No. 883,312. PATENTED MAR. 31, 1908.

R. B. HOLLEY.

CASTING MACHINE.

APPLICATION FILED JUNE 5, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

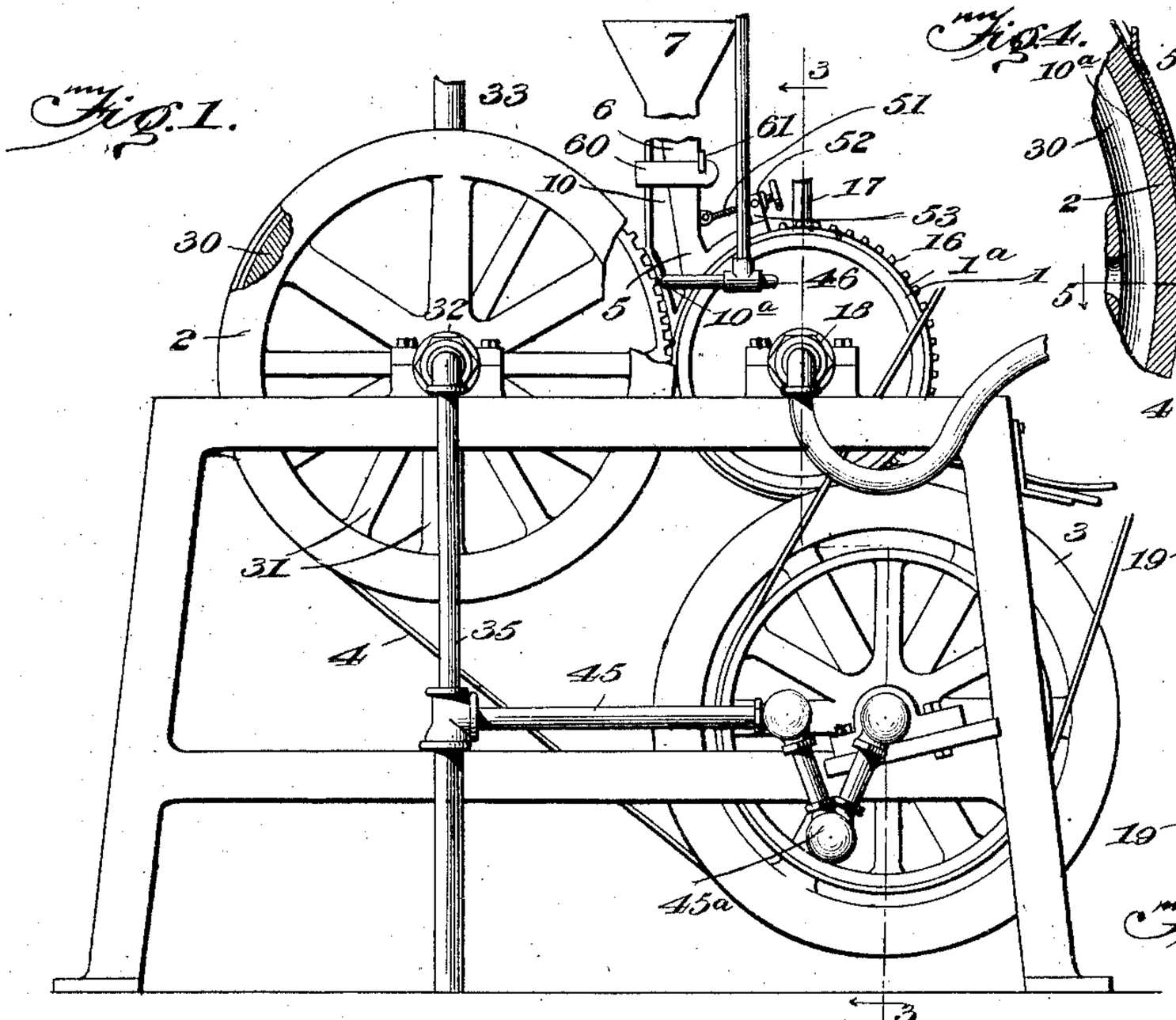


Fig. 4.

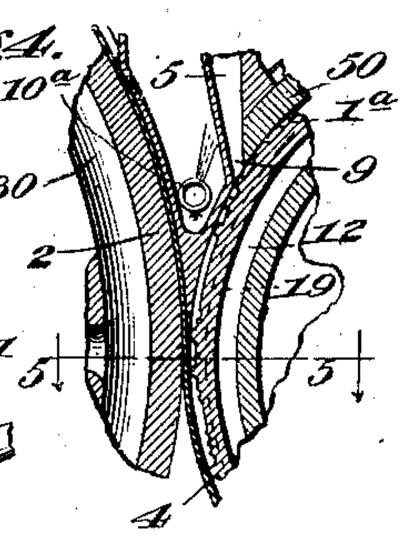


Fig. 5.

