

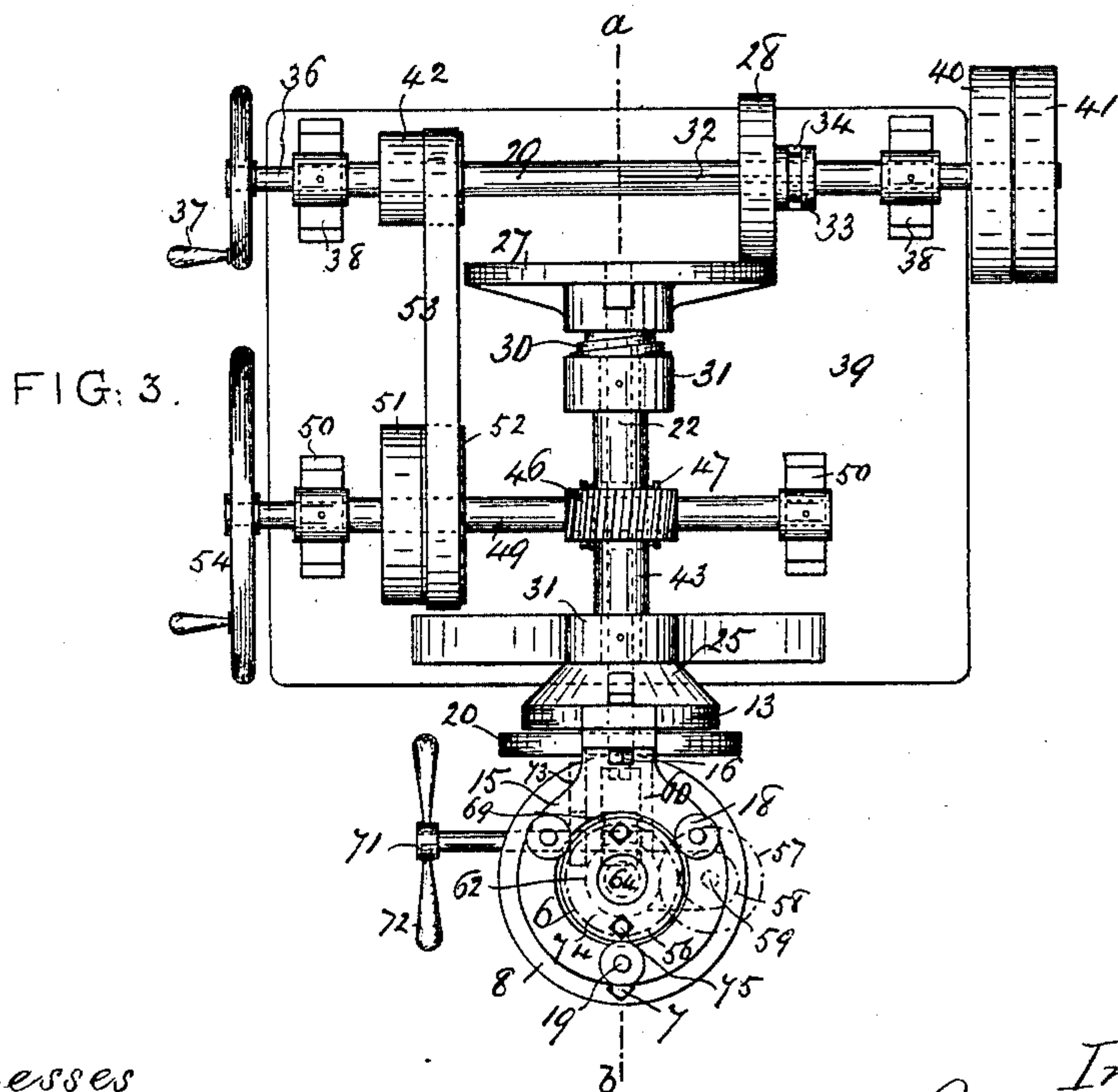
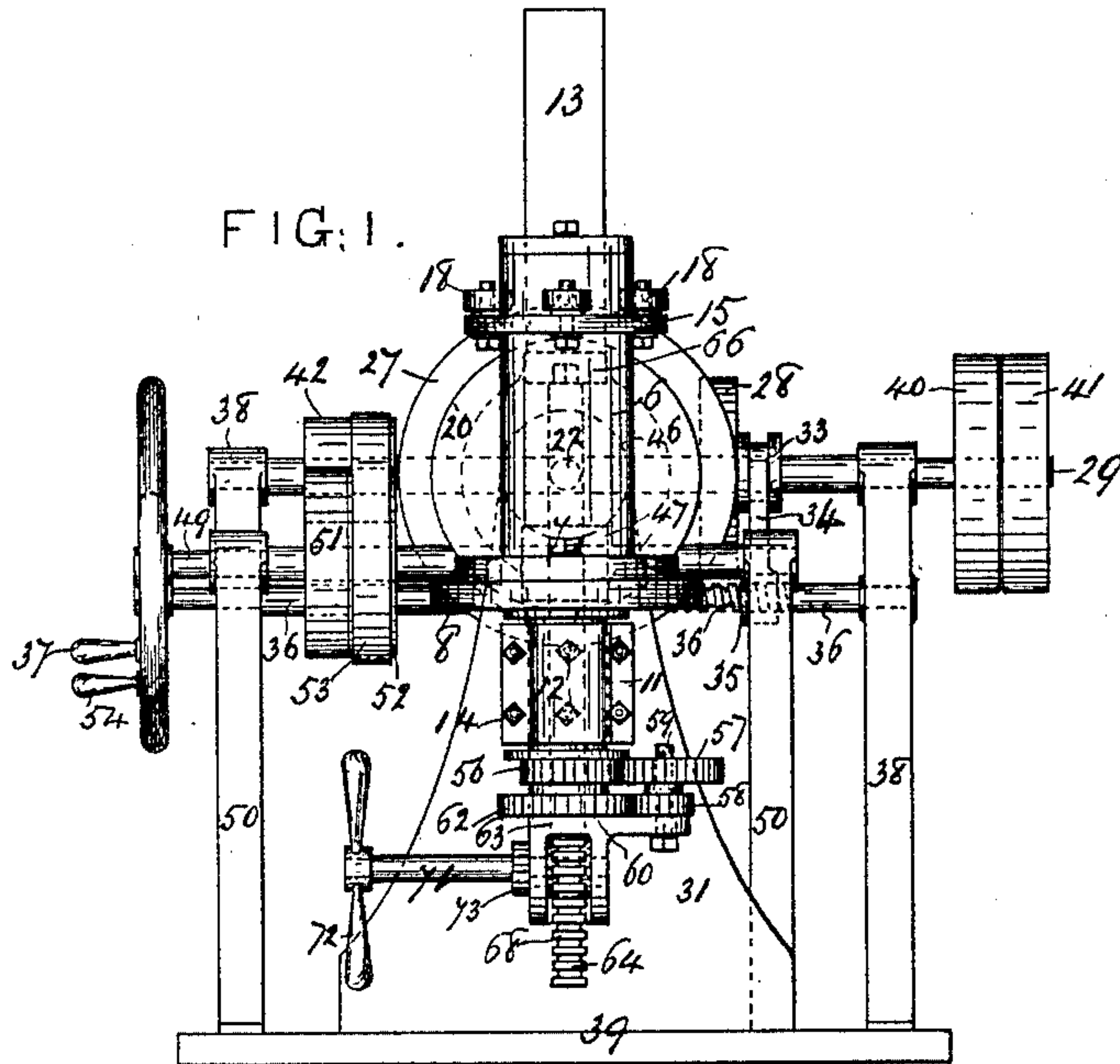
(No Model.)

