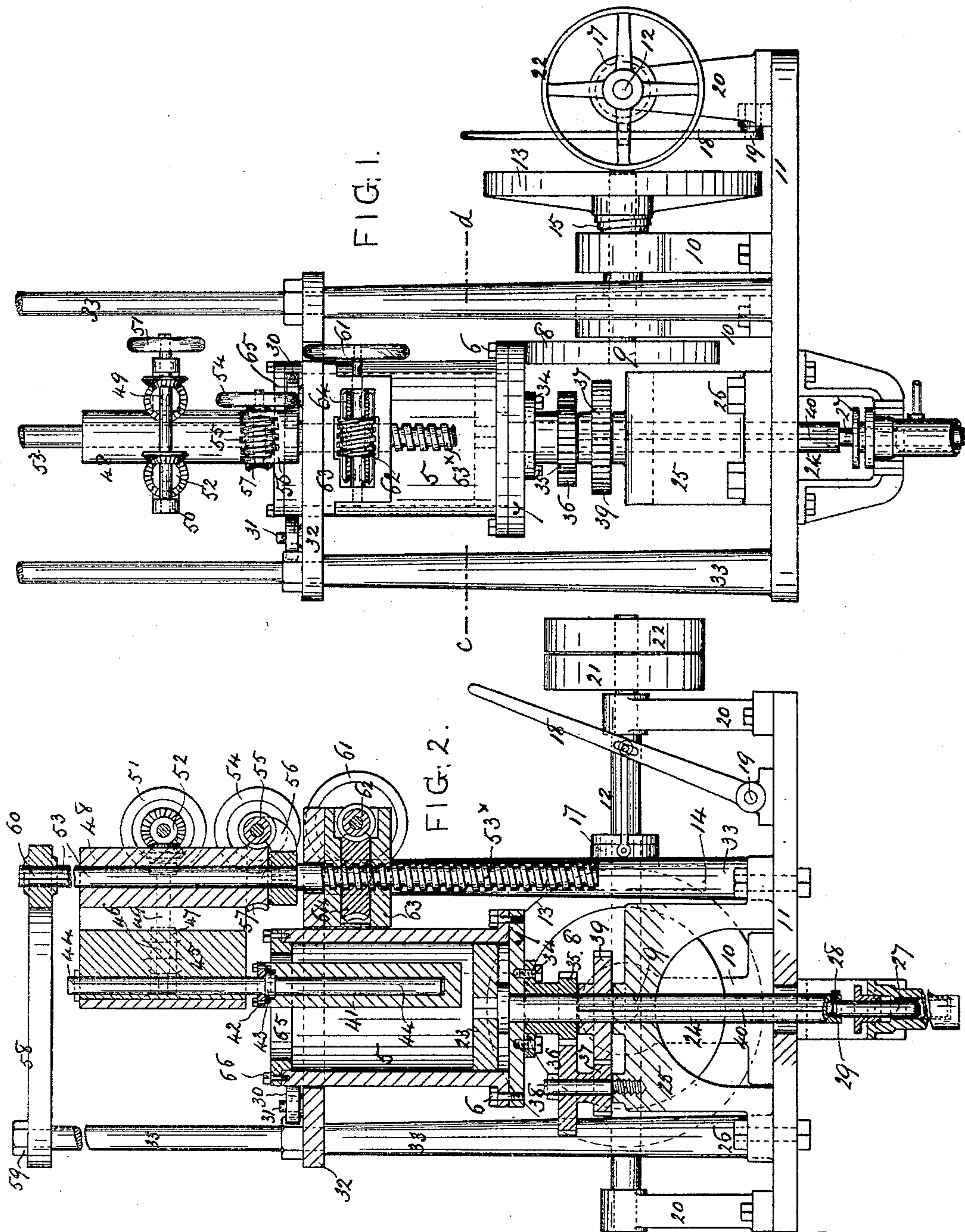


3 Sheets—Sheet 1.

No. 462,423.

Patented Nov. 3, 1891.



Witnesses,
George Baumann
S. C. Connor

Inventor:
William Ambler
By his Attorneys.
Horsan and Haven

(No Model.)

