No. 611,634. Patented Oct. 4, 1898.

A. I. JACOBS.

MACHINE FOR FORMING NIPPLES.

(Application filed Sept. 29, 1896.)

(No Model.) 6 Sheets—Sheet 1.

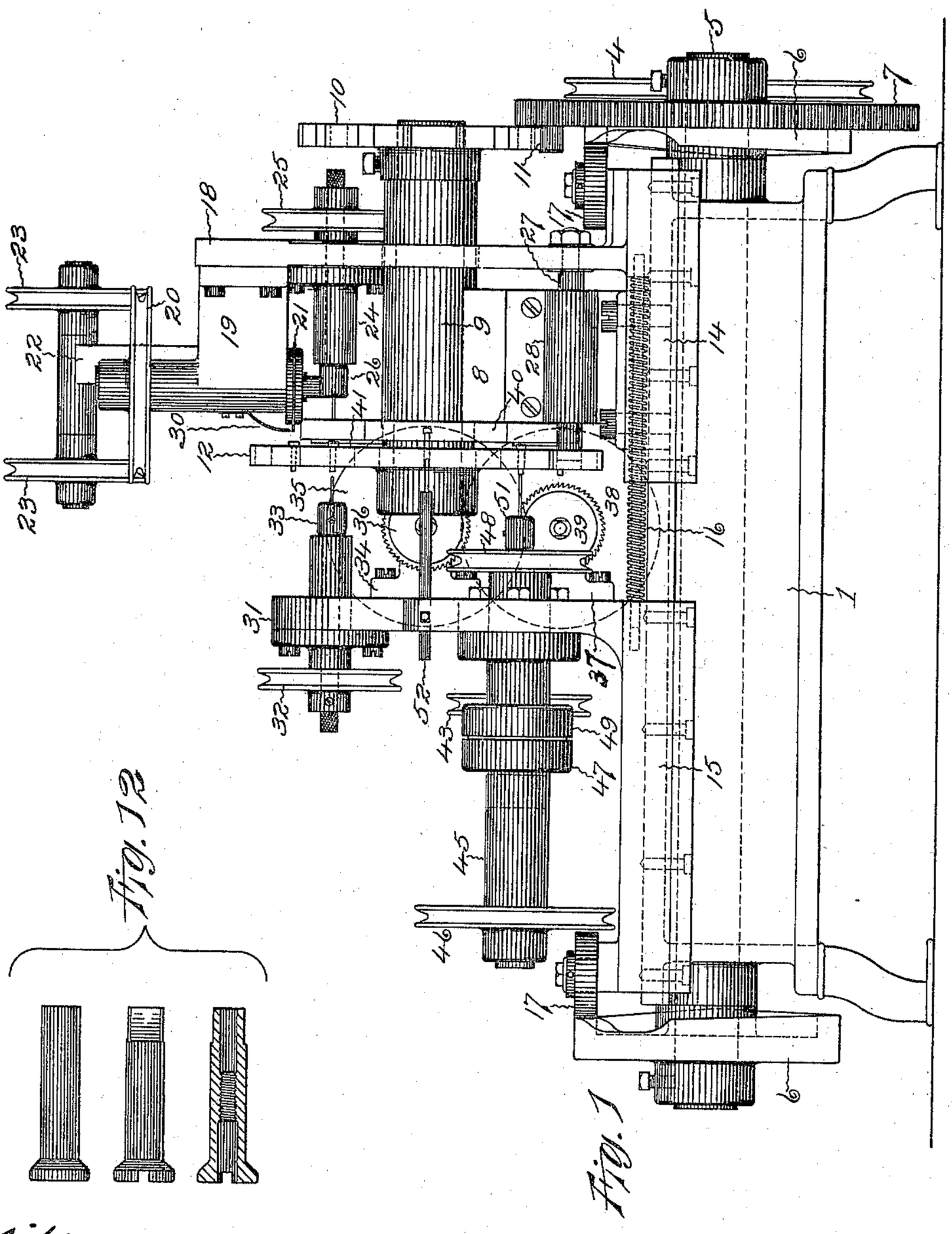

Fig. 1

Fig. 12

