No. 735,040. PATENTED JULY 28, 1903.

S. C. SHEPARD.

SHOE LACE TIPPING MACHINE.

APPLICATION FILED APR. 10, 1903.

NO MODEL. 6 SHEETS—SHEET 1.

Fig. 1.

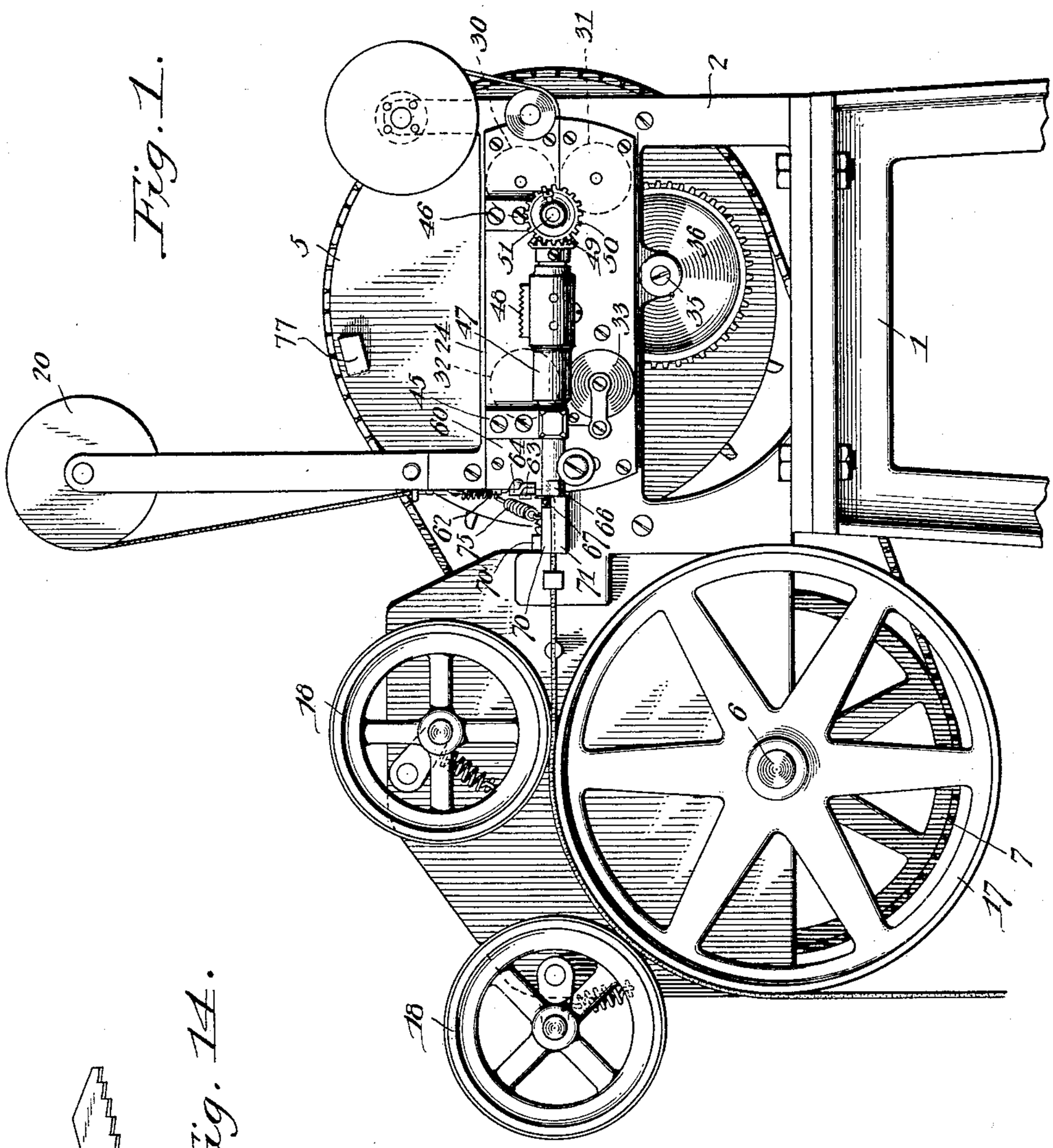
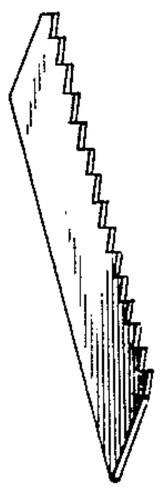


Fig. 14.



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NO MODEL. 6 SHEETS—SHEET 2.

Fig. 13.