2 Sheets—Sheet 1.

W. AMBLER.
APPARATUS FOR CASTING.

No. 462,422.

Patented Nov. 3, 1891.



Witnesses
George Baumann
S. C. Connor

Inventor
William Ambler
By his Attorneys
Howden and Howden

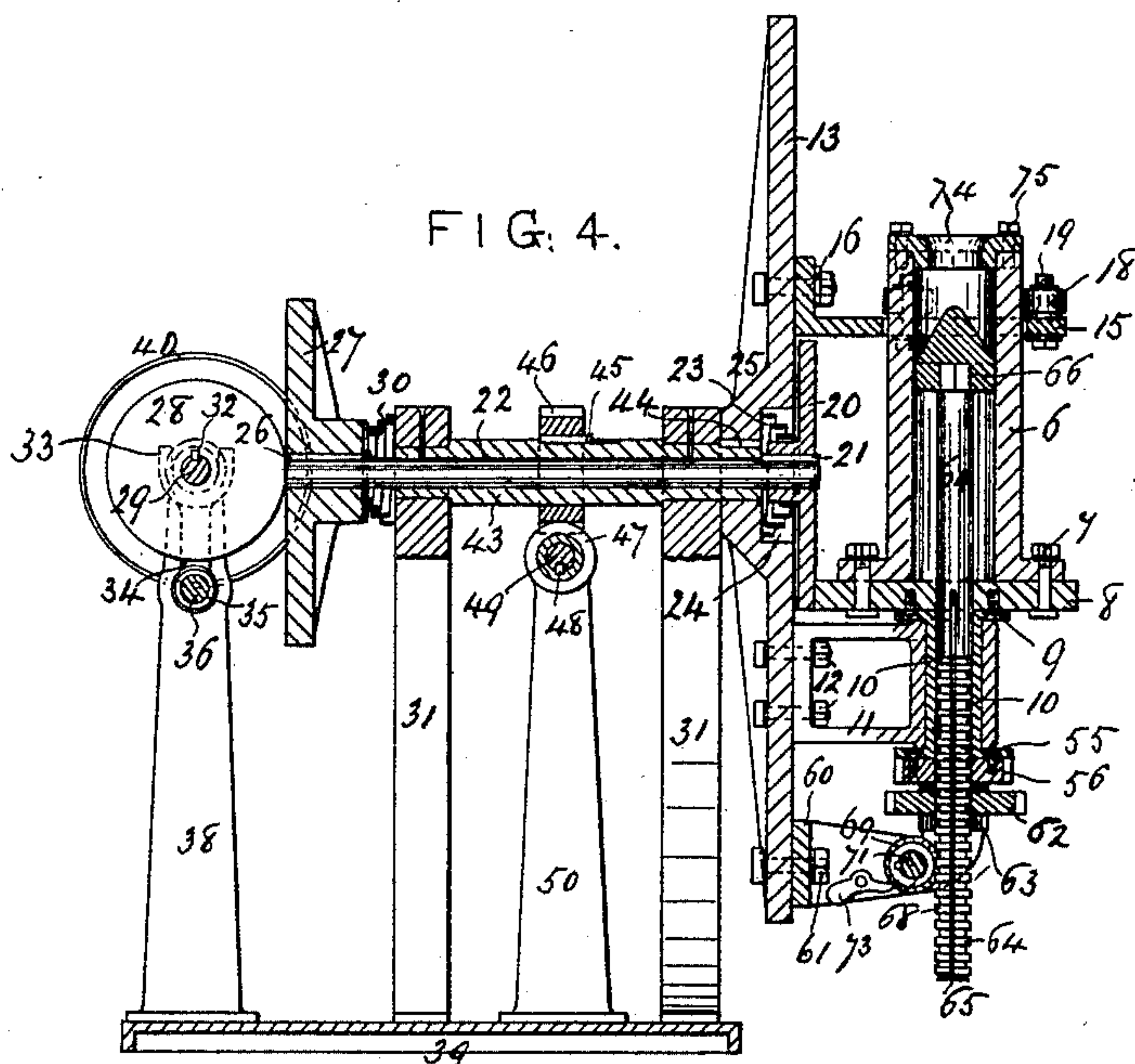
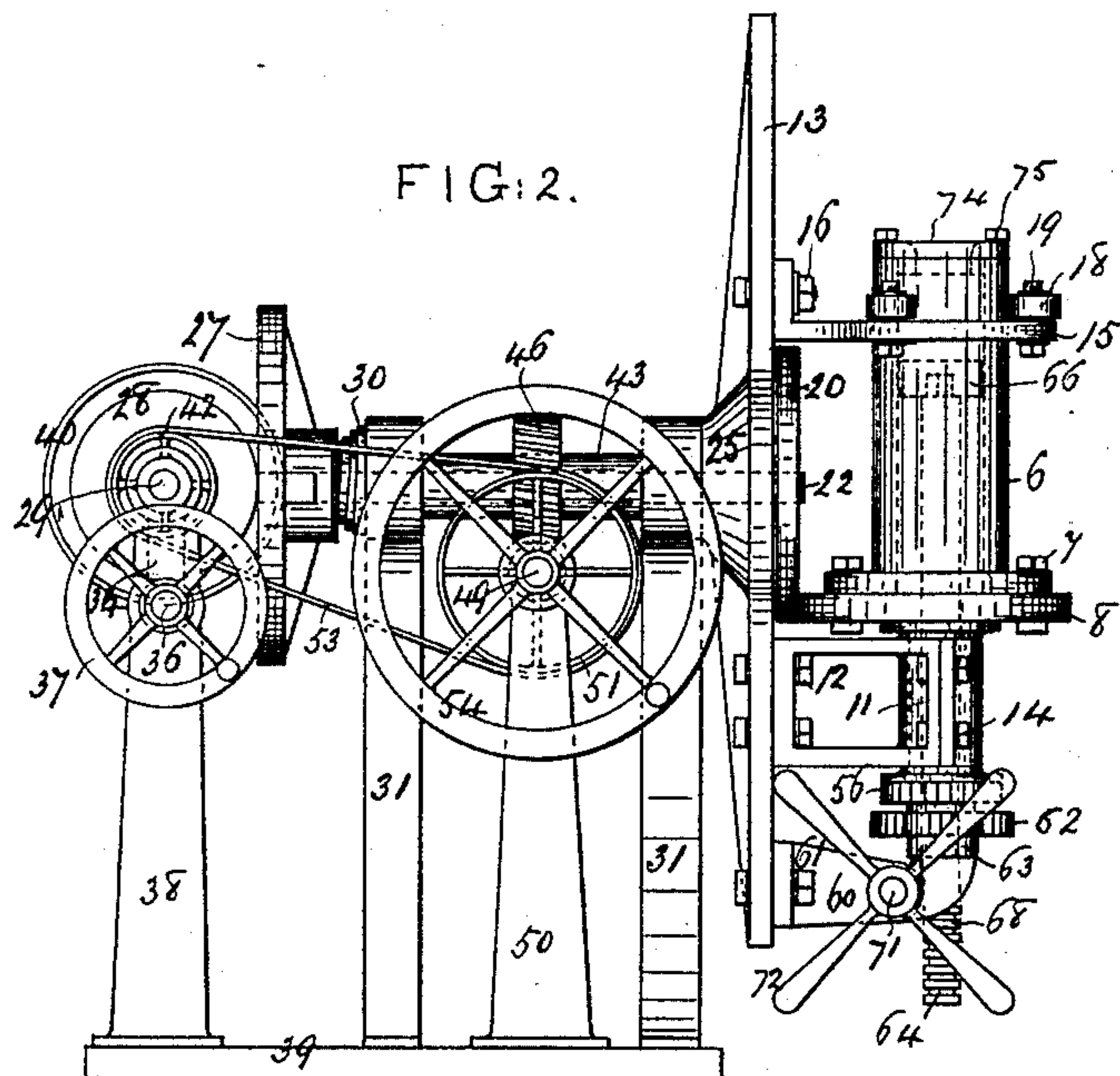
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UNITED STATES PATENT OFFICE.