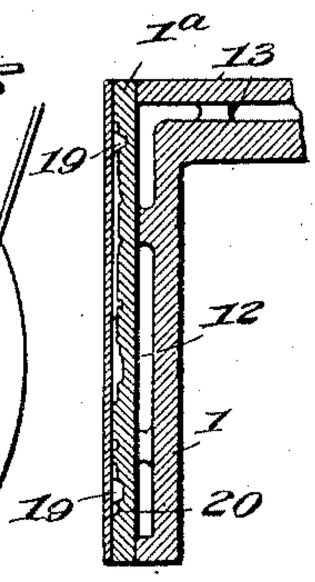


Fig. 2.

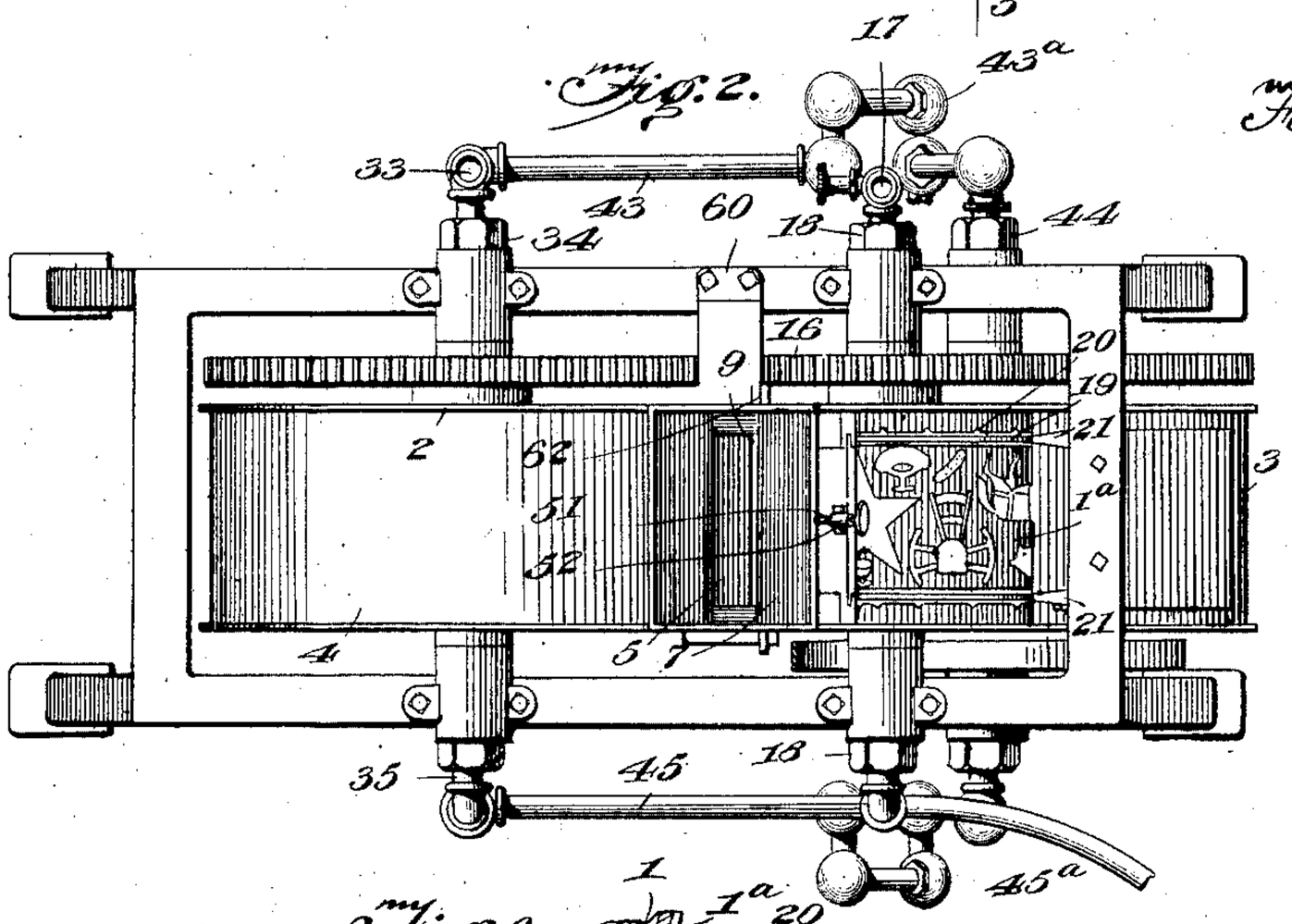


Fig. 9.