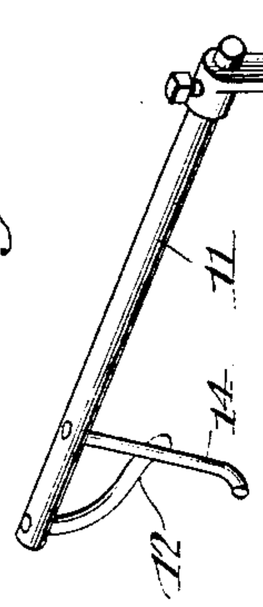
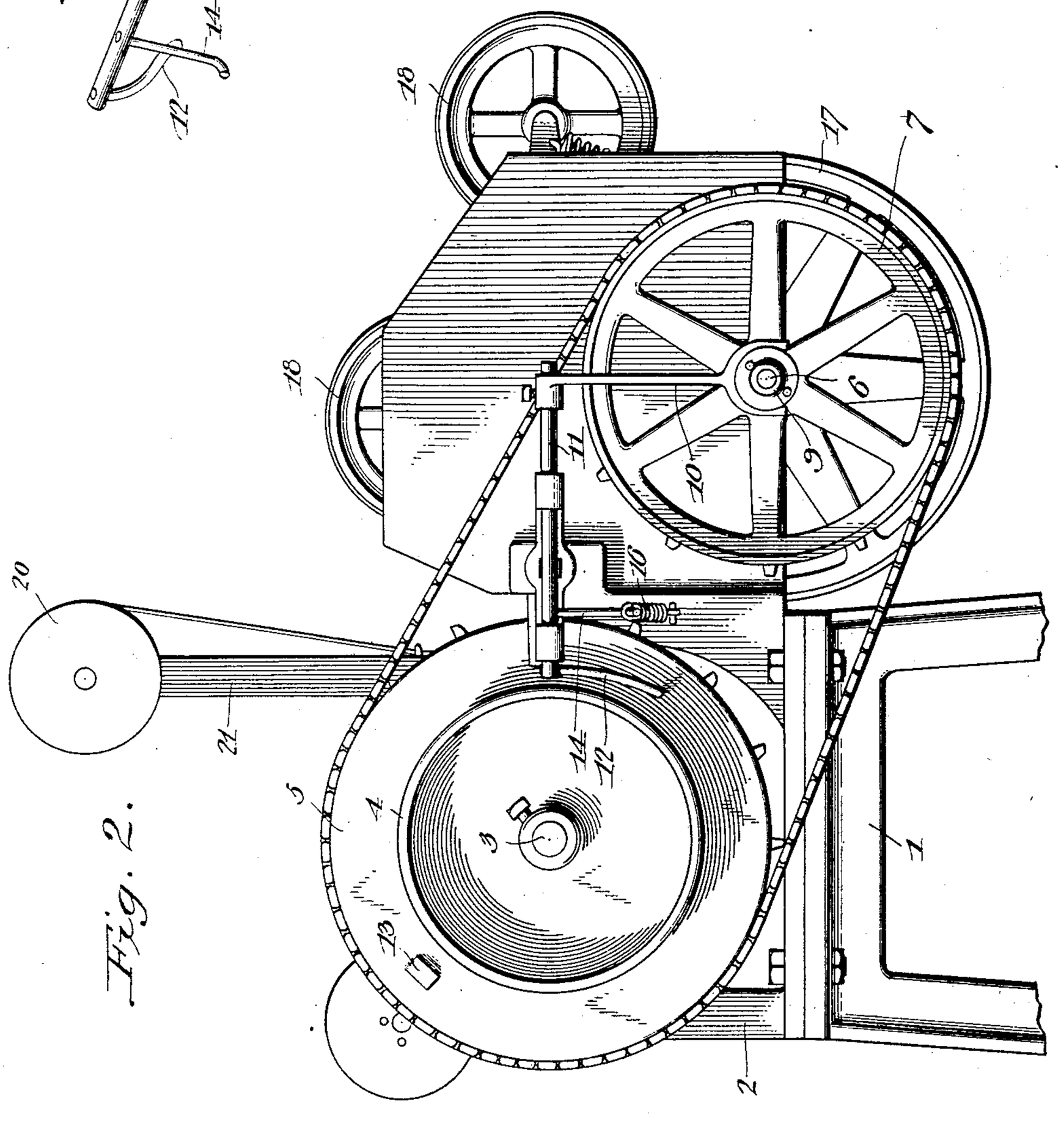


Fig. 2.



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NO MODEL. 6 SHEETS—SHEET 3.

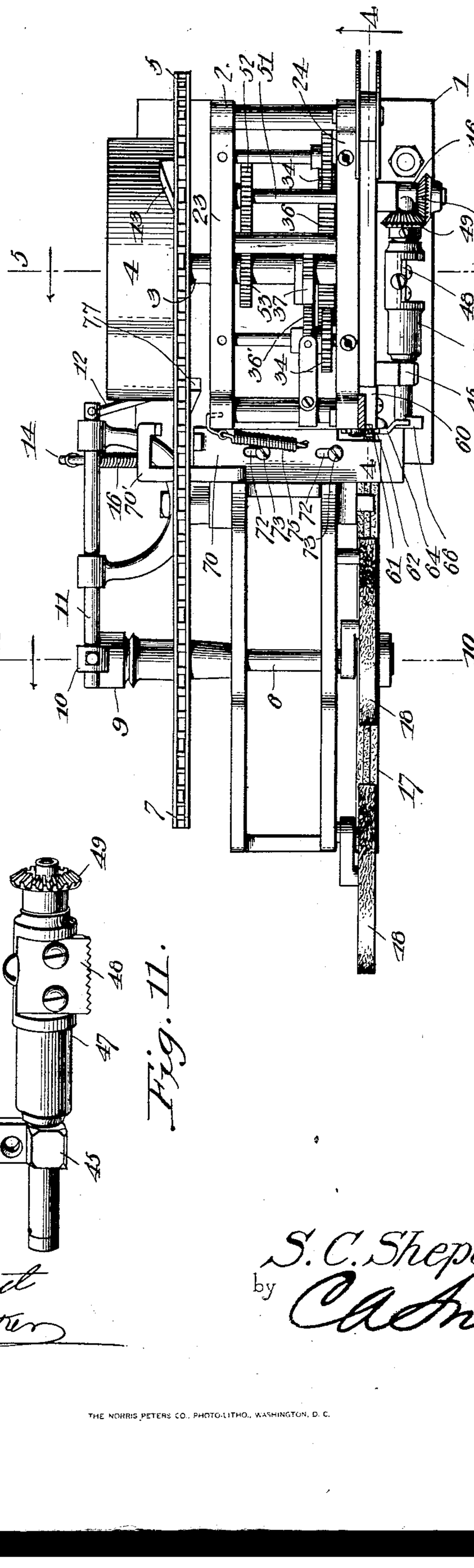

Fig. 3.

Fig. 12.

Fig. 11.

