R. M. WARWICK.

TYING MACHINE.

APPLICATION FILED JUNE 13, 1914.

1,320,515.

Patented Nov. 4, 1919.

6 SHEETS—SHEET 1.

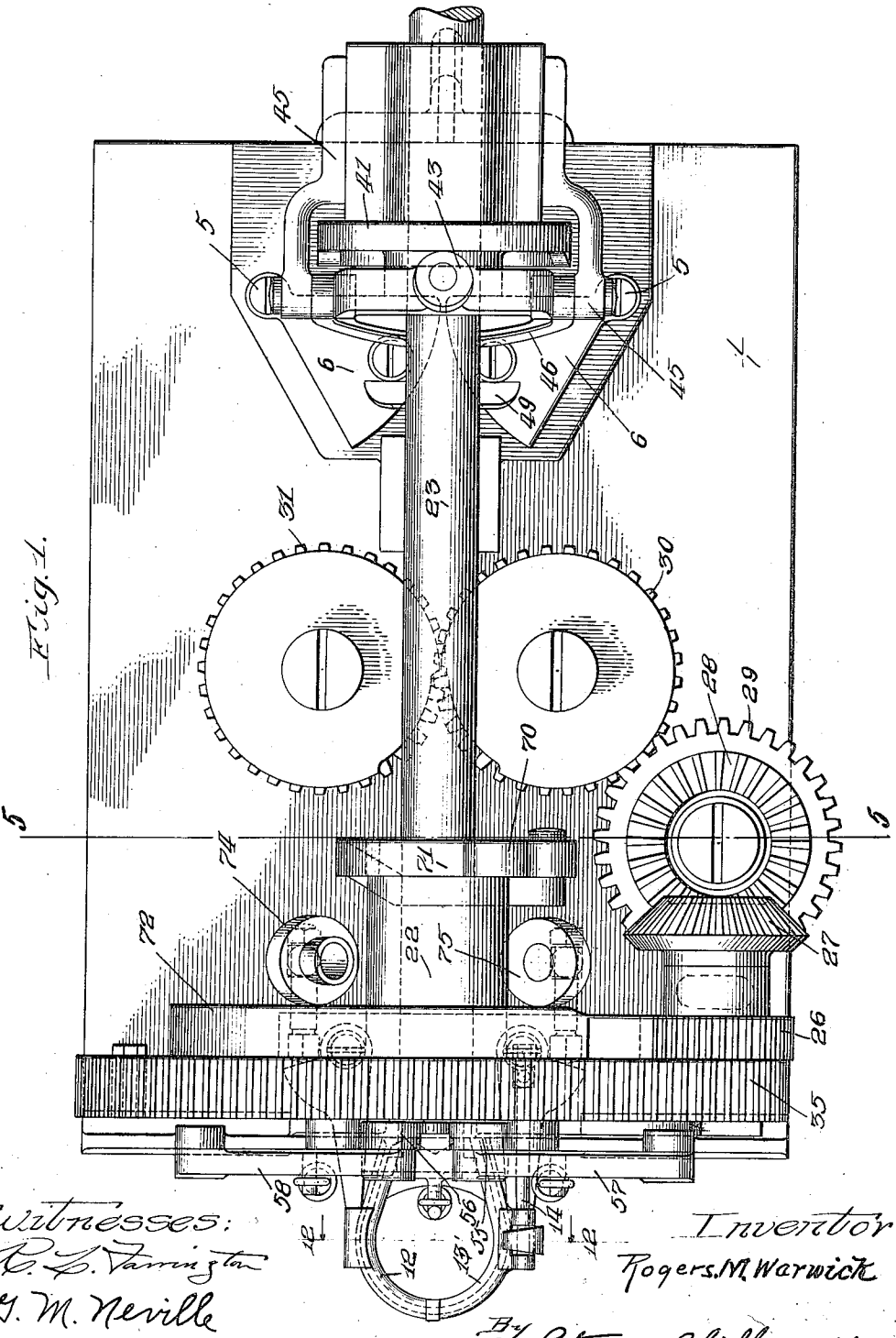


Fig. 1.

