 on the ingot-mold 23. The plunger 20 is secured to the lower end of rack-bar D 15 and is designed to enter the smaller end of the mold and bear against the ingot and hold the latter against movement while the mold 23 is being stripped therefrom by the upward movement of the bell-crank levers. The bell-crank levers are owing to their construction adapted to normally swing or rest, so that their looped ends are in contact with the sides of the mold in position to engage the ears 22 when the rack-bar is lifted and are disengaged by the rods 24, the lower headed ends of which pass through openings in the outer ends of the horizontal members of the bell-crank levers, while their upper ends pass through openings in the ends of bracket 25 30 and are supported on springs 26, carried by said bracket. The bracket is secured to the rack-bar D, while the cross-head is loose on the plunger. Hence it will be seen that if the cross-head 19 be moved toward the bracket 25, as shown in Fig. 2, the rods 24 release the bell-cranks, thus permitting the looped ends of the levers to swing into contact with the sides of the mold in position to engage the ears 22 when the rack-bar is lifted. 40 The pinion 10 on screw 14 is engaged by pinion 12 on square shaft 27. Pinion 12 rests on bracket 28, carried by the rack-bar D, and square shaft 27 passes through an opening in the bracket and through an angular opening 45 in pinion 12 and transmits motion to the latter, and as the pinion is free to slide on the rack-bar it will be seen that the pinion 12 follows the rack-bar in its vertical movements and may be rotated while at any point of its 50 movement by the square shaft 27. This square shaft is mounted in bearings on the trolley and carries at its lower end a bevel-pinion 28', which is engaged by bevel-pinion 29 on shaft 30. This shaft carries the large 55 toothed wheel 31, which meshes with a smaller pinion 32 on the armature-shaft of the motor 33. This bracket 28 when in its lowest position engages the seat or rest 29^a, carried by the trolley. From this construction it will be 60 seen that by rotating the square shaft 27 pinion 10 on screw 11 will be rotated, and as the screw is, as before explained, connected to the pinion 10 by a spline and groove the screw is caused to move longitudinally in its bearing 65 13 and the nut or sleeve 15 caused to move on the screw. Hence if the screw be turned in a direction to elevate the nut or sleeve 15 it will

be seen that the rods 18 pull up the cross-heads 19 toward bracket 25, thus releasing the levers 21 from the rods 24.

Assuming now that the mold 23 (shown in Fig. 1) contains an ingot. To strip the mold from the ingot, the stripper, with the parts in the position shown in Fig. 1, would be brought to a position over the ingot, after which the rack-bar would be lowered, so as to bring the plunger into contact with the ingot, after which motion would be imparted to pinion 10 by the square shaft and mechanism before explained in a direction to elevate the nut or sleeve 15. This upward movement of the nut or sleeve 15 and rods 18, carried thereby, operate to first release the levers 22, so that the latter may engage the ears 22 of the mold, while the continued upward movement of the sleeve 15 operates to strip the mold from the ingot, the latter being solidly held against movement by the plunger 20, which during the movements last described remains stationary. The stripping power imparted by the screw is necessarily slow but powerful. Hence just as soon as the mold separates from the ingot motor E is thrown into circuit and the rack-bar lifted, thus elevating the mold above the ingot. The bridge and trolley are thus operated to carry the mold to its proper place, after which the stripper returns to the next mold to be stripped.

In order to take the weight of the rack-bar off the motor E, we have provided a tower F for carrying a counterweight G. This counterweight is made with an open center, as shown in Fig. 1, so as to permit of the free vertical movement of the rack-bar through the same, and is connected to the latter by chains H, passing over sheaves I at the top of the tower.

While the empty mold is being removed, the direction of rotation of the screw 11 may be reversed, thus lowering the cross-head 19 to its lowest position. This of course would lower the stripping-levers onto the heads of the releasing-rods 24; but as the weight of the mold is greater than the tension of the springs 26 the latter will be simply compressed until the mold has been deposited on a car or floor. As soon as the weight is removed from the levers 21 the springs 26 cause the levers to fly open to the position shown in Fig. 1.

It is evident that many slight changes might be resorted to in the relative arrangement of parts herein shown and described without departing from the spirit and scope of our invention. Hence we would have it understood that we do not wish to restrict ourselves to the exact construction herein shown and described; but,

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In an ingot-extractor the combination with a rack-bar carrying a plunger, means for moving the rack-bar longitudinally, a screw movably mounted in the rack-bar, a nut on

the screw and means for rotating the screw, of mold-stripping devices having means for engaging the molds and means connecting the devices and nut.

5 2. In an ingot-extractor, the combination with a vertically-movable bar, means for moving it vertically, and a plunger secured to the lower end thereof, of a screw movably mounted in the upper end of the rack-bar, a nut
10 engaging the screw, means for rotating the screw, mold-stripping levers having means for engaging the molds, and means connecting the nut and mold-stripping levers.

3. In an ingot-extractor, the combination
15 with a traveling bridge and a traveling trolley thereon, of a bar carried by the trolley, means carried by said trolley for moving the bar vertically, mold-stripping devices having means for engaging the mold, a screw mov-
20 ably mounted in the upper end of said bar, a nut on the screw, means for rotating the screw and means connecting the nut and mold-stripping devices.

4. In an ingot-extractor the combination
25 with a traveling trolley, a rack-bar carried thereby and means on the trolley for moving the rack-bar vertically, of a screw loosely carried by the rack-bar, means for rotating the screw, a nut mounted on the screw, mold-
30 stripping devices guided by the rack-bar and having means for engaging the mold, and means connecting the nut and mold-stripping devices.