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Fig. 2

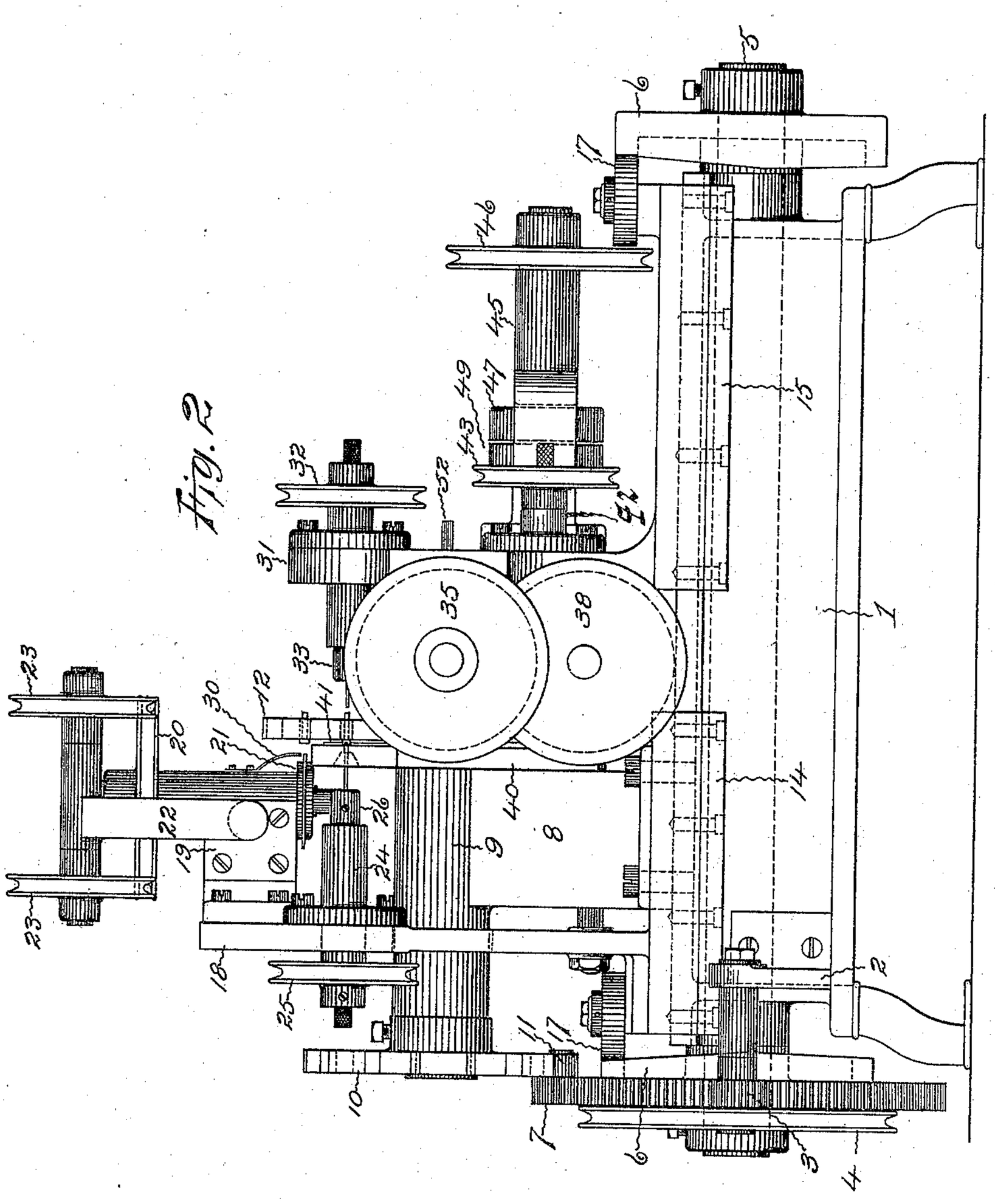

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Fig. 8

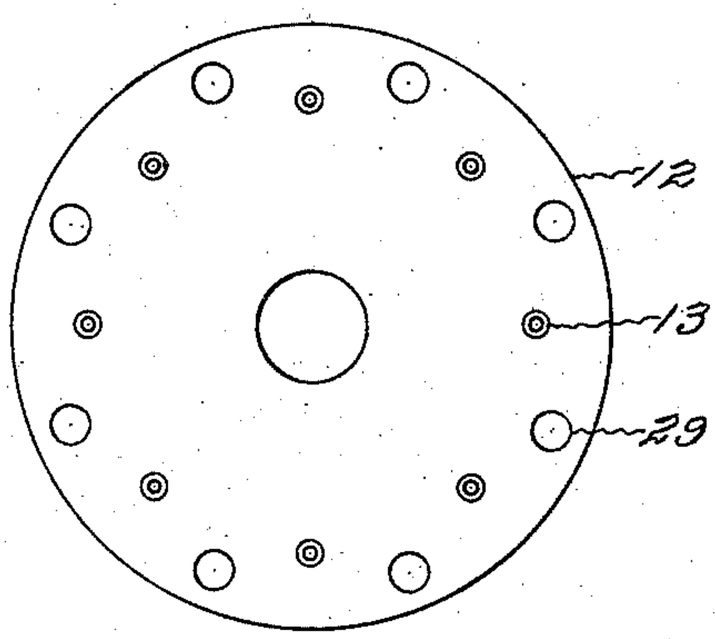

Fig. 3