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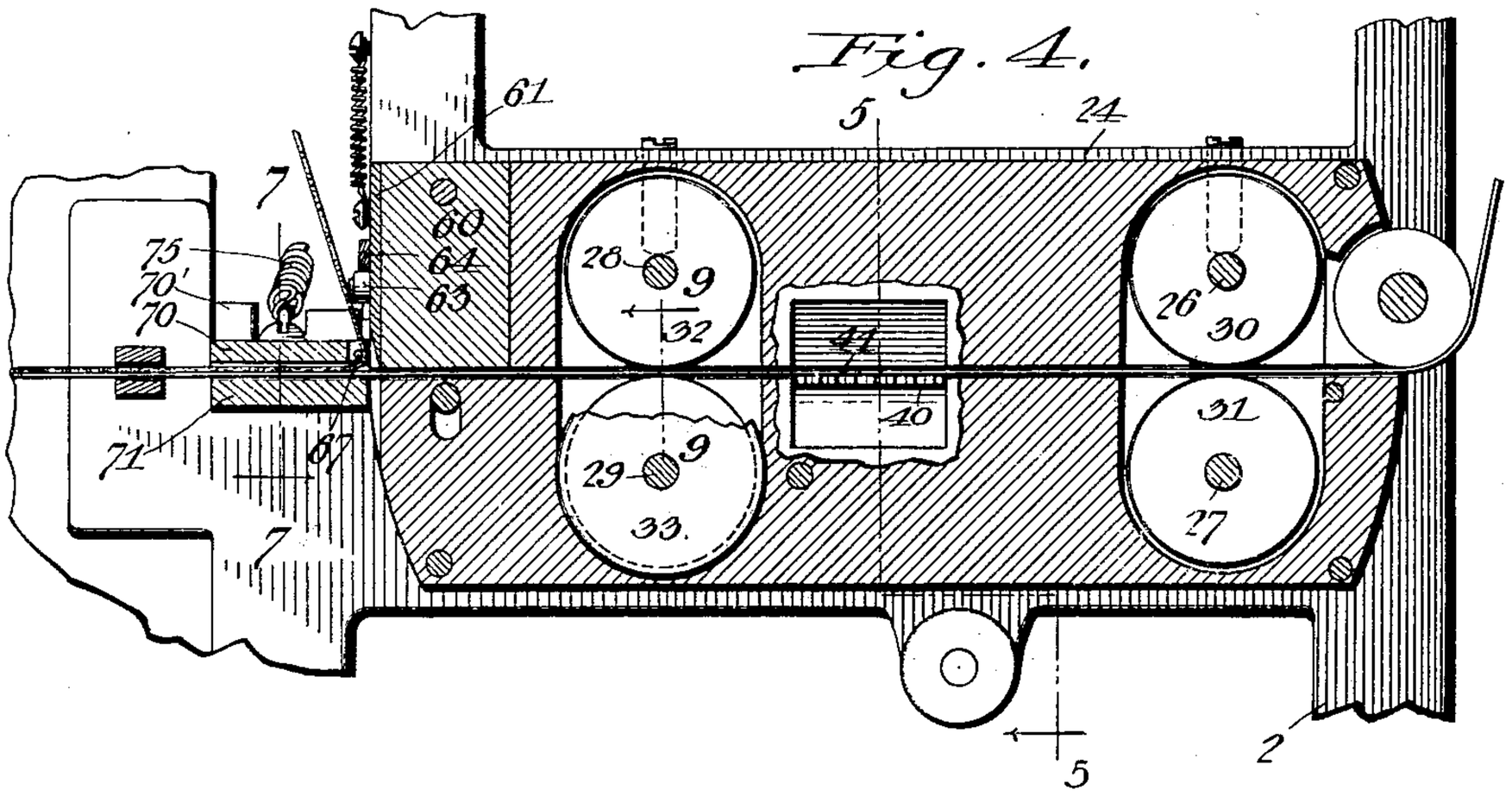
NO MODEL. 6 SHEETS—SHEET 4.

Fig. 4.



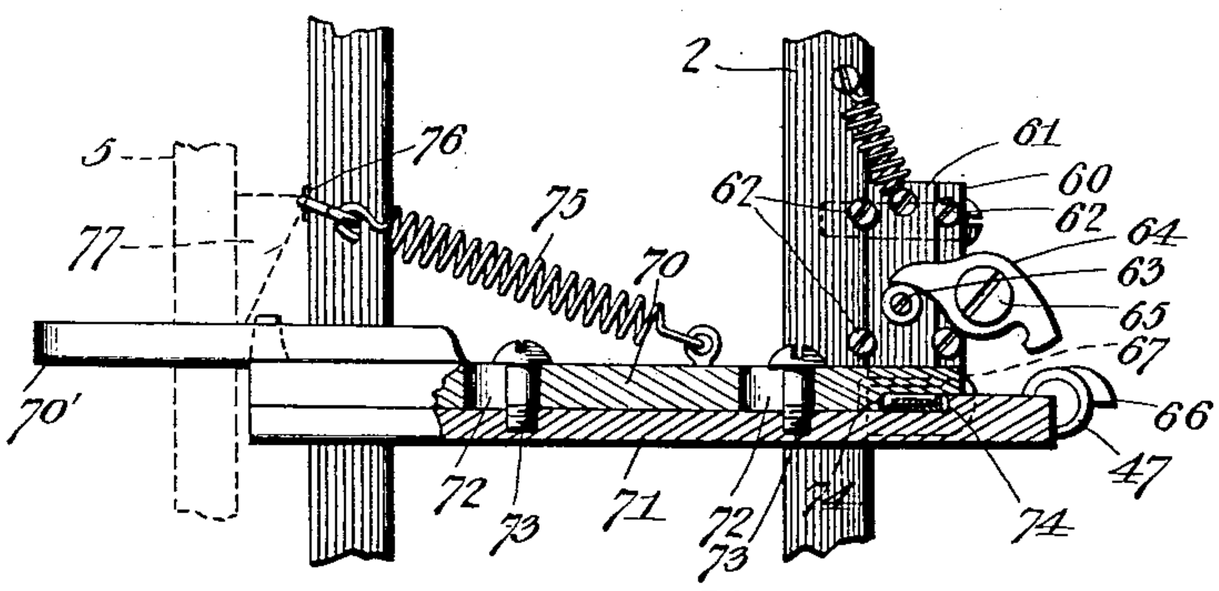


Fig. 7.