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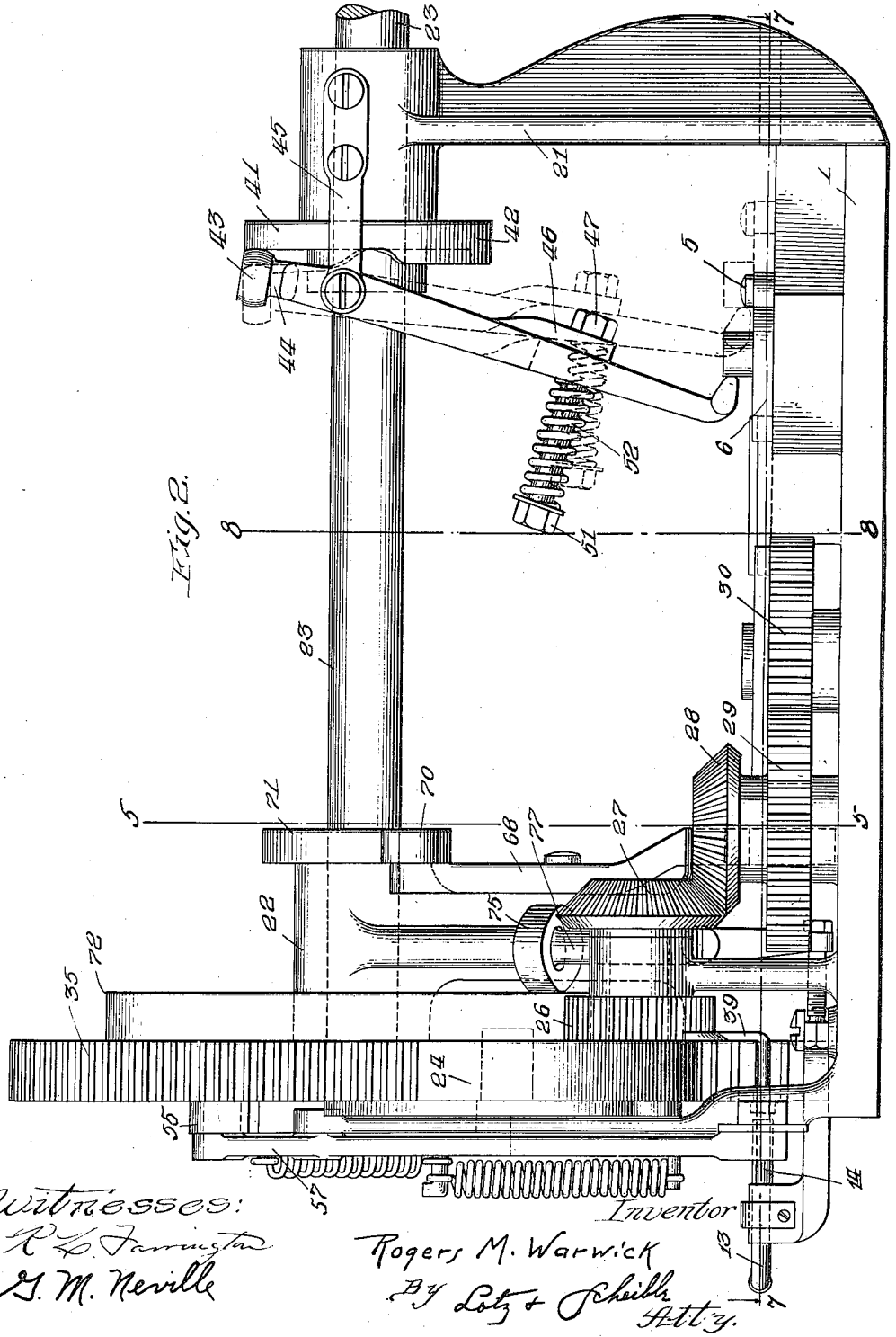


Fig. 2.