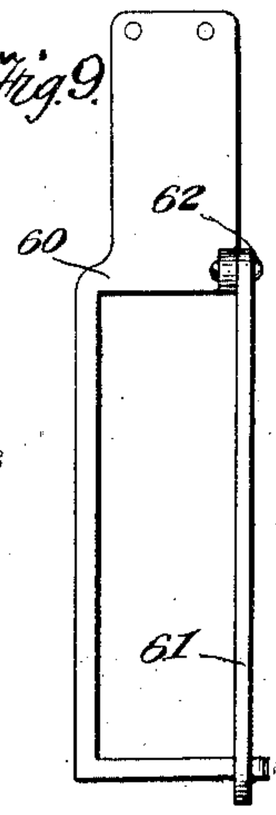
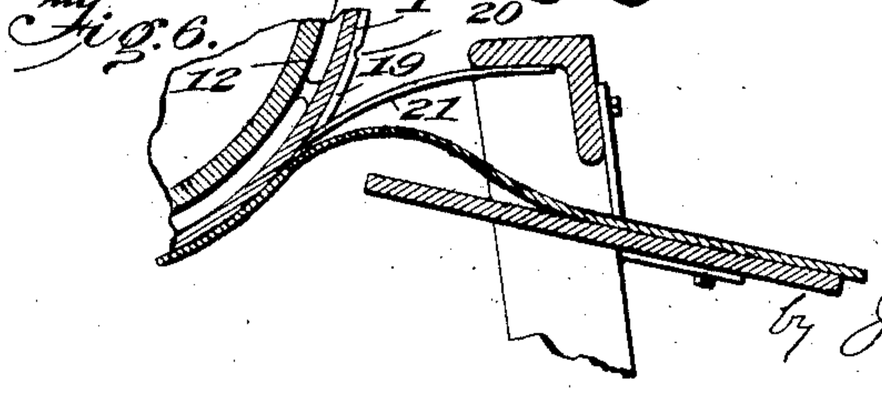


Fig. 6.



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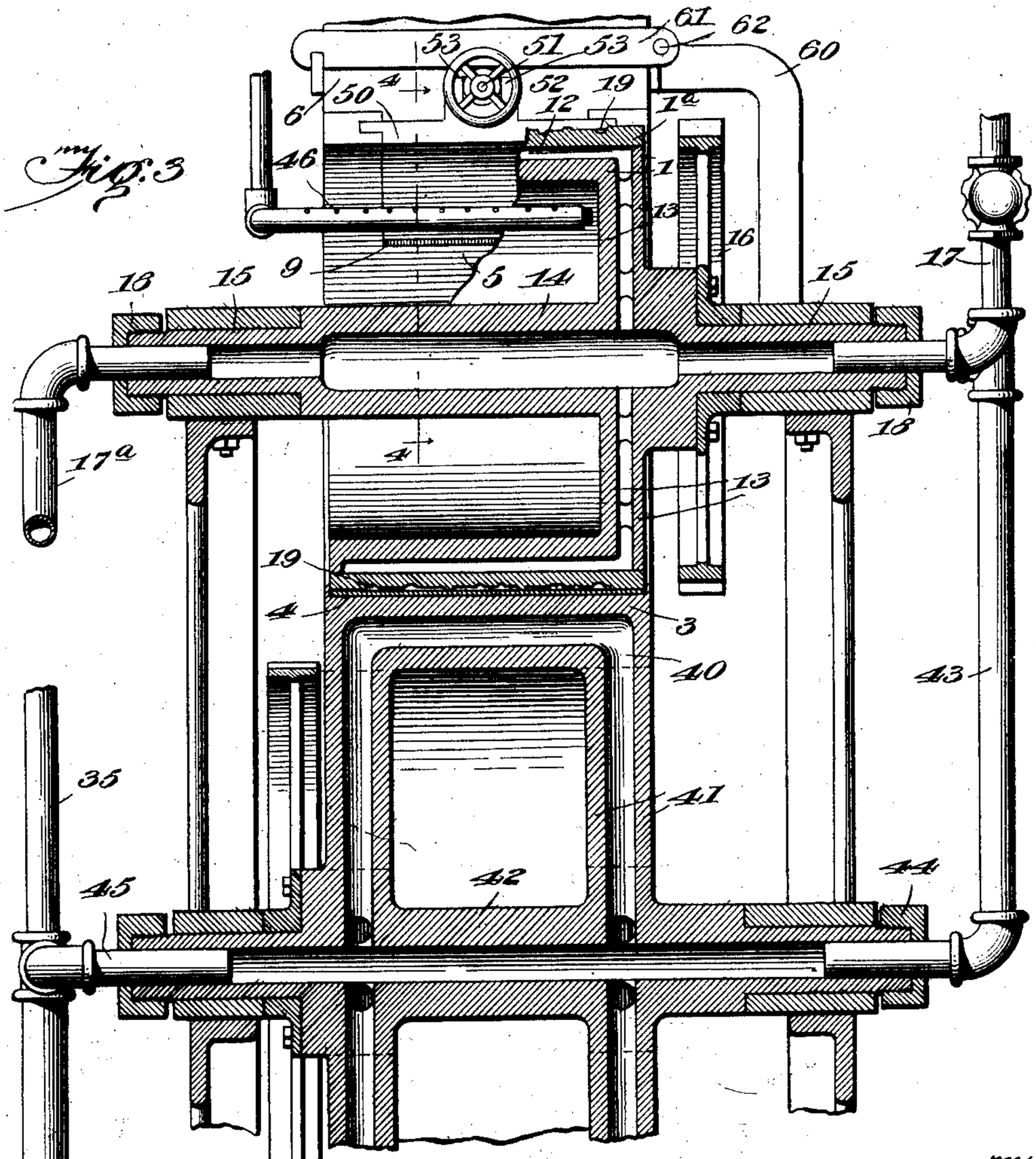