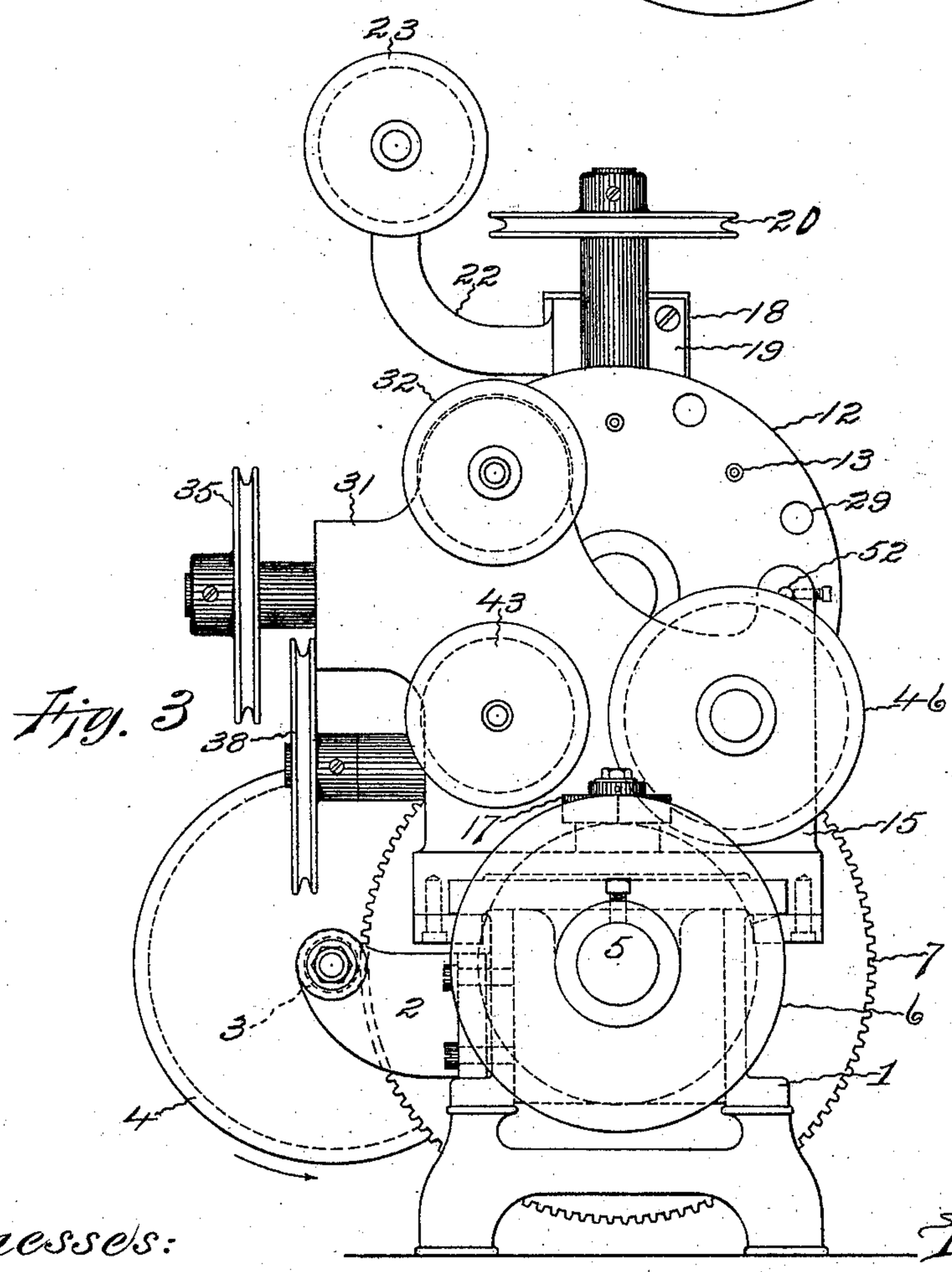

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Fig. 9

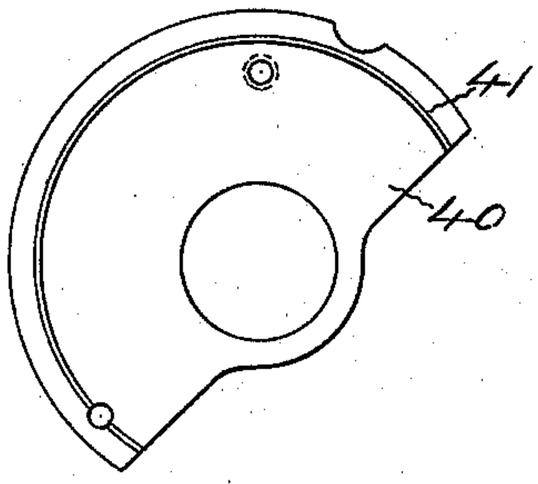


Fig. 10

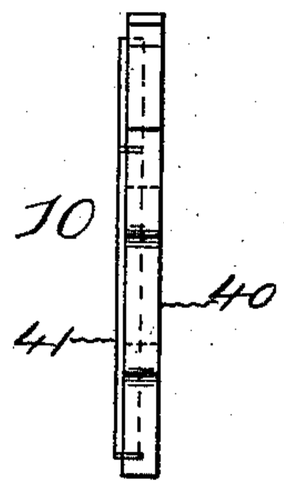
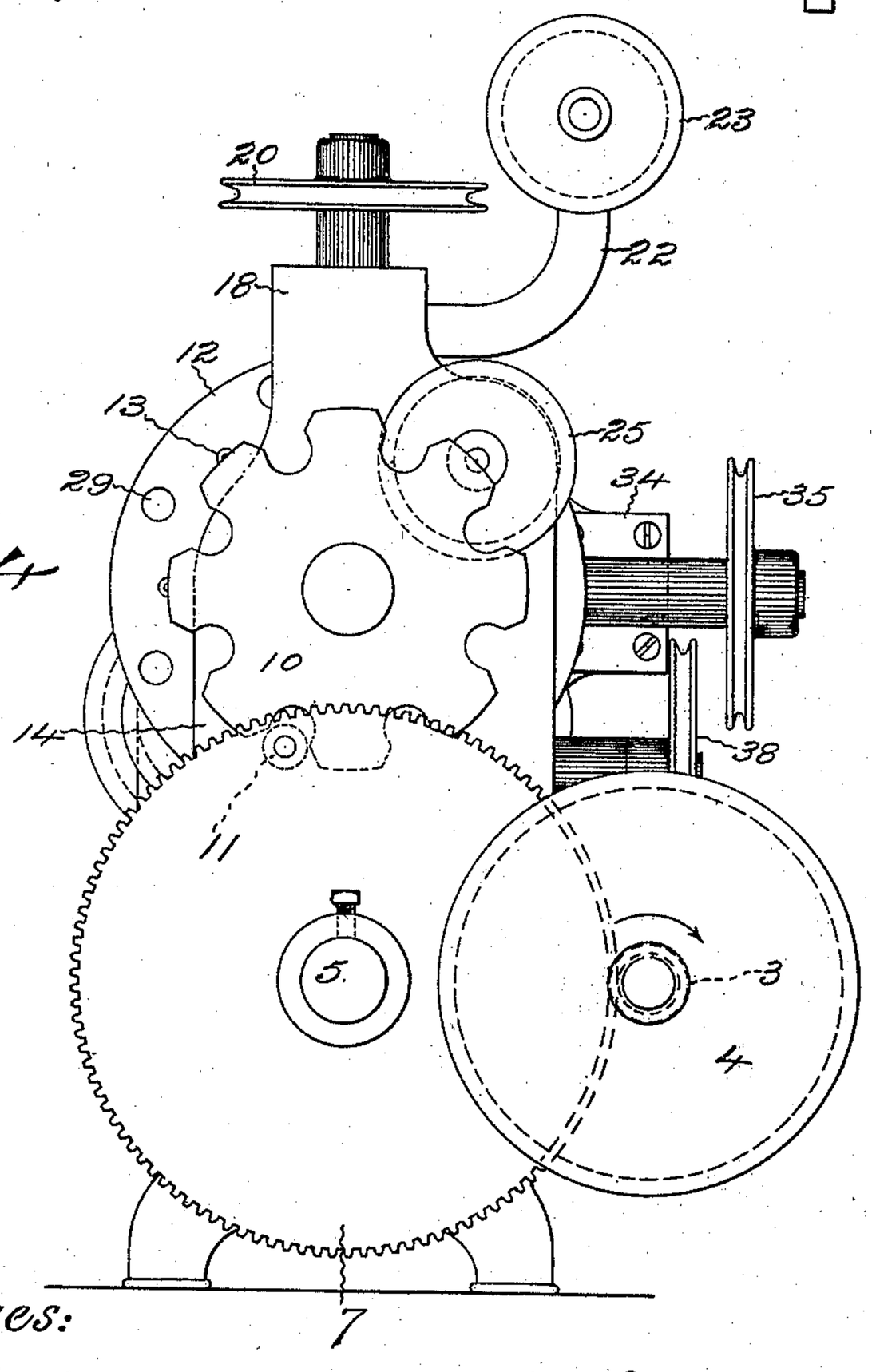