WILLIAM AMBLER, OF BRADFORD, ENGLAND.

APPARATUS FOR CASTING.

SPECIFICATION forming part of Letters Patent No. 462,422, dated November 3, 1891.

Application filed June 12, 1890. Serial No. 355,200. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM AMBLER, engineer, a subject of the Queen of Great Britain and Ireland, residing at Bradford, Yorkshire, England, have invented certain Improved Apparatus for Casting, of which the following is a specification.

This invention relates to an improved machine for casting from molten metal tubular articles either open throughout their length or closed at one end, as may be desired.

In the accompanying drawings, Figure 1 represents the improved machine in front elevation. Fig. 2 represents a side elevation thereof. Fig. 3 represents a plan view thereof, and Fig. 4 represents a sectional elevation thereof through the plane indicated by the line *a b*, Fig. 3.

6 represents an open-ended mold, which is made of the required internal formation and dimensions and is bolted, as at 7, to a table 8. The table 8 is bolted at 9, (*vide* Fig. 4,) to a flanged tubular carrier 10, which is supported by a flanged bracket 11, bolted at 12 to a vertical turn-table 13, the parts of the bracket 11 being bolted together at 14. The mold is also supported and guided in its turning movements, hereinafter further referred to, by an upper surrounding bracket 15, which is also bolted to the turn-table at 16 and carries a series of steadying-runners 18, mounted and secured on center-pins 19. The table 8 is rotated so as to impart rotary motion to the mold 6 by frictional contact with a disk 20, which is keyed, as at 21, to a shaft 22, so as to be rotated thereby, but to have a limited freedom of movement in the direction of the axis of the shaft 22, so as to permit of its being borne against the edge of the table 8 by a spring 23, which has its bearing in a recess 24 in the hub 25 of the turn-table. On the other end of the shaft 22 there is keyed, as at 26, a disk 27, which is driven by frictional contact with a disk 28 on a first-motion shaft 29. The disk 27 (like the disk 20) has a limited freedom of movement in the direction of the axis of the shaft 22, so as to permit of its being borne against the edge of the disk 28 by a spring 30, which has its bearing against an adjacent standard 31. The disk 28 is keyed, as at 32, on the shaft 29, with facility of to-and-fro adjustment thereon to the ex-