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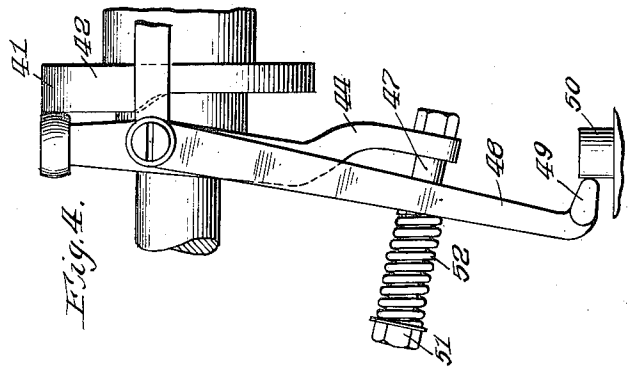


Fig. 4.

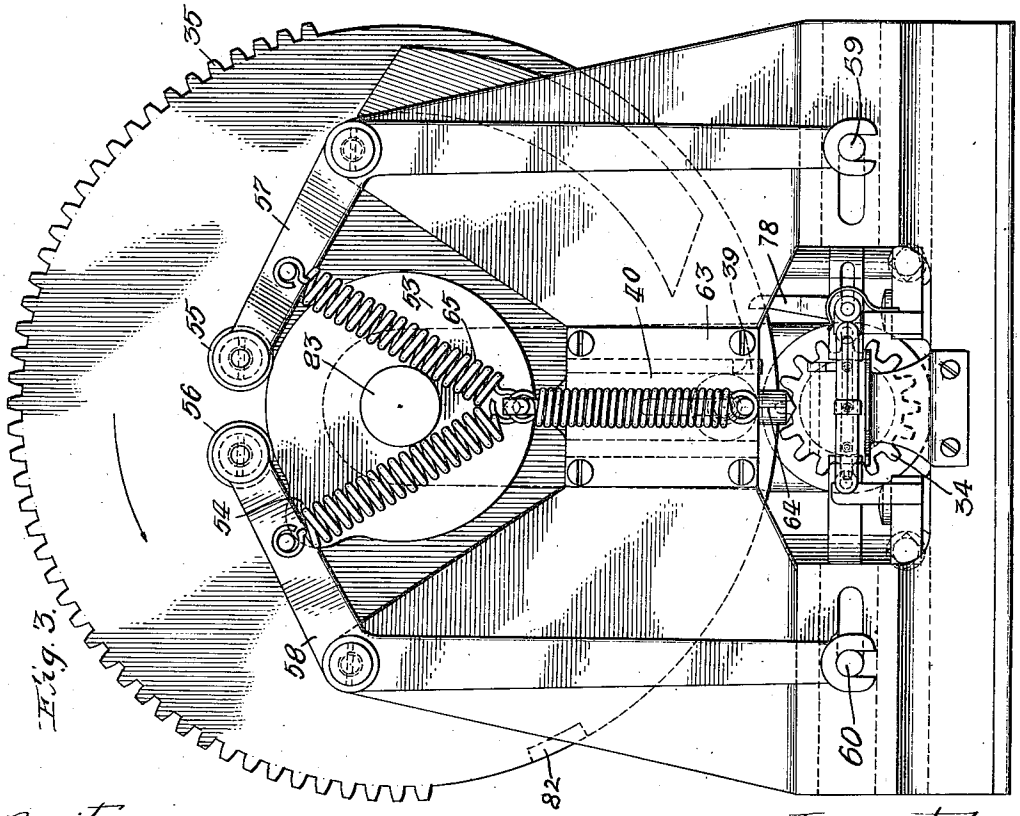


Fig. 3.