Fig. 4



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(No Model.) 6 Sheets—Sheet 5.

Fig. 5

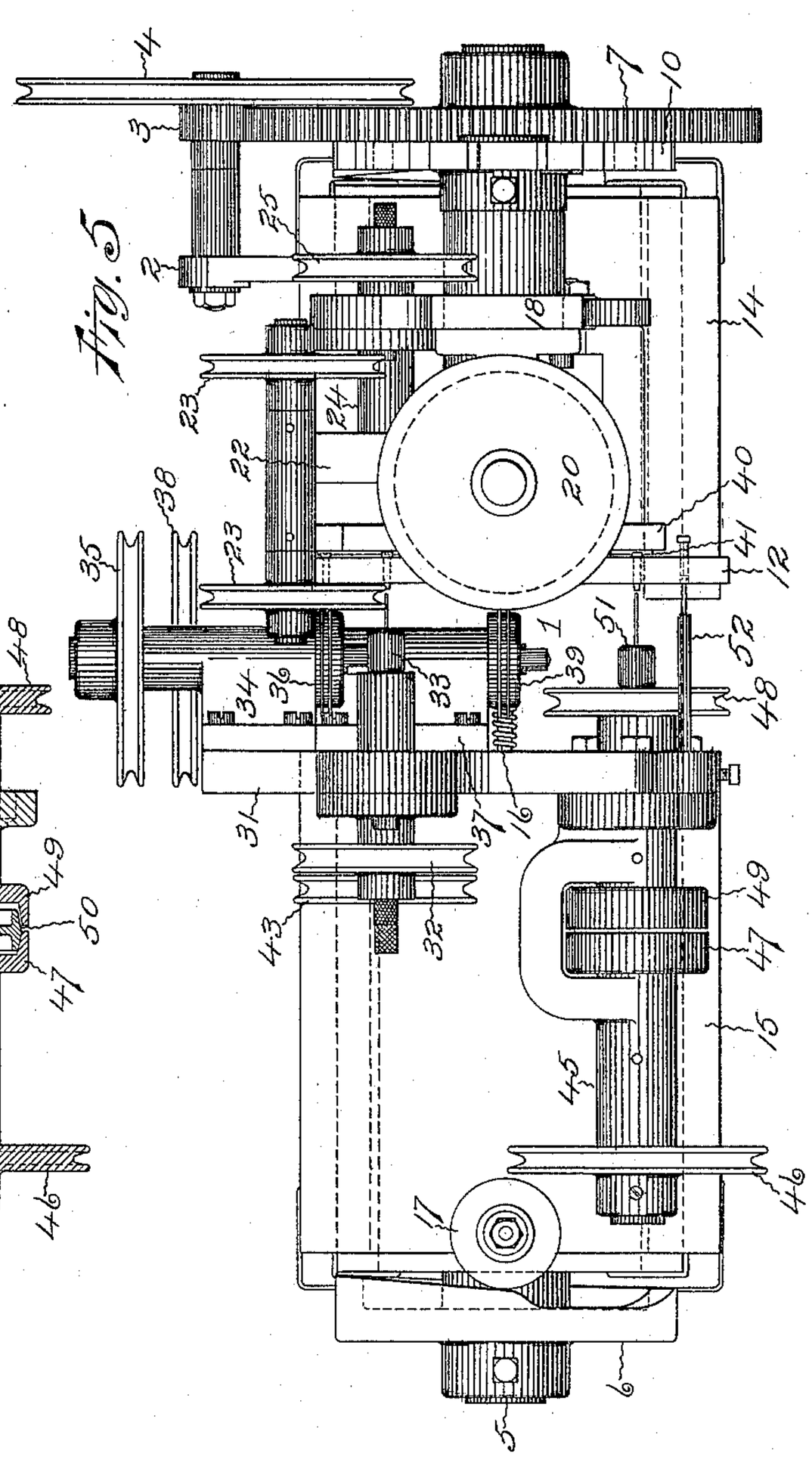

Fig. 11