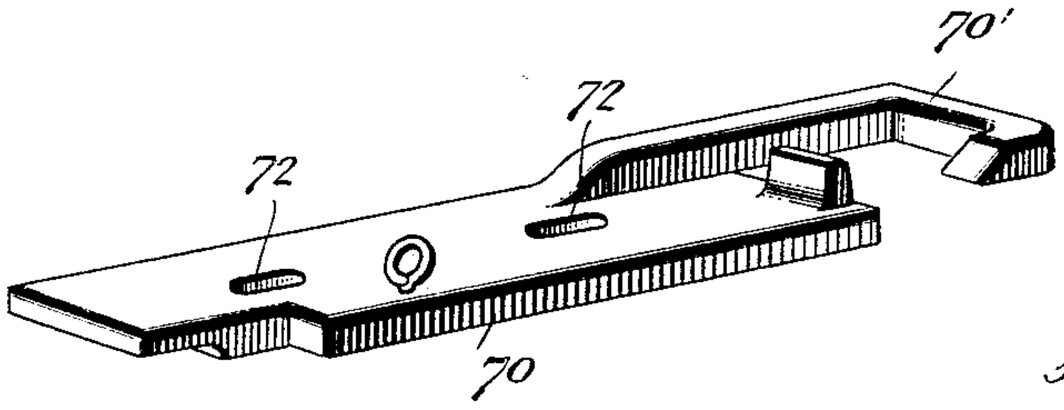
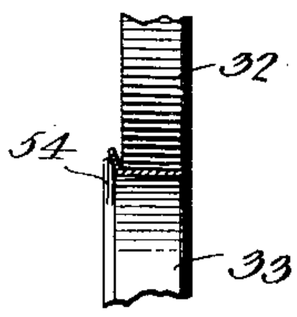


Fig. 8.

Fig. 9.



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APPLICATION FILED APR. 10, 1903.

NO MODEL. 6 SHEETS—SHEET 5.

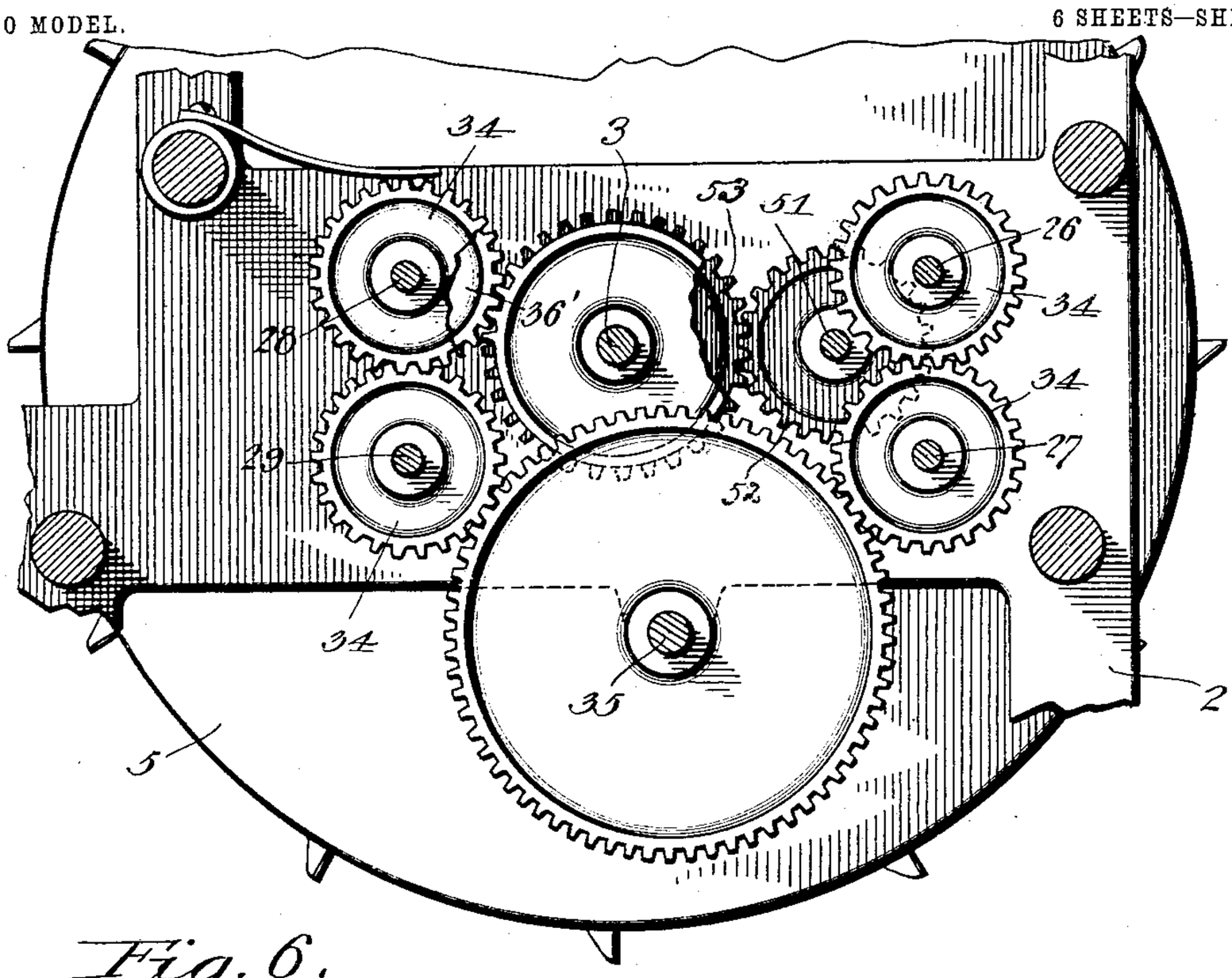

Fig. 6.