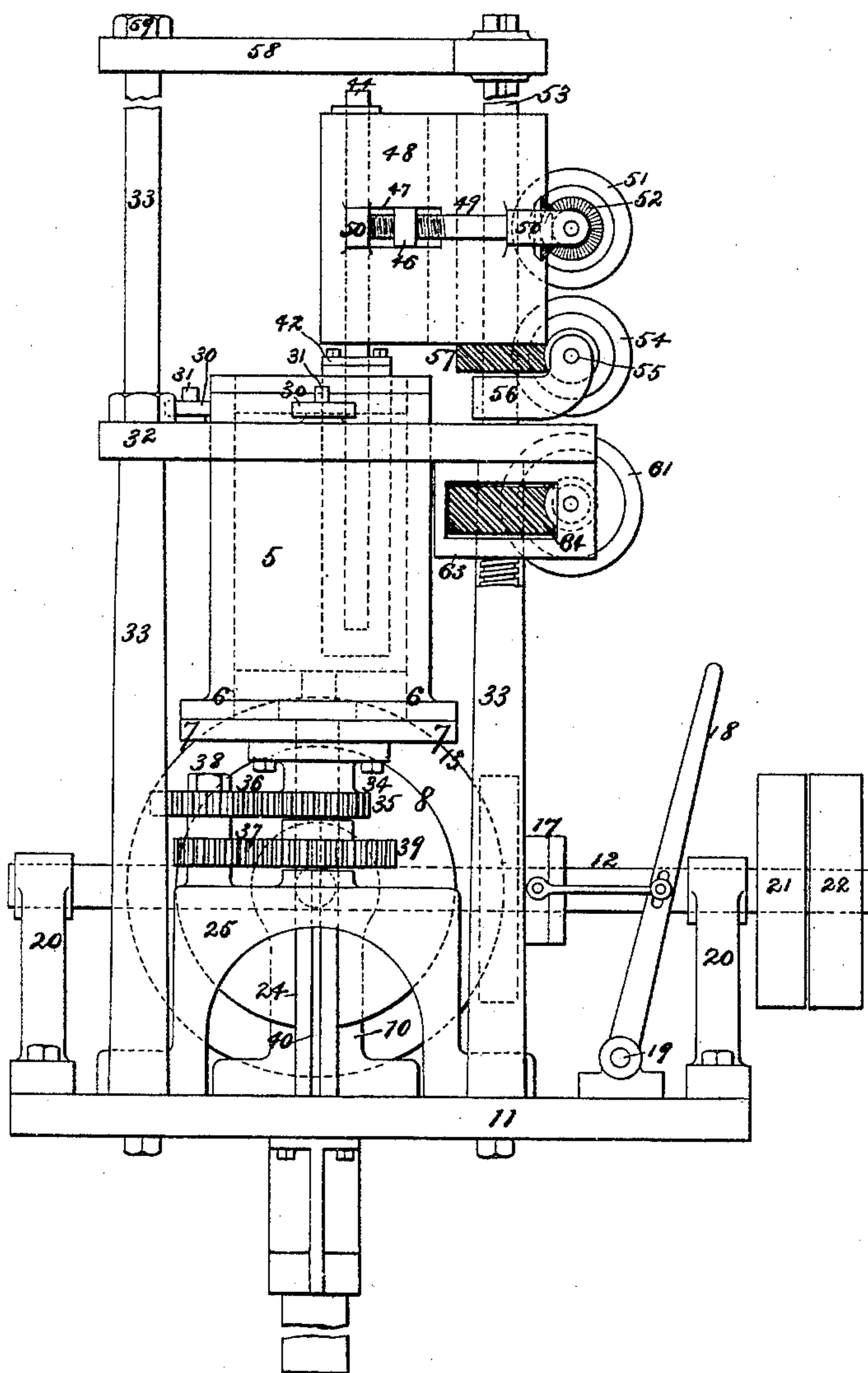
3 Sheets—Sheet 2.

W. AMBLER.
APPARATUS FOR CASTING.

No. 462,423.

Patented Nov. 3, 1891.

Fig 2a



WITNESSES:

George Bannan
John Revell

INVENTOR

William Ambler
BY
Horwath and Horwath
his ATTORNEYS

(No Model.)