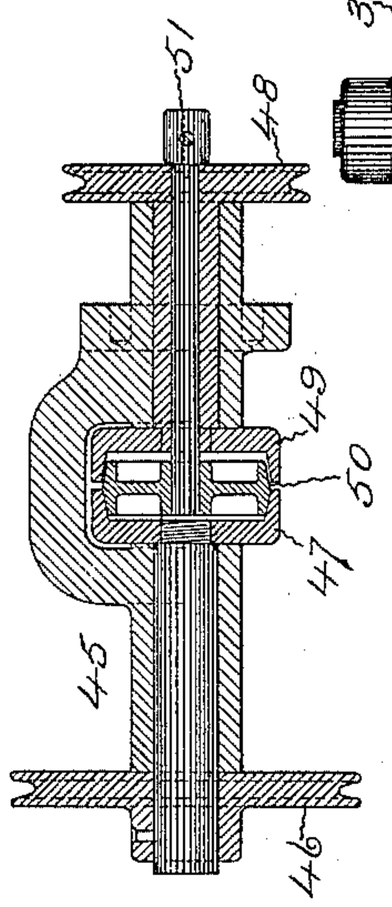

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Fig. 6

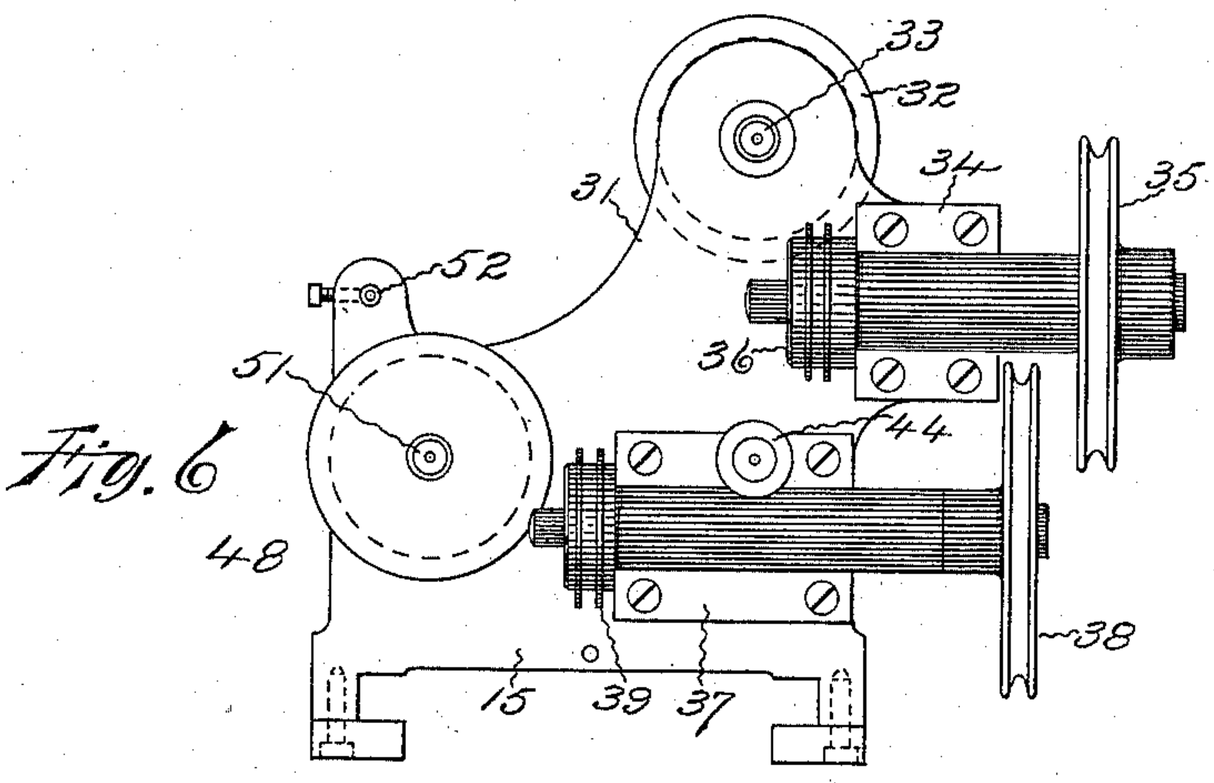
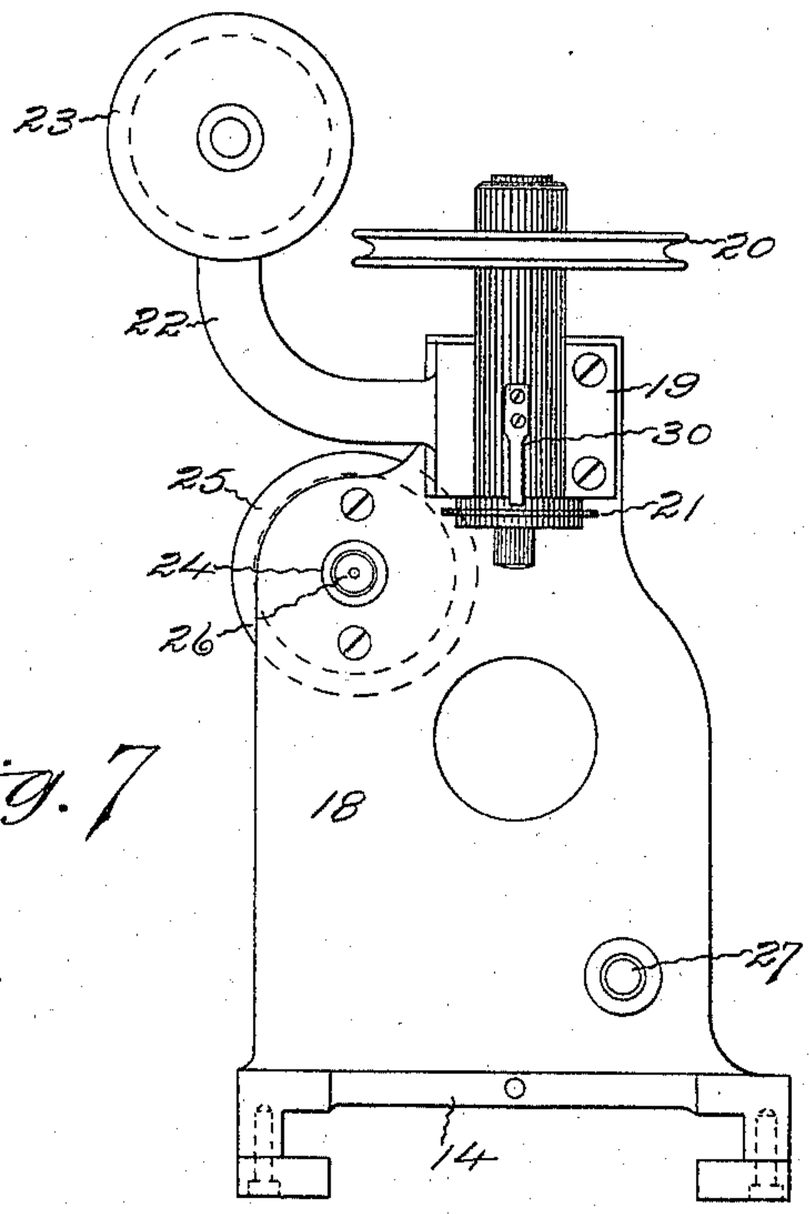