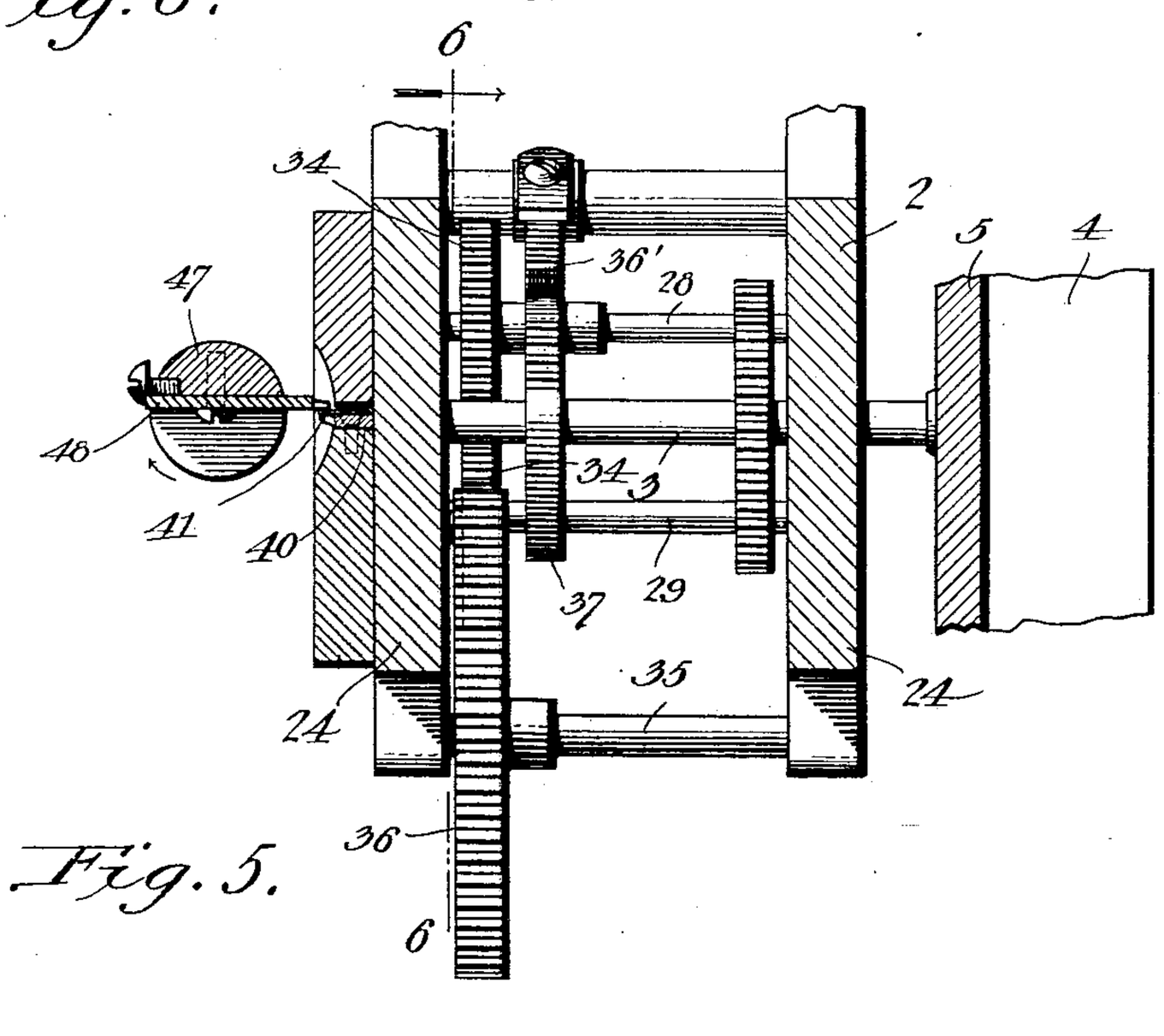

Fig. 5.

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APPLICATION FILED APR. 10, 1903.

NO MODEL. 6 SHEETS—SHEET 6.