3 Sheets—Sheet 3.

W. AMBLER.
APPARATUS FOR CASTING.

No. 462,423.

Patented Nov. 3, 1891.

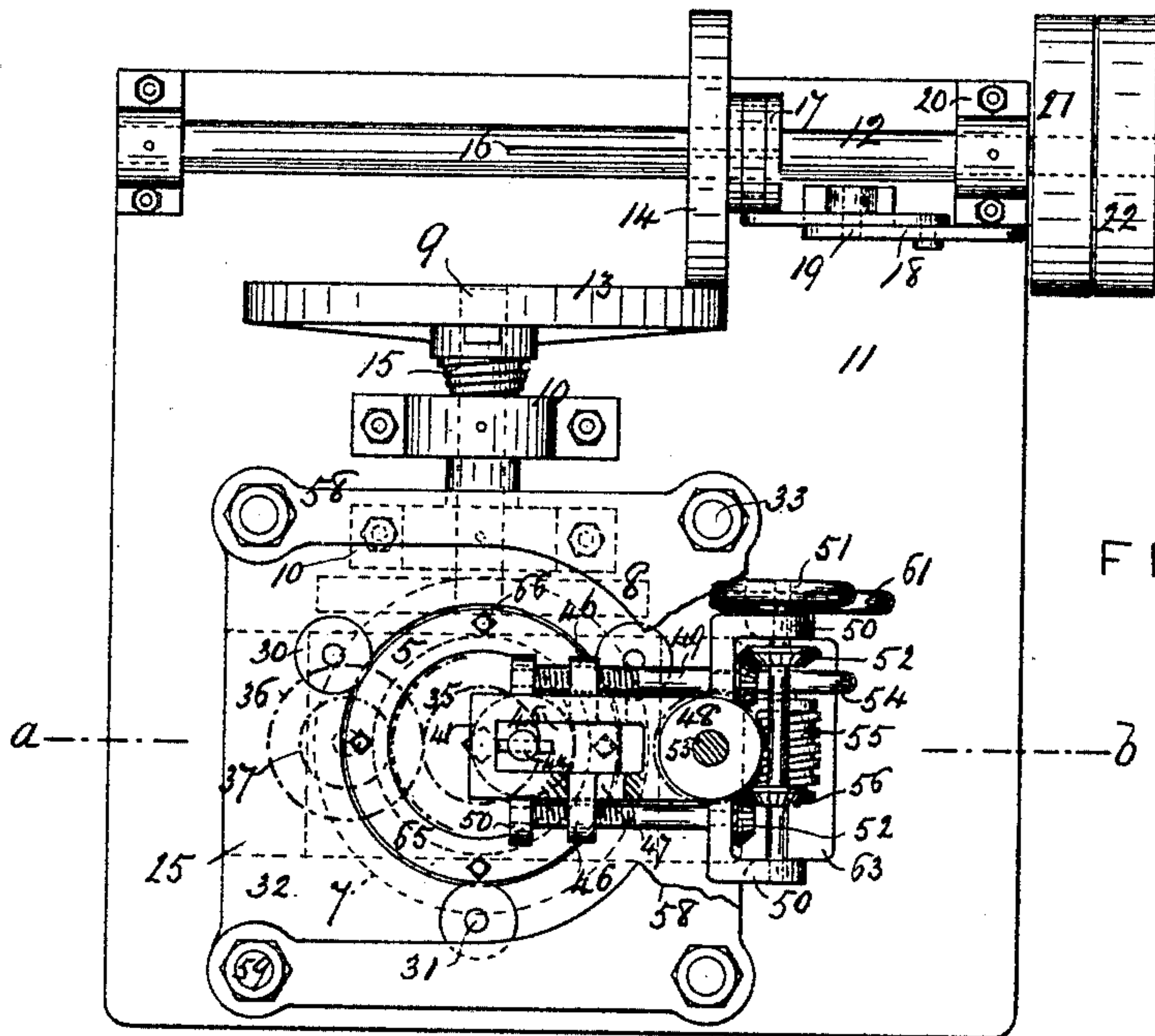


FIG. 3.