5. In an ingot-extractor, the combination
35 with a traveling trolley, a rack-bar carried thereby, means carried by the trolley for moving the rack-bar vertically and a counterweight for said rack-bar, of a screw pivotally mounted in the bar, a nut on the screw, means
40 for rotating the screw, mold-stripping levers having means for engaging the mold, and means connecting the nut and mold-stripping levers.

6. In an ingot-extractor the combination
45 with a rack-bar, means for moving the rack-bar vertically, a screw mounted in said bar, means for rotating the screw, a nut on the screw, and a cross-head carried by the nut, of mold-stripping levers having means for
50 engaging the molds and means for connecting the cross-head and mold-stripping levers.

7. In an ingot-extractor, the combination
55 with a rack-bar, means for moving same vertically, an ingot-holding plunger on the lower end of said bar, a screw mounted to rotate in the upper end of said bar, and means for rotating the screw, of a nut on the screw, a cross-head secured to the nut, rods depend-
60 ing from said cross-head, mold-stripping levers having means for engaging the mold and means connecting the levers and rods.

8. In an ingot-extractor, the combination
65 with a rack-bar, means for moving same vertically, an ingot-holding plunger on the lower end of said bar, a screw mounted to turn in the upper end of said bar, and means for rotating the screw, of a nut on the screw, a

cross-head mounted to slide on the plunger, rods connecting the nut and cross-head, and mold-stripping levers carried by the cross- 70 head, the said mold-stripping levers having means for engaging the mold.

9. In an ingot-extractor the combination with a rack-bar, means for moving same ver- 75 tically, an ingot-holding plunger secured to the lower end of the bar, a screw mounted to rotate in the upper end of said bar, and means for rotating the screw, of a cross-head mounted to slide on the plunger, a cross-head car-
80 ried by the nut, rods connecting the two cross-heads, and ingot-stripping levers carried by the lower cross-head, the said levers having means for engaging the mold.

10. In an ingot-extractor the combination with a bar, means for moving same vertically 85 and a counterweight for said bar, of a screw mounted to rotate in the upper end of said bar means for rotating the screw, a nut on the screw, mold-stripping devices having means for engaging the mold and means con- 90 necting the nut and mold-stripping devices.

11. In an ingot-extractor, the combination with a rack-bar having an ingot-holding plunger at its lower end, means for moving the rack-bar longitudinally, a screw mounted 95 in the upper end of said rack-bar, a toothed wheel connected to said screw so that the latter may move longitudinally but without rotation therein, and means for rotating the toothed wheel, of a nut mounted on the screw, 100 mold-stripping levers adjacent to the plunger on the rack-bar and means connecting the mold-stripping levers and nut.

12. In an ingot-extractor, the combination with a rack-bar having an ingot-holding 105 plunger at its lower end, means for moving said rack-bar longitudinally, a pinion mounted in the upper end of said rack-bar, a double screw mounted at one end in a threaded bearing in said rack-bar and having sliding con- 110 nection with the pinion and a nut mounted on the upper end of said screw, of mold-stripping levers and means connecting the nut and levers.

13. In an ingot-extractor, the combination 115 with a rack-bar having an ingot-holding plunger at one end, means for moving said rack-bar longitudinally and a screw at its other end, the said screw being threaded at both ends, one screw-threaded end of the 120 screw engaging a member having female threads at the upper end of the rack-bar, of a toothed wheel embracing the screw and connected thereto by a spline, a nut mounted on the upper screw-threaded end of the screw, 125 mold-stripping devices having means for engaging the mold and means connecting said nut and levers.

14. In an ingot-extractor, the combination with a rack-bar, means for moving same lon- 130 gitudinally, a double screw-shaft one end of which is mounted in a screw-threaded bearing in the upper end of the bar, a pinion having a spline-and-groove connection with said

shaft, a square shaft, means for rotating same, a pinion slidably mounted on said square shaft and engaging the pinion on the screw-shaft, and a nut carried on the upper end of
5 the screw-shaft, of mold-stripping devices having means for engaging the molds and means connecting the mold-stripping devices and nut.

15. In an ingot-extractor, the combination
10 with a rack-bar having an ingot-holding plunger at its lower end and casing at its upper end and means for moving said rack-bar longitudinally, of a double screw-shaft carried by a threaded bearing in the upper end
15 of the rack-bar, a pinion located within the casing and having a groove-and-spline connection with the screw-shaft, a nut mounted on the upper end of the screw-shaft and adapted to be moved thereby, a pinion carried by the rack-bar and meshing with the
20 pinion on the screw-shaft and a square shaft for imparting motion to said latter pinion, of mold-stripping devices having means for engaging the mold and means connecting the
25 nut and molding-stripping levers.

16. In an ingot-extractor the combination with a rack-bar, means for moving same longitudinally, and an ingot-holding plunger at

its lower end, of a cross-bar sliding on the plunger, bell-crank levers carried by said
30 cross-bar, rods connected at their lower ends to said cross-bar, and means carried by the rack-bar and capable of vertical movement independent of the movement of the rack-bar, for moving said rods.
35

17. In an ingot-extractor, the combination with a rack-bar, means for moving same longitudinally, a bracket carried by the lower end thereof and an ingot-holding plunger
40 depending from the lower end of the rack-bar, of a cross-head sliding on the plunger, rods connected to the cross-head, bell-crank levers depending from the cross-head for moving the latter vertically, lever-releasing
45 rods carried by the bracket and engaging the levers and springs interposed between the bracket and upper ends of the releasing-rods.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

WILLIAM HENRY MORGAN.
CLARENCE LANDFEAR TAYLOR.

Witnesses:

J. H. LLOYD,
H. W. HARRIS.