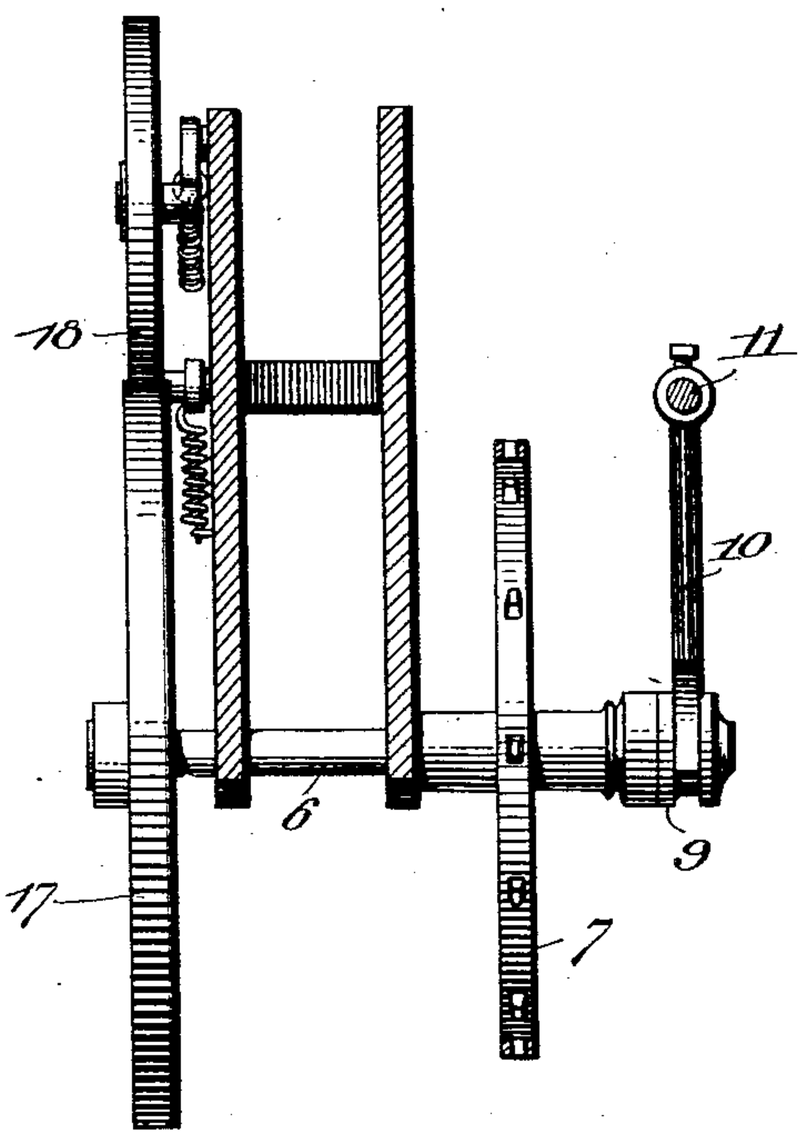

Fig. 10.

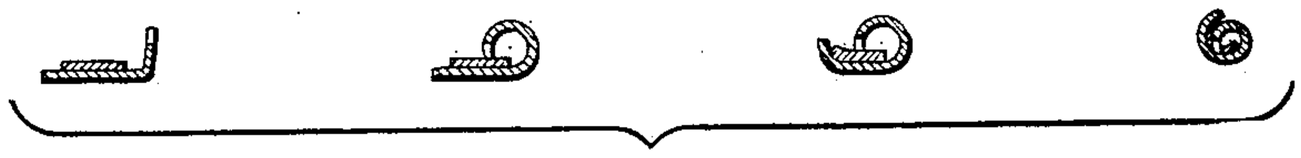

Fig. 15.

Witnesses
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No. 735,040. Patented July 28, 1903.

UNITED STATES PATENT OFFICE.

SYLVANDER C. SHEPARD, OF HANNIBAL, MISSOURI, ASSIGNOR TO H. K. LOGAN, GEORGE L. BENSON, AND JOHN LOGAN, OF HANNIBAL, MISSOURI.

SHOE-LACE-TIPPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 735,040, dated July 28, 1903.

Application filed April 10, 1903. Serial No. 152,072. (No model.)

To all whom it may concern:

Be it known that I, SYLVANDER C. SHEPARD, a citizen of the United States, residing at Hannibal, in the county of Marion and State of Missouri, have invented a new and useful Shoe-Lace-Tipping Machine, of which the following is a specification.

This invention relates to certain improvements in machines of that class for securing metallic tips to shoe and corset lacings, and has for its principal object to provide an automatic machine for forming the metal tips from a suitable strip and applying the same at proper intervals to a lacing which is subsequently severed in any suitable manner at a point midway of the length of the tip member, the latter being of sufficient length to form two tips at the ends of two lacings.

A further object of the invention is to construct a machine in which tip members may be formed from a ribbon of metal which may be fed to the machine without previous treatment and provided during the operation of the machine with teeth or serrations in order to more firmly bind it in position on the lacing.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a side elevation of a lace-tipping machine constructed in accordance with the invention. Fig. 2 is a similar view looking from the opposite side of the machine. Fig. 3 is a plan view of the machine. Fig. 4 is a longitudinal sectional elevation of the same, on an enlarged scale, on the line 4 4 of Fig. 3. Fig. 5 is a transverse sectional elevation on the line 5 5 of Fig. 4. Fig. 6 is a longitudinal sectional elevation of a portion of the machine on the line 6 6 of Fig. 5, illustrating the arrangement of the gearing connections for the feeding-rolls. Fig. 7 is a transverse sectional elevation of a portion of the mechanism on the line 7 7 of Fig. 4. Fig. 8 is a detail perspective view of one of the die members. Fig. 9 is a detail sectional view on the line 9 9 of Fig. 4, illustrating the construction of the strip-shifting rollers. Fig. 10 is a transverse sectional elevation of a portion of the machine on the line 10 10 of Fig. 3. Fig. 11 is a detail perspective view of the cutter-carrying shaft. Fig. 12 is a similar view of the cutter detached. Fig. 13 is a detail perspective view of the clutch-shifting mechanism. Fig. 14 is a perspective view of a portion of the strip after the action of the serrating-dies. Fig. 15 illustrates the several steps in the operation of the forming-die during the coiling of the strip around the lace.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

In the manufacture of laces for shoes, corsets, and the like it is usual to apply metallic tips to the ends of the laces in order to properly stiffen the same and permit the ready introduction of the lace through the eyelets or other coöperative lacing devices, and in the present machine it is proposed to supply these tips from a ribbon of thin metal, which is first serrated at one edge and then severed into lengths of sufficient size to form two tips, and this metal plate is subsequently acted upon by a die and rolled around a lacing in such manner that when the lacing and tip are severed a lace will be formed having a stiffening-tip at each end.

Referring to the drawings, 1 designates a suitable base carrying a frame 2 of suitable size and shape for the support of the various operating members. The frame is provided with bearings for the reception of a transversely-extending shaft 3, to which is secured a belt-wheel 4 and a sprocket-wheel 5, the belt-wheel being driven from any suitable source of power and serving to communicate motion to the remaining portion of the machine. The frame is further provided with bearings for the reception of a second transverse shaft 6, carrying a somewhat smaller

sprocket-wheel 7, which is connected with the main sprocket-wheel 5. The sprocket-wheel 7 is mounted loosely on the shaft, and the hub of said sprocket-wheel is provided with clutch-teeth adapted to be engaged by a clutch member 9, feathered to the shaft and movable longitudinally thereof, said clutch member being provided with an annular groove for the reception of a bifurcated end of a clutch-operating arm 10, which is secured to a rock-shaft 11, mounted in a bearing on the main frame. To that end of the shaft 11 opposite the arm 10 is secured a rocker-arm 12, projecting into the path of movement of a cam 13 on the sprocket-wheel 5 and so arranged that at each revolution the cam will come into engagement with the rocker-arm and shift the clutch member in such manner as to temporarily release the sprocket-wheel from the shaft 6 and stop the rotative movement of the latter. The rock-shaft is further provided with an arm 14, connected by a helical spring 16 to a fixed portion of the frame, the spring tending normally to force the clutch member into engagement with the sprocket-wheel and serving to reclutch the latter to the shaft after the passage of the cam 13.