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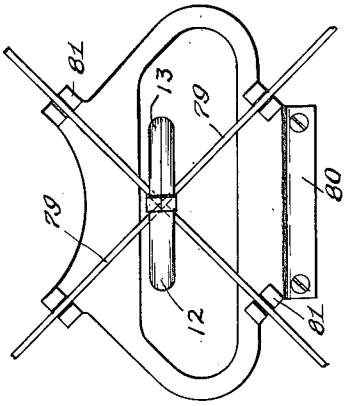


Fig. 6.

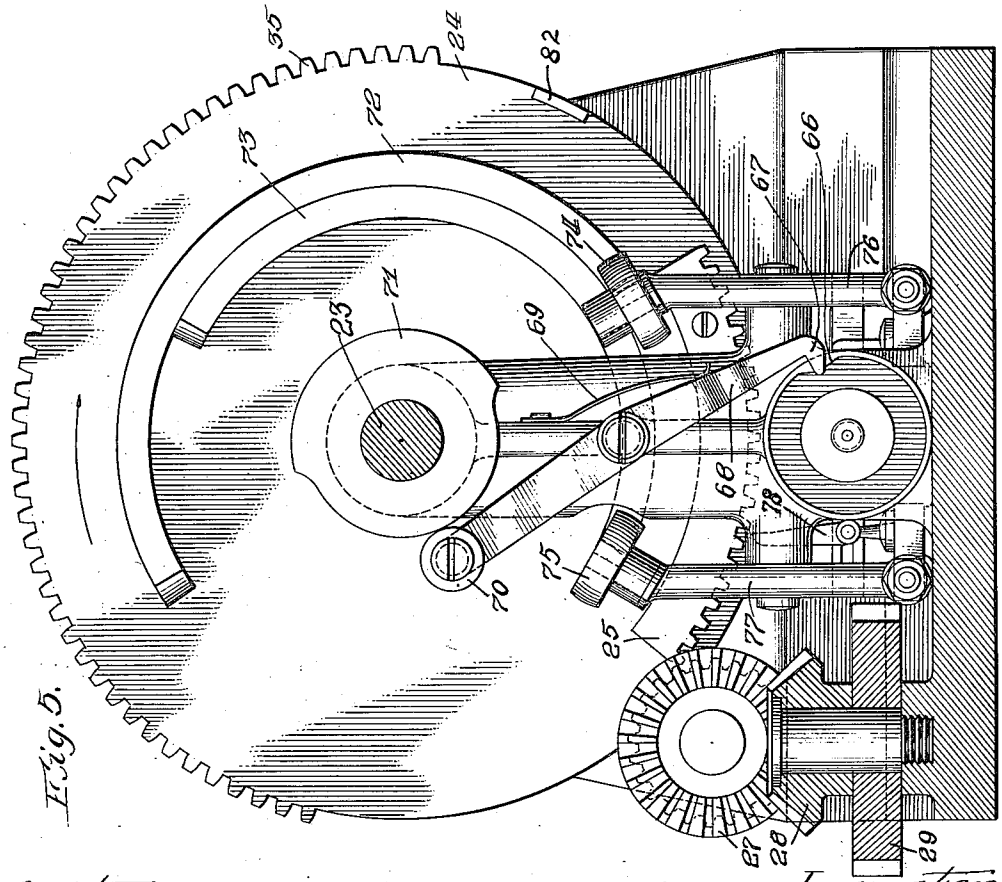


Fig. 5.

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6 SHEETS—SHEET 5.