tent of the radius of the disk 27 for the purpose of regulating, as desired, the speed at which the shaft 22 and consequently the table 8 and mold 6 are driven from the constant speed of the shaft 29. The adjustment of the disk 28 is effected by means of a clutch 33, fast to the disk 28, operated by a fork 34, rising from a wormed nut 35, actuated by a wormed shaft 36, which is turned as required by a hand-wheel 37. The shafts 29 and 36 are supported by opposite side standards 38 rising from the foundation-plate 39, and the shaft 29 is fitted with fast and loose pulleys 40 41 and may be driven at any suitable speed. It is also fitted with a fast pulley 42, hereinafter further referred to. The shaft 22 (*vide* Fig. 4) works within a sleeve or tubular shaft 43, which is supported by opposite standards 31, rising from the foundation-plate, and on the front end of such latter shaft 43 the hub 25 of the turn-table 13 is keyed, as at 44. There is also keyed, as at 45, on such tubular shaft 43 a worm-wheel 46, which engages with a worm 47, keyed, as at 48, on a shaft 49, which latter is supported in opposite side standards 50, rising from the foundation-plate. The shaft 49 is fitted with fast and loose pulleys 51 52, by means of the former, of which and a strap 53, driven by the pulley 42 on the shaft 29, it can be rotated, as may be desired, for the purpose of turning the turn-table 13, together with the rotating mold 6, and all other attachments it carries, about the axis of the shaft 22 and 43, as hereinafter further referred to. The shaft 49 is also fitted with a hand-wheel 54, by means of which the turn-table can be operated or returned to its vertical position by hand, if desired. The tubular hub 10, to which the table 8 is bolted as aforesaid, is (*vide* Fig. 4) bolted at 55 to a toothed wheel 56, which actuates one 57 of a pair of connected change-wheels 57 58, which are supported by a stud 59, carried by a bracket 60, which is bolted at 61 to the turn-table. The other change-wheel 58 of the pair 57 58 actuates a change-wheel 62, which is situated between the wheel 56 and a projecting part 63 of the bracket 60, and is formed with a tubular hub surrounding a rod 64, which rises through the said tubular hub 10 and the table 8 into the interior of the mold 6. The wheel 62 is formed with a feather or key which

engages with a longitudinal keyway 65, formed in the rod 64, (*vide* Fig. 4,) and so rotates it. Within the mold the squared top end of the rod 64 is fitted with a removable
 5 false bottom 66, so as to be rotated thereby. Such false bottom may either be of a conical formation (*vide* Fig. 4) or of a flat cheese-shaped or analogous formation, (*vide* Figs. 1 and 2,) in which latter event it may be made in
 10 one piece or in concentric rings. The lower projecting end of the rod 64 is formed with surrounding circular corrugations 68, which engage with a correspondingly-toothed wheel 69, keyed on an axle 71, which is supported
 15 by the bracket 60, and is provided with a spoke or hand wheel 72, by which it can be rotated, so as to cause the rod 64, (whether rotating or not,) together with the false bottom it carries, to be raised or lowered within
 20 the mold, either while the mold is stationary or when it is rotating, as may be required. The toothed wheel may be adapted with a pawl or pawls 73, which may be caused to gear therewith or be placed out of gear there-
 25 with, as required.

74 represents a removable ring of any required width or thickness, which is applied to the open end of the mold and secured by bolts 75.

30 In the aforesaid improved arrangement of apparatus I provide in combination means, respectively, for rotating the mold at any desirable constant or differential speed, for rotating the false bottom at any desirable rela-
 35 tive speed, for raising and lowering the false bottom within the mold, as may be required, for causing the mold and its attachments to assume different positions during the manufacture of the article, as may be required, and
 40 for forming open-bottomed or closed-bottomed tubular articles.