Fig. 7



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UNITED STATES PATENT OFFICE.

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MACHINE FOR FORMING NIPPLES.

SPECIFICATION forming part of Letters Patent No. 611,634, dated October 4, 1898.

Application filed September 29, 1896. Serial No. 607,352. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR I. JACOBS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Forming Nipples, of which the following is a specification.

The invention relates to the class of machines into which small blanks are fed and automatically presented to the operation of the different cutting, boring, and threading tools and then ejected fully formed, the operations of the forming-tools being carried on simultaneously on the successive blanks.

The object of the invention is to provide a simple, durable, and inexpensive machine of this class into which the blanks can be easily fed and quickly and accurately presented to the action of the moving cutting-tools, whereby the blanks are formed very rapidly into completed nipples, such as are employed for connecting the hubs and wire spokes of wheels of the kind designed for bicycles and other light vehicles.

The machine shown as embodying the several features of the invention is constructed to receive headed blanks and successively present these blanks to a tool which slots the headed end, to tools which bore out both ends, to tools which slab off diametrically opposite sides of the smaller end, to a tool which completes the perforation through the blank, to tools which slab off other sides of the smaller end, to a tool which taps the interior with a thread, and then to a tool which ejects the finished nipple from the blank-carrier, as more particularly hereinafter described, and pointed out in the claims.

Referring to the accompanying drawings, which illustrate a machine embodying the features of the invention, Figure 1 is a front elevation of the machine. Fig. 2 is a rear elevation. Fig. 3 is an elevation of the left end. Fig. 4 is an elevation of the right end. Fig. 5 is a plan. Fig. 6 is a view of the face of one of the movable tool-holding carriages. Fig. 7 is a view of the face of the other of the carriages. Fig. 8 is a face view of the blank-carrier. Fig. 9 is a face view of the plate that keeps the blanks from rotating in their holding-perforations in the carrier. Fig. 10 is an edge view of the same. Fig. 11 is a sectional view of the clutch parts employed for driving the tap-shaft; and Fig. 12 shows an enlarged side view of the blank, a side view of the finished nipple, and a sectional view of the nipple.

In the views, 1 indicates the bed of the machine, which may be mounted on any desired form of legs. Supported in bearings held by a bracket 2, secured to the bed, is a shaft bearing a pinion 3 and a driving-pulley 4, that may be belted to any convenient source of power. Extending longitudinally of the bed and supported by bearings attached thereto is a shaft 5, which, near each end of the bed, bears cams 6. This shaft also bears a gear 7, that meshes with a pinion 3, so that when the pulley 4 is driven the cams 6 are rotated, Figs. 2, 3, and 5.

Secured to the upper face of the bed is a block 8 with a bearing-sleeve 9. This sleeve holds a journal that upon one end bears a star-wheel 10, the notches of which are adapted to be engaged by a roll 11 on a pin projecting from the face of the gear 7, and upon the opposite end the journal bears a disk 12, that is provided with a number of perforations 13, which are adapted to receive and hold the blanks while they are being presented to and acted upon by the operating-tools. The engagement of the roll with the star-wheel causes the disk to advance one step at each rotation of the gear, and as there are preferably eight notches in the star-wheel there are eight successive intermittent steps during one rotation of the disk, which, therefore, is preferably provided with eight blank-holding perforations to correspond, Figs. 1, 2, and 4.

Held by guideways on the bed are the carriages 14 and 15. These carriages are normally forced apart by a spring 16, that thrusts between them, and they are forced toward each other at the proper time by the contact of the cams 6 with the rollers 17, mounted on journals near the outer ends of the carriages, Figs. 1 and 2.

Projecting upward from the carriage 14 is a standard 18. Near the top this standard supports a bracket 19, in bearings secured to which

is a spindle that has on one end a driving-pulley 20 and on the other end a saw or similar slotting-tool 21. Connected with the bracket 19 is an arm 22, that supports a bearing in which there is a shaft that has on its ends pulleys 23, and the belt for rotating the saw is passed around these pulleys, Figs. 1, 2, and 7.

Secured to the standard 18 is a bearing 24, in which is supported a spindle that has a driving-pulley 25 at one end and a chuck 26, adapted to receive a drill or similar boring-tool, at the other end. This pulley is belted to any convenient source of power for rotating the drill, Figs. 1, 2, and 7. To the same standard is secured a rod 27, which projects outward through a guiding-sleeve 28, attached to the block 8. This rod is adapted to register with the perforations 29 in the blank-carrier disk 12, Figs. 1, 7, and 8.