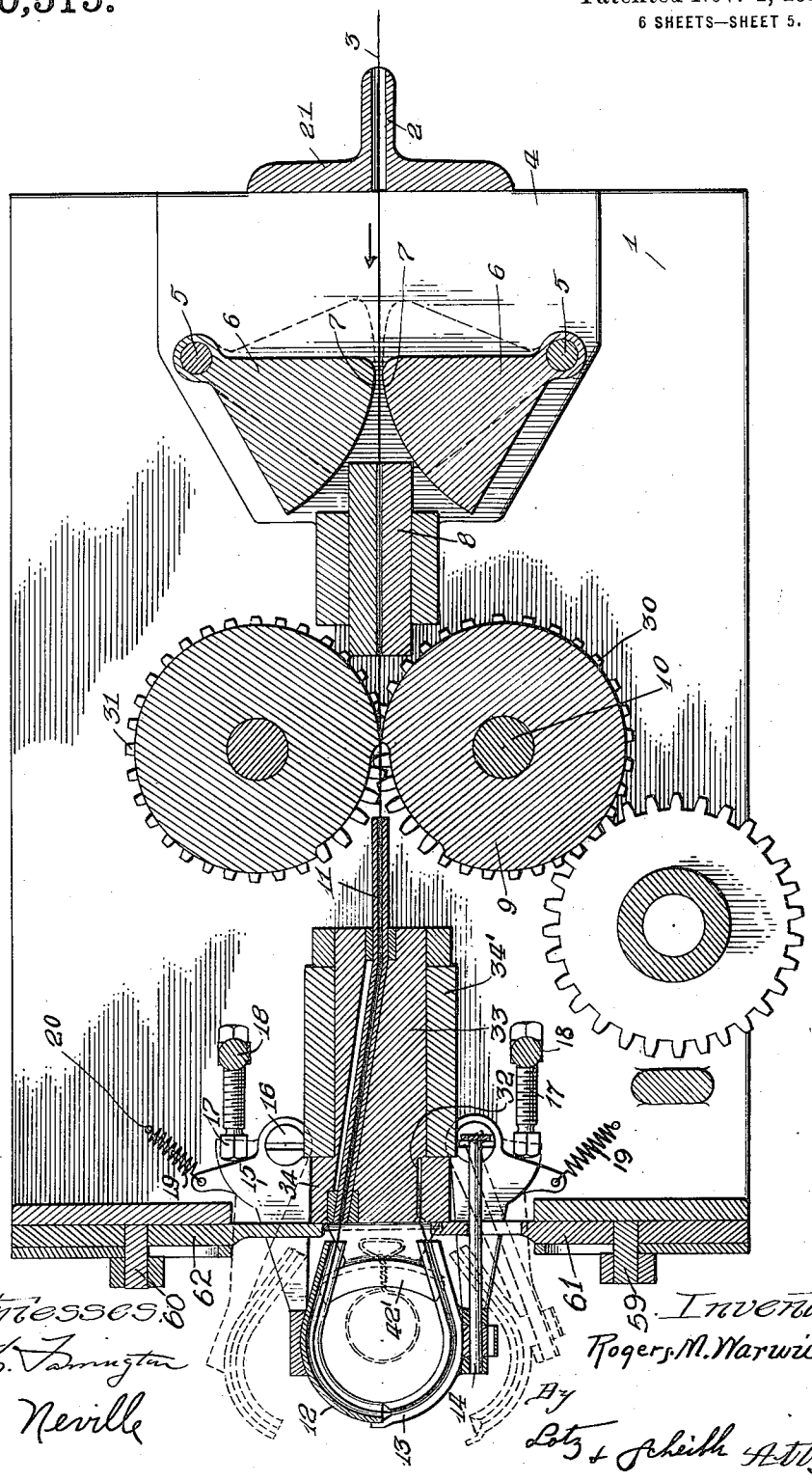


Fig. 7.

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6 SHEETS—SHEET 6.

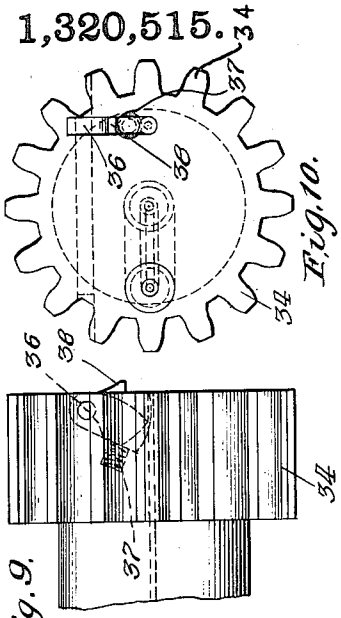


Fig. 10.