In manufacturing tubular articles in the above-described improved apparatus at the beginning of the operation the mold occupies
 45 the vertical position indicated on the accompanying drawings and the false bottom occupies the raised position indicated in Figs. 1, 2, and 4. As a sufficient quantity of molten metal is poured into the mold the latter is ro-
 50 tated at such a speed as to cause the metal to fly outward to and up the inner circumference of the mold to a thickness determined by the ring 74. As this thickness is reached the tube in process of formation is elongated
 55 by the gradual lowering of the rod 64 and false bottom by operating the hand-wheel 72 during the continuance of the pouring of the molten metal. When the false bottom has reached the bottom of the mold, the pouring
 60 of the metal thereinto is discontinued and the turn-table is gradually rotated about its axis and that of the shafts 22 43 a quarter-circle, so as to bring the mold into a horizontal position by operating the shaft 49, as afore-
 65 said, for a sufficient time. While the mold remains in such horizontal position its speed of rotation is increased by shifting the disk

28 toward the center of the disk 27, and by such means, acting conjunctively with the aforesaid lowering false bottom, any tendency
 70 of the metal to gravitate more to one end of the mold than to the other and to produce interiorly-tapered tubes is avoided and the formation of the tubes with interior parallel sides is insured. As the metal sets, the speed
 75 of rotation of the mold is gradually lowered by shifting the disk 28 toward the periphery of the disk 27, and when the molded article is ready for removal the turn-table is again
 80 rotated a further quarter-circle by again operating the shaft 49, as aforesaid, which causes the mold to be inverted when the molded article falls out, or may be gradually lowered. If an open-bottomed tubular article is being
 85 formed, then the conically-formed false bottom may be used and rotate at the same speed as the mold, in which event the molten metal will wholly fall from off the conical false bottom toward the inner surface of the mold and
 90 will be wholly spread in even thickness there- over by the rotating thereof; or the cheese-shaped false bottom may be used and be rotated at a greater speed than the mold, so as
 95 to cause the molten metal resting thereon to be spun by the increased centrifugal force against the inner surface of the mold, by the rotation of which it will be spread in even
 100 thickness about its inner surface, as aforesaid; but if a closed-bottomed tubular ingot or article is being formed the cheese-shaped false bottom is used and rotated at a some-
 105 what slower speed than the mold, so as to effect a retarding influence on the lowest portion of the molten metal and prevent such metal being wholly taken up by and spread
 over the inner surface of the mold.

I claim as my invention—

1. In apparatus to be used in the casting of cylindrical and tubular articles from molten
 110 metal, in combination, a mold having a false bottom, means for rotating the mold at any desired speed, means for rotating the false bottom at any desired relative speed, means
 115 for raising and lowering the false bottom within the mold, as required, and means for carrying the mold and causing it and its at-
 120 tachments to assume different axial positions during the manufacture of the article, as required, and thereby forming tubular articles, as set forth.

2. In apparatus to be employed in the casting of cylindrical and tubular articles from molten metal, in combination, a mold, a movable bottom therefor, a table supporting the
 125 mold, a friction-wheel gearing with said table and a spring to keep them in contact, a shaft for the friction-wheel and carrying also one of a pair of differential friction-gears, a spring to keep them in contact, and means for driv-
 130 ing them.

3. In apparatus to be employed in the casting of tubular and cylindrical articles from molten metal, in combination, a mold, a movable bottom therefor, differential frictional

gearing to rotate the mold, change-wheels for differentially rotating the said bottom relatively to the mold, and means for actuating the same by power.

5 4. In apparatus to be employed in the casting of cylindrical and tubular articles from molten metal, in combination, a mold, differential frictional gearing for rotating the mold, a rising and falling false bottom for the mold,
10 change-wheel gearing for differentially rotating the said bottom relatively to the mold, a depending rod connected to the false bottom, and means for raising and lowering the same within the mold, and means for actuating the
15 same by power.

5. In apparatus to be employed in the casting of tubular and cylindrical articles from molten metal, in combination, a mold, differential frictional gearing for rotating the mold,

a rising and falling false bottom, change-wheel 20 gearing for differentially rotating the said bottom relatively to the mold, a depending rod connected to the false bottom, and means for raising and lowering the same within the mold, a turn-table carrying the mold and its 25 attachments, with means to operate the turn-table to cause the mold to assume vertical, horizontal, and inverted positions, and means for actuating the apparatus by power.

In witness whereof I have hereunto set my 30 hand in presence of two witnesses.

WM. AMBLER.

Witnesses:

HENRY S. LENTY,

GEO. F. MOSS,

*Clerks to T. P. and Greenwood Teale, Solrs.
and Notaries Public, Leeds, England.*