Fig. 3.

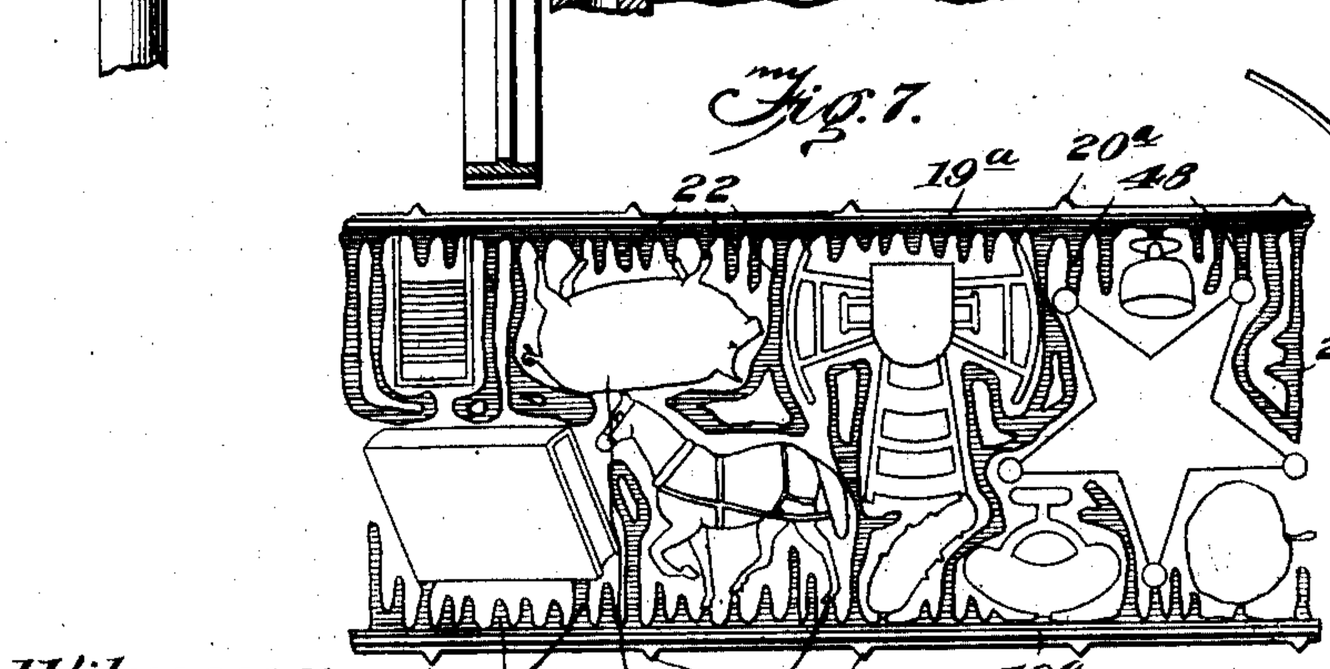

Fig. 7.

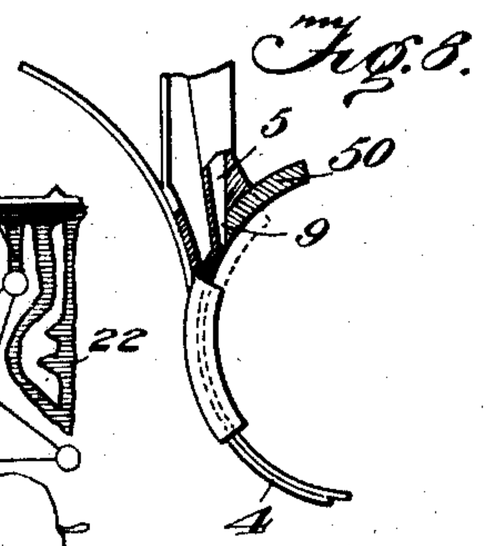

Fig. 8.