The shaft 6 carries a grooved lace-feeding wheel 17, against which the lace is held by a pair of idler-rolls 18, mounted on cranks carried by the frame and serving to maintain the lace in frictional engagement with the feeding-reel 17, so that as the latter is rotated the lace will be drawn from the machine after the tipping operation has been completed and the feeding movement stopping temporarily at the end of each single revolution of the feeding-wheel in order to hold the lace stationary during the application of the tip. In this connection it may be observed that the diameter of the feed-wheel is proportioned to the length of lace desired, and the circumference of the wheel determines the length of said lace.

The lace is wound on a spool or reel 20, mounted at the top of a standard 21, and is guided around a small pin or roller through a forming-die, where the tip is applied in the manner hereinafter described.

At one side of the frame of the machine are two spaced plates 23 and 24, and in said plates and the frame member at the opposite side of the machine are formed bearings for the reception of a plurality of shafts 26, 27, 28, and 29, the shafts 26 and 27 being provided with strip-feeding rollers 30 and 31, respectively, while the shafts 28 and 29 carry, respectively, the combined feeding-strip-shaping rollers 32 and 33. The feed-rollers are thus divided into two sets, and each of the shafts carrying such rollers is provided with a gear-wheel, as 34, these gears intermeshing in order to rotate all of the rollers at a uniform speed. At a point below the lowermost feeding-rollers the frame is provided with bearings for a shaft 35, having a gear-wheel 36, which intermeshes with the gear-wheels 34 of the lower sets of feed-rollers and rotates the latter at a uniform speed.

The rotative movement of the strip-feeding rolls is accomplished from the main shaft 3 through the medium of the mutilated gear 37, which intermeshes with the gear-wheel 36′ and rotates the latter at intervals to an extent sufficient to feed the strip of metal for a distance equal to the length of two finished tips, the interval between feeding operations allowing sufficient time to form the severed length into a tip and apply the same to the lace.

At a point between the two sets of feed-rolls the frame is provided with a die 40, having a serrated cutting-surface 41, over which the strip passes, the edge of the strip being in alinement with the points of the teeth of said die and the length of the die being preferably equal to the length of two finished tips.

The outer plate 24 of the frame is provided with bearings 45 and 46 for the reception of a cutter-shaft 47, one side of which is recessed and carries a serrated cutting-die 48, which coacts with the similar die between the plates once during each revolution of the shaft 47 and forms indentations or serrations in the edge of the strip previous to the operation of cutting and forming said strip into tips. At one end of the shaft 47 is a miter-gear 49, intermeshing with a similar gear 50 on a shaft 51, which extends through suitable bearings in the frame of the machine and is provided with a pinion 52, intermeshing with a pinion 53 on the main shaft 3, the gearing being so proportioned as to revolve the cutter-shaft once during a single revolution of the remaining revoluble members, so that the strip of metal will be acted upon to form tips arranged in a continuous series for a length equal to the combined length of finished tips.

The combined feeding and flanging rollers 32 and 33, which have been previously referred to, are so arranged and disposed as to turn upward the toothed edge of the strip to form a flange at a right angle to the main body of the strip, and for this purpose the lower of the rolls 33 is provided with a peripheral flange or rib 54 of a diameter greater than the diameter of the main body of the roller. This operation is effected preliminary to severing the strip in the length and the bending of such lengths around the lace.

At the end of the two plates 23 and 24 is a block 60, having a recess forming a guide for a vertically-movable knife 61, which is held in place by the heads of a plurality of screws 62, which are adapted to threaded openings in the plate, the cutting edge of the plate being at the lower edge of the knife and coacting with a stationary cutter and arranged in the plane immediately below the strip. On the cutting-knife is a stud carrying an anti-friction-roller 63, with which engages one

end of a lever 64, fulcrumed at an intermediate point on a stud 65, carried by the block 60, the opposite end of said lever being engaged by a cam 66, projecting radially from the shaft 47, so that at the rotation of the shaft 47 the cutting-knife is depressed to sever a plate of sufficient length to form two finished tips. Immediately in advance of the cutting-knife is a guiding bar or roller 67, under which the lacing is passed, being fed forward immediately over the severed plate and passing with said plate into a two-part die formed of upper and lower die-plates 70 and 71. The lower die-plate 71 is stationary, while the upper plate is provided with horizontally-disposed slots 72, extending transversely of the machine and through which pass headed pins 73 into the lower stationary plate. The two die-plates are each provided with oppositely-facing curved shoulders 74, forming an elongated opening into which the severed plate and the lacing are fed. Normally the die is held open by means of a spring 75, extending between the upper die-plate and the boss or stud 76, and the end of said upper die-plate projects into the path of travel of a cam 77, arranged on the inner face of the sprocket-wheel 5, so that at each rotation of the sprocket-wheel the cam acts to force the die 70 to closed position and wrap or coil the plate around the lacing.