When the carriage 14 is moved toward the blank-carrier disk by the engagement of the cam on the main shaft with the roll on the carriage, the rod 27 is advanced into one of the perforations 29, so as to register and lock the disk in position, while the further forward movement of this carriage carries the saw and the drill mentioned close to the disk, so that these tools will operate upon the blanks held in the perforations in the carrying-disk in front of them.

A spring 30 is preferably secured to the bracket 19 so that its free end will project into the vicinity of the edge of the saw and engage and hold the heads of the blanks while the saw is slotting them, Figs. 1, 2, and 7.

Projecting upward from the carriage 15 is a standard 31. In bearings secured near the top of this standard is supported a spindle that has on one end a driving-pulley 32 and on the opposite end a chuck 33, that is adapted to hold a drill or similar boring-tool. The axis of this drill is preferably located in line with the axis of the drill borne by the other carriage, so that both drills may operate upon opposite ends of the same blank simultaneously, Figs. 1, 2, 5, and 6. Secured to this standard 31 is a bracket 34, in bearings in which is held a spindle that has on one end a pulley 35 and on the other end a pair of mills or similar cutting or abrading tools 36. Secured to the same standard is a bracket 37, having a bearing in which is a spindle that has a pulley 38 and another pair of mills or similar abrading or cutting tools 39, Figs. 1, 5, and 6. These mills are located with relation to the axis of the blank-carrying disk just ninety degrees apart, so that the first set operate to slab off two diametrically opposite sides of the end of the blank presented to them, and then when the same blank is carried around ninety degrees the other set operate to slab off the other diametrically opposite sides and thus square that end of the blank.

To keep the blanks from rotating in the holding-perforations and insure that they are correctly presented to the mills, so the slabbing will accurately square the ends, a plate 40 is secured to the block 8, and on this is formed a rib 41, that projects outward on the arc of a circle into the path of the slots that are sawed in the heads of the blanks. When the blanks are carried around the ninety degrees from one set to the other of the slabbing-mills, the slots travel along this rib, so that the blanks will be turned just the ninety degrees and be presented so that the mill cuts will be at right angles with each other, Figs. 1, 6, 9, and 10.

Supported in bearings 42, secured to the standard 31, is a spindle that has on one end a pulley 43 and on the opposite end a chuck 44, adapted to hold a drill or similar boring-tool, Figs. 2 and 6.

A bearing-sleeve 45, that is preferably formed in two sections joined together by a yoke, is supported by the standard 31. In one of the sections of this sleeve is a shaft with a pulley 46 and a clutch part 47, and in the other of the sections is a shaft that has a pulley 48 and a clutch part 49. These pulleys 46 and 48 are belted so as to be rotated in opposite directions. A spindle is passed through a perforation in one of the shafts, and on one end this spindle has a clutch part 50, and on the other end is a clutch 51, that is adapted to hold a tap or similar threading-tool. The clutch part on the spindle is complementary to and is adapted to be engaged with either of the clutch parts connected with the shafts. When the tap is being forced into the blank against the material, the spindle is pushed back so that its clutch part engages with one of the shaft clutch parts and is consequently rotated in one direction, but when the tap is being pulled back out of the blank by the backward movement of the carriage the pull of the threads in the material will draw the tap and spindle forward so that its clutch part disengages from the clutch part that drove it in and becomes engaged with the other of the shaft clutch parts and thus is rotated in the reverse direction. By means of this the blank can be readily tapped by the forward feed of the carriage and the tap unscrewed when the carriage moves backward without any complicated mechanism or fine adjustment of the parts, Figs. 1, 5, and 11.

A rod 52 is held by the standard 31 with an end projecting toward the blank-carrying disk in such manner that when the carriage 15 moves toward the disk the end of the rod will push the finished nipple from the perforation opposite it, and when this carriage moves toward the disk both of the sets of mills and both of the drills and the tap which it carries, as well as the ejecting-rod, are brought up to accomplish the work on the ends of the blanks, Figs. 1, 5, and 6.

In the machine illustrated the tools that operate upon both ends of the blanks are arranged in a circle forty-five degrees apart

about the axis of the carrying-disk, and after the tools have sufficiently operated upon the ends of the blanks held in the perforations of the carrying-disk the cams reach a position which permits the spring to force the carriages with the tools back from the ends of the blanks and withdraw the locking-rod, so the disk may be advanced another step. When the tools are again brought up to the ends of the blanks, they encounter those next in succession. The tools are brought up to the blanks after each movement of the disk, which of course presents the blanks differently. As all of the operations on the blanks are carried on from both sides simultaneously the blanks are rapidly formed into completed nipples, and as fast as one is finished and reaches a position opposite the ejector it is thrown out and another blank inserted in the cleared perforation. It is preferred that the cams be so timed that the carriages are moved from each other more rapidly than toward each other.

As the empty perforations in the disk of this machine come around blanks are inserted with their heads toward the right. A blank located in this manner is first carried by the disk in front of the saw that slots its head. It is then carried into line with the drills that bore it from both ends. The next movement of the disk carries this blank into position to be operated upon by the first set of slabbing-mills. Then it is carried to the drill that completes the perforation. Next it is presented to the second set of slabbing-mills. Then it is presented in front of the tap for tapping, and finally it is ejected from the machine. As stated, when all of the perforations are filled with blanks these operations are carried on simultaneously from both sides on the successive blanks, as all of the tools are brought up by the carriages after each movement of the carrying-disk. With this construction the blanks are automatically presented rapidly to the actions of the different cutting-tools in such manner that they are operated upon quite accurately, and as a number of blanks are being operated upon simultaneously in this manner a large quantity of finished nipples can be produced by this machine in a given period.