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UNITED STATES PATENT OFFICE.

ROBERT B. HOLLEY, OF CHICAGO, ILLINOIS.

CASTING-MACHINE.

No. 883,312. Specification of Letters Patent. Patented March 31, 1908.

Application filed June 5, 1907. Serial No. 377,464.

To all whom it may concern:

Be it known that I, ROBERT B. HOLLEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Casting-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This application is identical with my application Serial No. 176,629, filed Oct. 12, 1903; allowed Oct. 28, 1904; revived Oct. 27, 1906; re-allowed Nov. 13, 1906, and forfeited May 13, 1907.

The purpose of this invention is to provide an improved mechanism for casting by continuous process small articles, especially such as may be made of soft metal.

It consists of the features of construction of the machine which are set out in the claims.

In the drawings:—Figure 1 is a side elevation of my improved casting machine. Fig. 2 is a top plan of the same. Fig. 3 is a section at the line 3—3 on Fig. 1. Fig. 4 is a detail section at the line 4—4 on Fig. 3. Fig. 5 is a detail section of the molding cylinder at the line 5—5 on Fig. 4. Fig. 6 is a detail section transverse to the axis of the molding cylinder at the point of delivery of the web of castings, showing the stripper and delivery board. Fig. 7 is a plan view of a portion of cast web formed in my machine. Fig. 8 is a sectional detail showing a portion of the molding cylinder and the adjacent parts, illustrating a form which may be used for casting plain metal sheet, the side of the spout being broken away and shown in vertical section for a short distance. Fig. 9 is a plan view of the bracket and open rectangular guide-way for steadying and guiding the spout vertically.

In my improved machine, I employ a molding cylinder, 1, in whose cylindrical periphery are formed the mold cavaties for producing the various articles to be cast with the machine. And the machine, in the particular form shown, is designed and adapted only for casting such forms as have one face or side profile plane, the configuration by upraise and depression being all on the opposite side or face. Another class of articles commonly known as confectioners' novelties,—being usually miniature reproductions of familiar objects of art and nature,—and also the class of toys, particularly miniature furniture, which may be made of sheet metal or paper or flexible cast forms, which, being formed first in a sheet and then folded into the form of familiar articles of furniture represented, constitute the more familiar product of such a machine. This molding cylinder is associated in my machine with two other cylinders, 2 and 3, having their axes parallel with the molding cylinder and in positions, respectively, to be tangent to the latter at lines distant from 60 to 120 degrees apart on said molding cylinder. Encompassing the two cylinders, 2 and 3, and lapping on the molding cylinder, 1, over the portion of its periphery contained between the lines of tangency with the other two cylinders, is an endless metal belt, 4. The three cylinders, 1, 2 and 3, are preferably geared together so as to run all at the same circumferential speed, causing the endless metal belt, 4, to travel at the same speed and thereby to run without slipping or rubbing on the periphery of the molding cylinder at the portion of that periphery in contact with the belt.

5 is a downwardly discharging spout leading from or terminating a stand-pipe, 6, which leads from a crucible,—or other source of melted metal,—7. The spout, 5, is formed exteriorly at its lower end so as to fit accurately between the proximate surfaces at the upper side of the molding cylinder, 1, and the endless metal belt, 4, as the latter runs upon the upper side of the cylinder, 2, and is supported and held in place within the said angular interval between said surface and the endless belt as it runs thereonto, by the open rectangular guide-way or bracket, 60, so as to be free to settle by gravity into said angular interval and thereby into contact with said molded surface. The guide-way, 60, is mounted on the frame and has the bar, 61, forming one of the sides of the rectangle adapted to swing upward on the pivot, 62, thus affording means for readily removing the spout from its place in the said angular opening. This spout is of the full width of the mold-bearing surface of the cylinder, 1, and its throat or duct, 9, for melted metal tapers, narrowing from the stand-pipe downward to the point of discharge of said throat on the surface of the mold cylinder, 1, where it opens at a narrow rift so as to deliver the molten metal on to

the face of the mold cylinder in a thin blade-like stream. One wall of the spout,—preferably that toward the cylinder, 2,—is hollow, the cavity, 10, being occupied by a gas burner, 10^a, whose flame is discharged against the wall of the cavity toward the duct or metal passage, 9, to keep the same hot and maintain the metal in properly fluid condition.