In the operation of the machine the lacing is directed from one of the spools or reels under the guiding pin or roller and thence out over the feeding-reel 17. The strip is engaged by the feeding-rollers 30 and 31. As the main driving-shaft is rotated the lacing is fed forward at each operation for a distance equal to the desired length of the lace, the feeding movement ceasing for an interval at the end of each rotation of the main sprocket-wheel, the cam 13 on the sprocket-wheel causing the disengagement of said wheel from the shaft 6. During the feeding movement of the lacing the ribbon of metal has been fed for a distance equal to the length of a pair of finished tips and the outer horizontal shaft 47 has been rotated once in order to serrate one edge of the ribbon or strip. The strip is then flanged by means of the rollers 32 and 33 and is fed forward into the open die, being passed under the lace. At the completion of the rotative movement of the shaft 47 the cam 66 depresses the cutting-knife through the medium of the lever 64 and severs the projected end of the ribbon or strip. The severed plate lying within the die has the upturned edge previously described, and as the upper die member 17 is moved by a cam 77 the serrated edge of the plate will be gradually rolled around the lace and firmly compressed to an extent sufficient to bind it firmly on the lace. The operative movement of the die takes place between the intervals of feeding, so that the lace is stationary during this operation. At the completion of the die-forming operation the feeding-wheel 17 is again revolved and the lace fed out to an extent equal to the length of a lace, when the same operation is again accomplished and another tip member applied. The resultant product is a continuous lace having a tip-plate coiled around it at intervals, and this product is carried to a second machine and the tip and lace are severed at a point midway between the two ends of the tip-plate, the length of the latter being sufficient, as previously described, to form two finished tips.

It is obvious that the device may be employed for the application of tips to lacings of any character and that the length of the laces may be altered to any desired extent by suitable increase or decrease in the size of the feed-wheel 17, and at the same time the length of the tip may be altered by properly proportioning the cutting-gearing for the purpose.

As a precautionary measure the die 70 is provided with an extended arm 70′, passing around one edge of the main sprocket-wheel in the path of movement of the main cam 13, so that in case of accidental jamming of the metal strip and the die or failure of the spring the upper die will be drawn to open position.

Having thus described the invention, what is claimed is—

1. In a lace-tip-applying machine, the combination with means for feeding the lace and means for feeding the tip-forming strip, of means for serrating the edge of the strip, means for flanging said serrated edge, means for severing the strip into tip lengths, and a forming-die for coiling said tip lengths around the lace.

2. In a lace-tip-applying machine, the combination with an intermittently-operated lace-feeding means, of an intermittently-operated means for feeding tip-forming strips, means for serrating the edge of the strip, means for flanging the serrated edge, means for cutting the strip into lengths, and a forming-die for coiling the flanged lengths around the lace.

3. In a lace-tip-applying machine, the combination with an intermittently-operated lace-feeding means, of an intermittently-operated means for feeding the tip-forming strip, a stationary cutting-die, a revoluble cutting-die coacting therewith and adapted to form teeth or serrations in the edge of the strip, an intermittently-operated severing-knife for cutting the strip into the lengths, and a die receiving the lace and the severed lengths, said die serving to coil the lengths around the strip.

4. In a lace-tip-applying machine, the combination with strip-feeding means, of means for feeding the tip-forming strip, a strip-flanging roller forming one of the strip-feeding elements, cutting-dies for the formation of teeth or serrations in the edge of the strip, a strip-severing means, and an intermittently-operated forming-die for coiling the severed lengths of material around the lace.

5. In a lace-tip-applying machine, the combination with a frame, of a main shaft, a sprocket-wheel thereon, a second shaft, a sprocket-wheel mounted thereon, a link belt connecting the two sprocket-wheels, a clutching mechanism for locking the second sprocket-wheel, a lace-feeding wheel secured to the second shaft, means for holding the lace in engagement with said feeding-wheel, an intermittently-operated means for feeding the tip-forming strip, a pair of cutter-dies for the formation of teeth or serrations in the edge of the strip, a flanging device for upturning the serrated edge of the strip, means for cutting the flanged strip into lengths, and a forming-die for coiling the lengths around the lace.

6. In a lace-tip-applying machine, the combination with a main shaft, of a sprocket-wheel carried thereby, a second shaft, a sprocket-wheel mounted thereon, a link belt connecting the two sprocket-wheels, a clutching mechanism connecting the second sprocket-wheel to its shaft, a cam carried by the main sprocket-wheel and controlling the movement of the clutch-operating mechanism, a lace-feeding wheel carried by the second shaft, means for holding the lace in engagement with said feeding-wheel, means for feeding the tip-forming strip, connecting-gearing between the main shaft and said feeding means, a stationary serrated die, a revoluble shaft receiving motion from the main driving-shaft, a serrated die carried by the shaft and communicating with the stationary die to form teeth or serrations in the edge of the strip, a forming-roller forming an element of the strip-feeding means and serving to flange the serrated edge of the strip, means for severing the strip into lengths, a forming-die for coiling the lengths around the lace, and a cam carried by the main sprocket-wheel and actuating the movable member of said forming-die.

7. The combination with a frame, of a main shaft, a sprocket-wheel mounted thereon, a second shaft, a sprocket-wheel loosely mounted on the second shaft, a clutching mechanism for locking the second sprocket-wheel to its shaft, a rock-shaft, a rocker-arm carried thereby and connected to the clutch mechanism, a second rocker-arm on said shaft, a cam carried by the main sprocket-wheel and serving to engage said second rocker-arm, a lace-feeding wheel carried by the second shaft, a pair of friction-rollers for holding the lace in engagement with the feeding-wheel, a pair of sets of rolls for feeding the tip-forming strip, one of the sets of rolls serving to flange the strip, a stationary serrated cutting-die, a shaft adapted to bearings in the frame and extending at an angle to the main shaft, gearing connecting said shaft to the main shaft, a serrated cutting-die carried by said shaft and coöperating with the stationary cutting-die, means for severing the strip into lengths, and a forming-die for coiling the lengths around the lace.

8. In a lace-tip-applying machine, the combination with lace-feeding means, of means for feeding the tip-forming strip, a stationary serrated die, a revoluble die-shaft, a die carried thereby and coöperating with the stationary die to form teeth or serrations in the edge of the strip, a strip-severing knife, an antifriction-roller carried thereby, a cam carried by the die-shaft, a lever pivoted to the frame and having one end engaging the antifriction-roller and its opposite end being disposed in the path of movement of the cam to thereby effect the operation of the knife, and a forming-die for coiling the severed lengths around the lace.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

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Witnesses:

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