The construction of this machine is such that the mechanisms are not liable to get out of repair nor to wear so as to operate inaccurately. When the mechanisms are set in motion, they operate to form the nipples so long as the blanks are fed to them.

I claim as my invention—

1. In a machine for forming nipples, in combination, a blank-carrier with holding-perforations arranged in a circle, rotarily supported upon the bed, mechanisms for imparting to the carrier an intermittent rotary movement, carriages movable upon the bed toward and from each side of the carrier, mechanisms for moving the carriages, operating-tools mounted upon and movable together with the carriages in arcs of the same circle as the holding-perforations in the carrier, means for rotating the operating-tools as they move with the carriages, and a guide projecting from the bed to prevent the blanks from rotating in the holding-perforations while being operated upon, substantially as specified.

2. In a machine for forming nipples, in combination, a blank-carrier rotarily supported upon the bed, mechanisms for imparting to the carrier an intermittent rotary movement, carriages movable upon the bed toward and from each side of the carrier, mechanisms for moving the carriages, boring and threading tools mounted upon and movable together with the carriages with their axes parallel with the axes of the carrier-perforations, cutting-tools mounted upon and movable together with the carriages with their axes at right angles with the axes of the carrier-perforations, and means for rotating the tools as they move with the carriages, substantially as specified.

3. In a machine for forming nipples, in combination, a blank-carrier rotarily supported upon the bed, mechanisms for imparting to the carrier an intermittent rotary movement, carriages movable upon the bed toward and from each side of the carrier, mechanisms for moving the carriages, cutting, boring and threading tools mounted upon and movable together with the carriages, means for rotating the tools as they move with the carriages, a guide projecting from the bed to prevent the blanks from rotating in the holding-perforations while being operated upon, and a part borne by one of the carriages and adapted to engage with and lock the carrier when the carriages and tools are moving up and disengage from and unlock the carrier when the carriages and tools are moving away, substantially as specified.

4. In a machine for forming nipples, in combination, a blank-carrier rotarily supported upon the bed, mechanisms for imparting to the carrier an intermittent rotary movement, carriages movable upon the bed toward and from each side of the carrier, mechanisms for moving the carriages, cutting, boring and threading tools mounted upon and movable together with the carriages, means for rotating the tools as they move with the carriages, a guide projecting from the bed to prevent the blanks from rotating in the holding-perforations while being operated upon, and a part borne by one of the carriages and adapted to eject a finished nipple from the carrier when the carriages and tools move up, substantially as specified.

5. In a machine for forming nipples, in combination, a blank-carrier with transverse holding-perforations rotarily supported upon the bed, mechanisms for imparting to the carrier an intermittent rotary movement, a carriage movable upon the bed toward and from the carrier, mechanisms for moving the carriage, milling-cutters on a single shaft ar-

ranged on the carriage so as to rotate in planes parallel with the axis of the disk and operate when the carriage is moved up, in one part of the path of travel of the blanks, milling-cutters on a single shaft arranged on the same carriage so as to rotate in planes parallel with the axis of the disk and operate when the carriage is moved up, in another part of the path of travel of the blanks, whereby the blanks are given a partial revolution while passing from one set of mills to the other, and means for rotating the sets of mills independently, substantially as specified.

6. In a machine for forming nipples, in combination, a blank-carrier rotarily supported upon the bed, mechanisms for imparting to the carrier an intermittent rotary movement, a carriage movable upon the bed toward and from the carrier, mechanisms for moving the carriage, milling-cutters arranged on the carriage so as to operate when the carriage is moved up, in one part of the path of travel of the blanks, milling-cutters arranged on the carriage so as to operate when the carriage is moved up, in another part of the path of travel of the blanks whereby the blanks are given a partial revolution while passing from one set of mills to the other, means for rotating the mills, and a projecting guide connected with the bed and adapted to engage the ends of the blanks and prevent them from rotating in the holding-perforations while they are making the partial revolution from one set of the mills to the other, substantially as specified.

7. In a machine for forming nipples, in combination, a disk with transverse perforations rotarily supported upon the bed, mechanisms for imparting to the disk an intermittent rotary movement, a carriage movable back and forth upon ways on the bed each side of the disk, mechanisms for moving the carriages simultaneously, cutting, boring and threading tools mounted upon and movable together with the carriages in line with the perforations in the disk, and means for rotating the tools as the carriages carry them toward the opposite sides of the disk, substantially as specified.

8. In a machine for forming nipples, in combination, a blank-carrier rotarily supported upon the bed, mechanisms for imparting to the carrier an intermittent rotary movement, a carriage movable upon the bed toward and from the carrier, mechanisms for moving the carriage, and a saw, drill and locking-rod borne by the carriage, substantially as specified.

9. In a machine for forming nipples, in combination, a blank-carrier rotarily supported upon the bed, mechanisms for imparting to the carrier an intermittent rotary movement, a carriage movable upon the bed toward and from the carrier, mechanisms for moving the carriage, and two sets of slabbing-mills, a tap and an ejecting-rod borne by the carriage, substantially as specified.

10. In a machine for forming nipples, in combination, a disk with transverse perforations rotarily supported upon the bed, a star-wheel connected with the disk, mechanisms adapted to intermittently rotate the star-wheel, carriages movable back and forth upon ways on the bed on each side of the disk, cams for moving the carriages forward and a spring for moving the carriages backward, one of said carriages bearing a saw, a drill and a locking-rod and the other of said carriages bearing two sets of mills, two drills, a tap and an ejecting-rod, said forming-tools being connected with means for rotating them as they move with the carriages up to the blank-carrier disk, substantially as specified.

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