The mold cylinder, 1, is hollow; that is, it comprises a hollow cylindrical annulus, having a continuous cavity, 12, connected by a web, 13, at one side to a suitable hub, 14. The hub and web are also hollow, and the hub has at its ends two hollow stud axles, 15, 15, on one of which is the gear, 16, by which the cylinder is rotated.

Supply and waste pipes, 17, 17^a, are connected by proper swivel joints through stuffing boxes, 18, 18, to the ends of the hollow axles respectively, and thereby there is maintained a current of water which enters the shaft, and by way of the web reaches the hollow annulus forming the periphery, in which the water may be kept at any desired height, determined by the highest point in the waste pipe, 17^a, which in the drawings is that of the axis of the cylinder. The lower half of the cylinder is thus kept always full of water and the cylinder is cooled as it rotates through the lower half of its course.

Immediately back of the point at which the metal is discharged from the spout, 9, into the mold cavities on the outer periphery of the cylinder there is located a gas jet, 46, for heating the cylinder so that the metal discharged upon its surface shall not become cooled before it has time to fill all the recesses of the cavities of the mold.

The end of the spout, 9, being reduced to a feather edge where it extends in the angle between the metal belt, 4, and the surface of the molding cylinder, the mold cavities in the face of the cylinder are completely closed after they pass by the mouth of the spout, 9, first, by the end of the spout, and after running past that, by the belt, 4, where it is wrapped on the molding cylinder from the line of tangency of that cylinder with the cylinder, 2, to the line of tangency of the cylinder, 3. While the cylinder is revolving through this portion of its course it is exposed to the cooling action of the water which may be kept circulating through the water chamber of the hollow annulus, so that by the time any given mold cavity in the periphery begins to pass away from the belt, 4,—that is, beyond the line of tangency of the cylinders, 1 and 3,—the metal has become thoroughly cooled and set. In order to cool the metal belt, 4, so that it also shall operate as a means of promptly cooling the metal in the mold cavities when the latter reach the belt, the cylinders, 2 and 3, are constructed with connected or continuous cavities, 30 and 40, back of the cylindrical face, such cavities communicating through the web, 31, 41, with the hollow hubs, 32, 42, which are connected with the water supply by pipes, 33, 43, leading through stuffing boxes, 34, 44, into the hollow hubs, waste pipes, 35, 45, being similarly connected at the opposite ends of the hubs to carry the water off and thus maintain circulation. For the purpose of permitting the taking up of the slack of the belt, 4, the cylinder, 3, is provided with a suitable flexible connection such as the flexible joints, 43^a, 45^a, at the junction of the supply pipe, 43, and the waste pipe, 45, with the hollow hub of said cylinder, 3.

In order to facilitate removing the casts from the mold cavities, it is desirable to form all the cavities in the periphery of the mold wheel so that they communicate successively around the wheel as by connecting the recesses which are formed for the purpose of producing the desired shapes, by furrows, 48, in which the metal will flow, the result being that the entire cast is formed on the mold cylinder in a continuous web, the casts desired for use being gated together by the metal running in the connecting furrows. In order that this web may be most conveniently handled without danger of injuring the delicate casts, it is desirable that the margins should be continuous; and for this purpose, furrows or gate grooves, 19, are arranged so as to form unbroken margins for the strip. To prevent the cast web dragging in the cylinder, as it might if the metal belt, 4, should slip so as to have a reverse movement relatively to the molded face of the cylinder, I form in said molded face at intervals along the margin slight transversely-extending recesses, 20, in which the metal flows when the remainder of the cast is formed and which form thus projections, 20^a, engaging the face of the cylinder at sufficiently short intervals to tie the web to the cylinder against any longitudinal dragging which might otherwise occur. For the purpose of stripping the cast web from the mold cylinder as the latter begins to revolve up away from the cylinder, 3, I provide strippers, 21, 21, arranged to enter the marginal grooves, 19, in which the marginal gate beads, 19^a, are formed, so that being once entered under the gate beads as the cast strip emerges, they will continue to follow the grooves and plow up the said beads from the furrows and thereby strip the entire web free from the mold periphery. In order to permit the lifting away of the cylinder, 1, from the pulley for any desired purpose the bearings of the cylinder, 1, are mounted removably on the frame and are held in position by the same bolts which secure the cap of the bearings.