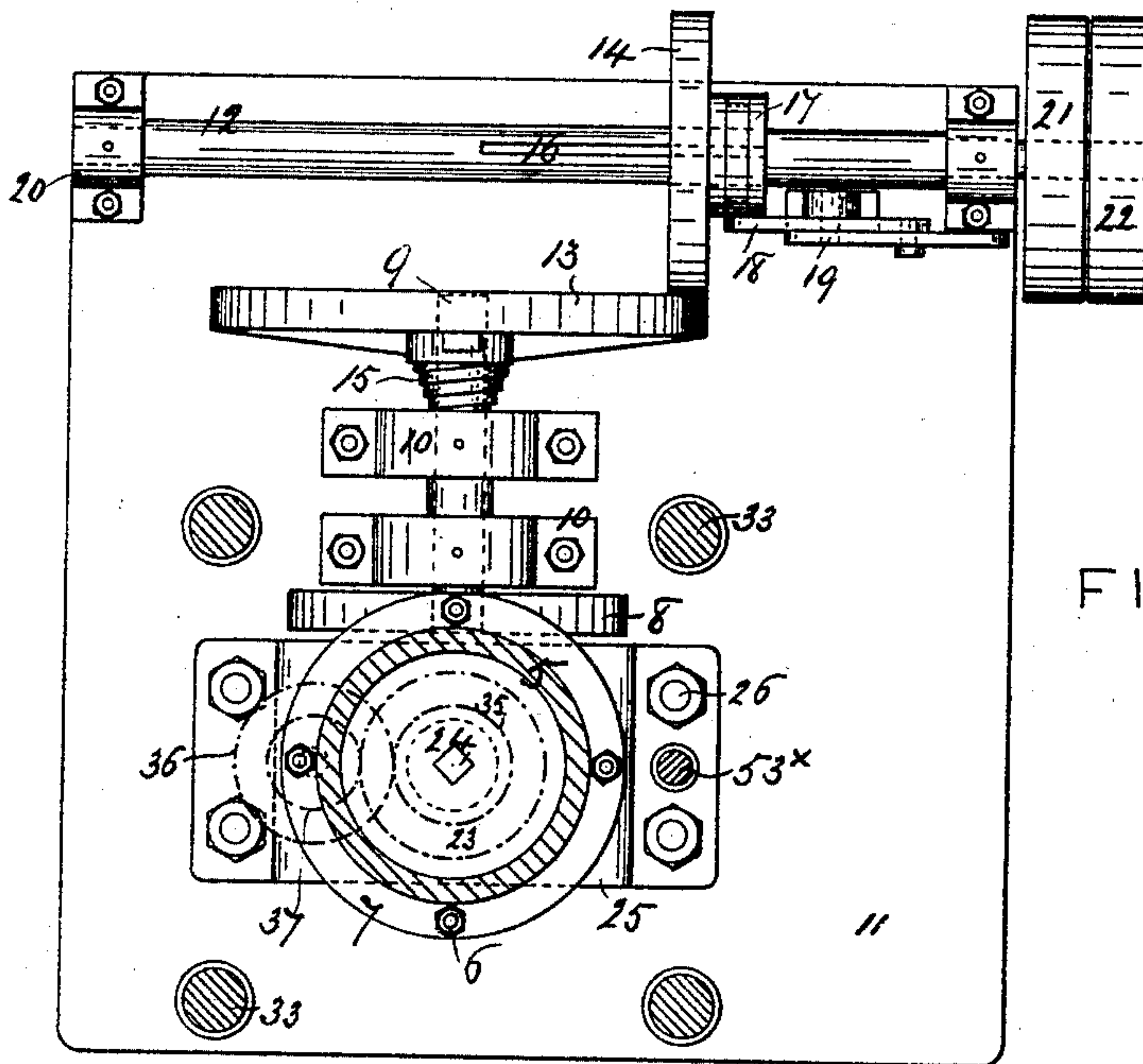


FIG. 4.

Witnesses
George Baumann
S. C. Connor

Inventor
William Ambler
By his Attorneys
Howe and Howe

UNITED STATES PATENT OFFICE.

WILLIAM AMBLER, OF BRADFORD, ENGLAND.

APPARATUS FOR CASTING.