Upon considering the manner in which the periphery of the mold wheel having the

cavities for forming the casts is related to the discharge end of the spout which brings the molten metal to the cavities, it will be understood that if the face of the mold cylinder were perfectly plain,—that is, without recesses or cavities,—for a distance greater than the width of the mouth of the duct, 9, the flow of metal from so much of the transverse extent of the spout as might be covered by such unrecessed area of the cylinder, would be stopped entirely while the same was passing said mouth. For this reason I find it desirable to avoid leaving anywhere in the periphery of the mold cylinder a smooth surface,—that is, one unbroken by recess,—which is of sufficient extent circumferentially to entirely span the mouth of the spout; for if there is such a smooth face, even though it may extend over only a small part of the width of the face of the mold cylinder so that it closes only a portion of the corresponding dimension of the spout, yet that portion of the spout's mouth is liable to become closed by the solidifying of the metal therein, and the mold cavities in the zone of such closure, following the smooth portion which caused the closure, will not be filled for a considerable distance. I therefore arrange the cavities for forming the various articles I desire to cast so that as nearly as may be they occupy the entire cylindrical surface of the mold cylinder with only the least intervals which will suffice to separate the successive forms; and wherever larger areas are necessarily left between these forms I make cavities of any convenient shape into which the metal may run connected by slender gate furrows with the cavities designed for the desired forms at both sides. Instances of these special cavities made to prevent the presence of continuous smooth surfaces which would cause the spout to become closed are seen at 22, 22, 22, in the web of casts shown in Fig. 7.

The portion of the molding cylinder, 1, which has the recessed face for forming the casts is most desirably made of steel forging, and in order that it may be thus made and at the same time have the continuous water cavity back of it, and also in order that it may be removed and substituted by other similar molds having different designs, I make for this purpose a forged steel annulus, 1^a, whose outer surface has the recesses and whose inner surface may be cylindrical, or preferably very slightly tapered conically; and I form the remainder of the cylinder, 1, by casting the same with a peripheral channel to form the continuous water cavity, 12, the marginal walls of such channel having their peripheral edges turned true to seat the steel annulus, and with a corresponding very slight conical taper so that the steel annulus may be thus forced onto the cast portion of the wheel and made perfectly water tight by the ordinary expedients, such as slightly leading the surfaces in contact or employing other form of packing for the joints.

In order that the stream of metal which is delivered onto the molding surface may be regulated according to the quantity of metal required for the casts varying with the depth of the molding surfaces on different cylinders, I provide a cut-off or slide valve, 50, which is mounted on the spout and guided thereon in an arc of a circle about the axis of the cylinder, 1, so that it may be adjusted in such arc to restrict or enlarge the mouth of the spout through which the metal is delivered. To adjust the valve I provide a bolt, 51, hinged to the back of the spout and taking through an eye in the lug, 52, at the end of the valve, and a nut, 53, on the threaded end of the bolt beyond the lug.

I claim:—

1. In combination with a rotary body having a surface which is conformed endlessly to its path of rotation, and having mold recesses in such surface; an endless flexible element adapted to conform to such path of rotation, and thereby cover the mold recesses over the extent of such conformation; means guiding and actuating such flexible cover in an endless path of travel, and holding it at one part of such path conformed to part of the recessed molding surface; means delivering molten metal onto such recessed surface at a point back of that which is covered by the flexible cover, and for heating said surface opposite the point at which the metal is thus delivered thereonto, and means for cooling said surface at the portion of its path where it is covered by the flexible cover beyond the point of delivery of the metal thereonto.

2. In combination with a rotary body having a surface which is conformed endlessly to its path of rotation and having mold recesses in such surface, an endless flexible element adapted to conform to such path of rotation and thereby to cover the molding recesses in such surface over the area of such conformation; means guiding and actuating such flexible cover in an endless path of travel, and holding it at one part of said path conformed to the part to be covered of the recessed molding surface; means delivering molten metal onto such recessed surface at a portion thereof which is not covered by said endless flexible cover; means for heating such rotary body at the point of delivery of the molten metal thereonto, said body having back of its molding surface a continuous cavity, and means supplying a cooling liquid to such cavity at a point in its path of rotation beyond the point of delivery of the molten metal, and for draining such cooling liquid from such cavity at a point in such path back of the means for heating said rotary body.

3. A casting machine comprising a rotary body having a surface which is conformed endlessly to its path of rotation; a spout having its end in contact with said surface and having its discharge mouth opening through such end to deliver molten metal into the recesses of such surface, all portions of said surface intervening between the recesses formed for the purpose of the casts to be made, and all portions corresponding to the apertures or interrupted areas in such casts being provided with supplemental recesses separated from the recesses made for the casts and from each other by narrow walls or ridges, whereby the closing of the metal-supplying mouth of the spout by the surface of such rotary body passing it is avoided.

4. A casting machine comprising a rotary body having a surface which is conformed endlessly to its path of rotation, and having in such surface recesses for castings to be formed therein; means for depositing molten metal onto such recessed surface and for limiting such deposit to the recesses thereof, said surface having, in addition to the recesses for producing the casts to be formed, grooves connecting such recesses to form gates connecting the casts successively, and continuous marginal grooves at the opposite sides, and grooves connecting such marginal grooves with the casting recesses, whereby the cast produced forms a continuous web with marginal beads and strips protuding into the marginal grooves as the rotary body revolves to engage said beads to strip the cast web therefrom.

5. A casting machine comprising a rotary body having a surface which is conformed endlessly to its path of rotation, said surface having recesses for producing casts to be formed therein; a spout having an end in contact with said surface and having a duct opening through said end to deliver molten metal into the recesses, whereby the deposit of such metal is limited to the recesses; means covering said recesses for a portion of the path of rotation after the deposit of the metal, and for cooling said body over such portion, the casting recesses in said surface being connected with each other successively by grooves forming gates joining the casts together, said surface having also marginal grooves and other grooves connecting them with the casting recesses, whereby the casting produced in such surface constitutes a continuous web of marginal beads, and strippers protruding into said marginal grooves beyond the covered area to engage the marginal beads of the cast web to strip the latter from the recessed surface.

6. A casting machine comprising a rotary body having a surface which is conformed endlessly to its path of rotation and having recesses for the deposit of metal to produce casts to be formed therein, said surface having, in addition to the casting recesses, marginal grooves and other grooves connecting them with the casting recesses, whereby are formed marginal beads with the casts all connected to them in a continuous web, said surface having short recesses or notches leading transversely from the marginal grooves at frequent intervals, whereby there are formed short transverse projections at like intervals on the marginal beads to prevent longitudinal slipping of the cast web.

7. In a casting machine comprising, in combination with a cylinder having its cylindrical periphery provided with casting recesses, an endless belt and pulleys which it encompasses and by which it is propelled, said pulleys being in position to hold the ply of the belt which runs onto the casting surface in contact therewith from the point where it leaves the preceding pulley to the point where it passes onto the succeeding pulley, whereby the belt is grasped closely between the casting cylinder on one hand and said pulleys on the other, the lower pulley onto which the belt runs having its bearings adjustable in an arc about the axis of the molding cylinder to take up the slack of the belt.

8. In combination with a cylinder having its cylindrical periphery provided with casting recesses, an endless belt with pulleys which it encompasses and by which it is propelled, located in position to hold one ply of the belt on the surface of the cylinder from the point where it leaves the preceding pulley to the point where it runs onto the succeeding pulley; a spout for delivering molten metal to the casting surface of the cylinder conformed to the angular interval between said surface and the endless belt as it runs thereonto, the relative position of the cylinder and pulleys being such that said angular interval is open upward, and the spout being supported and guided so as to be free to settle by gravity into said angular interval and thereby into contact with said casting surface; means for holding the spout elevated out of such contact, and bearings for the cylinder which are movable to lift it away from the pulleys.

9. In a casting machine, in combination with a cylinder having its axis horizontal and having its cylindrical periphery provided with molding recesses, a spout having an end in contact with said cylindrical surface at one side above the horizontal plane of the axis, and having a duct for the delivery of molten metal opening through said end, whereby the metal is delivered directly into the recesses and restricted thereto; means for controlling the discharge spout seated on the periphery of the cylinder and moving on said seat for opening and closing; means covering the recesses for a distance along the path of rotation beyond the spout and below said horizontal plane of the axis, to retain the metal

in the recesses; said cylinder having a contiouous cavity back of its cylindrical surface, said cylinder having a hollow axle and ducts connecting the cavity of such axle with the axle; a water-pipe from a source of water supply entering one end and a waste pipe leading from the other end, and stuffing boxes on said axle through which the supply and waste pipes enter and emerge respectively, whereby said cavity over the lower half of the cylinder may be kept supplied with water, and continuous circulation of the same therethrough maintained.

10. In a casting machine, in combination with a cylinder having its axis horizontal and having its cylindrical periphery provided with molding recesses, a spout having an end in contact with said cylindrical surface at one side above the horizontal plane of the axis, and having a duct for the delivery of molten metal opening through said end, whereby the metal is delivered directly into the recesses and restricted thereto; a valve forming one side of the mouth of the discharge spout and seated on the periphery of the cylinder and moving on said seat about the center of the cylinder for controlling the discharge; means covering the recesses for a distance along the path of rotation beyond the spout and below said horizontal plane of the axis, to retain the metal in the recesses, said cylinder having a continuous cavity back of its cylindrical surface, said cylinder having a hollow axle and ducts connecting the cavity of such axle with the axle; a water pipe from a source of water supply entering one end and a waste pipe leading from the other end, and stuffing boxes on said axle through which the supply and waste pipes enter and emerge respectively, whereby said cavity over the lower half of the cylinder may be kept supplied with water, and continued circulation of the same therethrough maintained.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 18th day of May, 1907.

ROBT. B. HOLLEY

Witnesses:
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J. S. ABBOTT.