SPECIFICATION forming part of Letters Patent No. 462,423, dated November 3, 1891.

Application filed June 12, 1890. Serial No. 355,201. (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, England, have invented certain Improved Apparatus for Casting, of which the following is a specification.

This invention relates to improved apparatus to be employed in the casting of tubular and dished articles from molten metal, the improved apparatus being specially adapted to produce such articles as shells, hollow ingots, still-bottoms, and heads and the like, having solid or closed bottom ends, though it may be also used in producing open-ended articles.

In the improved apparatus are combined a vertical mold and contained false bottom and rolling or revoluble former and means, respectively, for rotating the mold at any desired constant or differential speed; for rotating the false bottom at any desired relative speed for forming open-bottomed or closed-bottomed articles; for adjusting the said former to regulate the thickness of the article being molded; for raising the said former out of and laterally shifting it clear of the mold, and for raising the false bottom within the mold for ejecting the molded article.

In the accompanying drawings, Figure 1 represents an end elevation of the improved apparatus. Fig. 2 represents a sectional elevation on the line *a b*, Fig. 3. Fig. 2^a is a corresponding side elevation. Fig. 3 represents a plan view; and Fig. 4 represents a sectional plan view on the line *c d*, Fig. 1.

5 represents the mold, which may be made of any required internal formation and dimensions. It is bolted at 6 to a table 7, which rests on and is driven by a disk 8, keyed on a shaft 9, which is supported by bearings 10, rising from a sole-plate 11. The shaft 9 is driven from a first-motion shaft 12 by means of frictional disks 13 14, the former of which is loosely keyed on the shaft 9 and is borne against the periphery of the disk 14 by a spring 15, which has its bearing against the adjacent standard 10. The disk 14 is fitted with a feather adapted to slide in a longitudinal keyway 16 made in the shaft 12, and so has a facility of to-and-fro movement on such shaft to the extent of the radius of the disk

13. Such movements of the disk 14 are effected by a clutch 17, actuated by a hand-lever 18, centered to the sole-plate at 19. The shaft 12 is supported by opposite side standards 20, and is fitted with fast and loose pulleys 21 22, and may be driven at any desired speed.

23 represents the false bottom with which the mold 5 is fitted, (*vide* Fig. 2,) and which is mounted on the squared end of a shaft 24, by which it can be rotated within the mold at any required relative speed, and can be raised and lowered within the mold, both as hereinafter described. The shaft 24 is supported by a bridge 25, which is bolted at 26 to the sole-plate over a hydraulic ram 27, (*vide* Figs. 1 and 2,) to the rod of which the shaft 24 is connected by a screw-pin 28, which works in a groove 29, surrounding the ram-rod 27, such connection permitting both of the rotation of the shaft 24 and of its rising and falling movements. The upper part of the mold is guided by a series of steadying-runners 30, which are supported by studs 31, carried by a cross-head 32, which is supported by standards 33, rising from the sole-plate.

The table 7 (*vide* Fig. 2) is bolted at 34 to a change-wheel 35, which loosely encircles the rod 24 and actuates one 36 of a connected pair of superposed change-wheels 36 37, which rotate on a stud 38, supported by the bridge 25, the other 37 of such change-wheels actuating a change-wheel 39, which is fitted with a feather working in a longitudinal keyway 40 made in the shaft 24, which, together with the false bottom 23, are thus differentially driven from the frictional gearing by which the mold is rotated.

41 (*vide* Fig. 2) represents the rolling or revoluble former, which may be made of any required external formation conformable to that of the interior of the article to be molded. The said former is supported by a collar 42, resting on a shoulder 43, formed on a spindle 44, around which the collar and connected former 41 can freely rotate. The spindle 44 is supported by a slide-block 45, which is formed with lateral extensions 46, (*vide* Fig. 3,) which are adapted to slide in opposite guide-ways 47, (*vide* Figs. 2 and 3,) 2^a, formed in the sides of a hollowed carrier 48, by the inner sides of which the block is further guided.

The slide-block is actuated in such movements by screwed rods 49, which (*vide* Fig. 3) engage with the extensions 46 and are supported in arms 50, projecting from the carrier, and are actuated by a hand-wheel 51 and gearing 52, also supported by the arms 50. By such means the said former can be adjusted at any required distance from the adjacent interior surface of the mold, so as to regulate the thickness of the article to be molded.

The carrier 48 is loosely mounted on a shaft 53, about which it can be turned, (when the former 41 is raised from out of the mold, as hereinafter described,) so as to laterally move the said former clear of the mold by means of a hand-wheel 54 and worm 55, both carried by a bearing-piece 56, keyed to the shaft 53, the worm engaging with and actuating a worm-wheel 57, fast to the carrier. The shaft 53 is guided by the cross-head 32 and by an upper frame 58, (*vide* Figs. 2 and 3,) which is bolted at 59 to the standards 33. The shaft can be raised and lowered in such cross-head and upper frame, as hereinafter described; but it is prevented from rotating by a key in the frame 58 engaging in a longitudinal keyway 60, made in its upper part. The shaft, together with the carrier and the former 41 it supports, can be raised and lowered, as required, by a hand-wheel 61 and worm 62, both carried by bearings 63, bolted to the under side of the cross-head 32, the worm engaging with and actuating a worm-wheel 64, (*vide* Figs. 1 and 2,) which works between opposite parts of the bearing 63 and engages with a wormed portion 53^x of the shaft 53, and when rotated causes such shaft and all its attachments to be raised or lowered. By the aforesaid means the former 41 can be lowered into and raised from out of the mold, as required, and when lowered into the mold can be set at any required distance from the adjacent inner side of the latter, so as to regulate the thickness of the article to be formed, and when raised from out of the mold the said former can be moved laterally to the one side or the other, so as to permit of the molded article being ejected from the mold by the ram 27.

In manufacturing tubular or open-ended articles the former 41 is first lowered into the mold and adjusted at the required distance from the adjacent part of its inner periphery. The required quantity of molten metal is then poured into the mold and the false bottom and mold are rotated, the gearing 35 36 37 39 being so arranged as to cause the false bottom to be rotated at the greater speed, so as to cause all the metal resting thereon to fly to the inner circumference of the mold, by the rotation of which latter the metal is taken up and spread over such inner circumference to a height determined by a removable gage-ring 65, which is bolted at 66 or is

otherwise suitably secured to the mouth of the mold, and to a thickness determined by the adjustment of the former 41, which is rotated by its frictional contact with the molten metal. During the setting of the metal the speed of rotation of the mold is gradually lowered by shifting the disk 14 toward the center of the disk 13, and when the molded article is ready for removal the ring 65 is removed and the ram 27 is operated, so as to raise the formed article from out of the mold. When a closed-bottomed article is to be formed, the gearing 35 36 37 39 is so arranged as that the false bottom is rotated at a lower speed than the mold, so as to offer a retarding influence to the molten metal immediately resting thereon and prevent it from being spun off to the inner circumference of the mold.

I claim as my invention—

1. In apparatus employed in casting tubular and dished articles from molten metal, in combination, a vertical mold having a false bottom and a revoluble former within the mold, and means for rotating the mold at any desired speed, means for rotating the false bottom at any desired relative speed for forming tubular articles, means for adjusting the said former to regulate the thickness of the article being molded, means for raising the said former out of and laterally shifting it clear of the mold, and means for raising the false bottom within the mold for ejecting the molded article.

2. In apparatus employed in the casting of tubular and dished articles from molten metal, in combination, a mold frictional gearing for turning the mold, a shaft carrying the gear-wheel 8, differential frictional gearing for rotating said shaft, a false bottom for the mold, change-wheel gearing for differentially rotating the same relatively to the mold, a shaft connected to the false bottom, and means for raising the same within the mold and ejecting the formed article, a vertically-arranged revoluble former 41 within the mold and rotating freely on its support, shafts for the said former and the gearing, and means for lowering and adjusting the said former relatively to the inner surface of the mold, means for adjusting the thickness of the article to be formed, and means for raising the said former out of the mold and laterally shifting it, and means for actuating the apparatus by power.

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

WM. AMBLER.

Witnesses:

HENRY S. LENTY,

GEO. F. MOSS,

Clerks to T. P. & Greenwood Teale, Solicitors
and Notaries Public, Leeds, England.