Fig. 9.

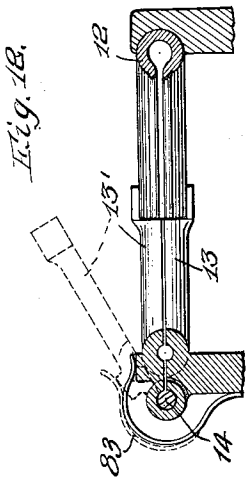


Fig. 12.

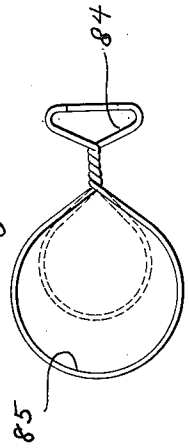


Fig. 11.

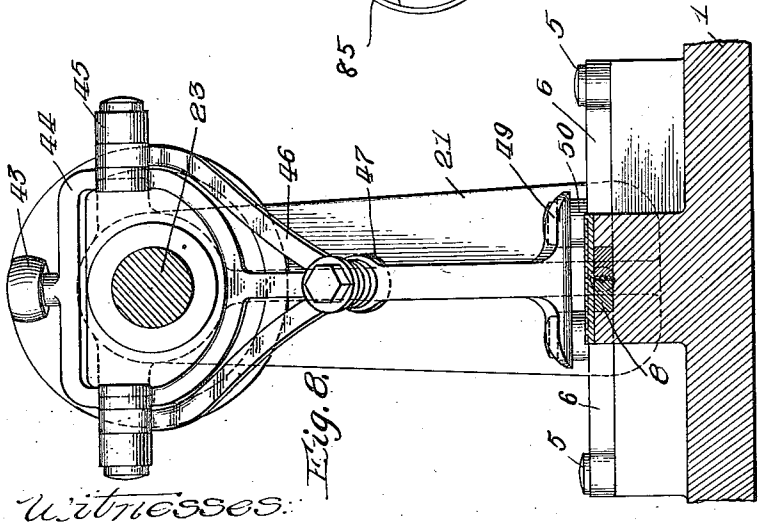


Fig. 8.

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UNITED STATES PATENT OFFICE.

ROGERS M. WARWICK, OF CHICAGO, ILLINOIS, ASSIGNOR TO GENERAL WIRE TIE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TYING-MACHINE.

1,320,515. Specification of Letters Patent. Patented Nov. 4, 1919.

Application filed June 13, 1914. Serial No. 844,894.

To all whom it may concern:

Be it known that I, ROGERS M. WARWICK, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Tying-Machines, and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to machines for making wire ties, being particularly suited for making the class of wire ties used with valve-filled bags, which bags are commonly used for shipping cement, grain, lime and the like. In tying such bags with wire, it has heretofore been customary to use wires cut to a predetermined length, such wires being either in the form of rings, or of straight lengths equipped at each end with suitable formations for gripping the said ends to manipulate them during the twisting of the tie. In either case, the length of wire used has to be the maximum size needed for the tying of the general size and type of bag upon which the tie is used, as the actual periphery of the puckered mouth of the bag will vary considerably in the same lot of bags; consequently the use of ties affording a sufficient length to allow for such variations has meant a waste of wire for a large proportion of the bags actually tied therewith. Moreover, the joining of the ends of ties into an endless ring by welding the said ends introduces an uncertain factor of strength; while equipping the ends of a straight piece of tie wire with easily gripped formations increases the labor required in handling such ties. In any case, the use of such ties also introduces the personal element of the operator in determining the tension put upon the wire during the twisting, and if this tension should be excessive, it may easily lead to a breakage of the wire while the bag is being shipped, or to a likewise objectionable breaking of the wire when the tie is being untwisted for opening the bag. Moreover, the use of ties of the class above described, involves the previous preparation and storing of the same and a separate handling of each tie when being applied, thereby leaving the operator free to use only one hand in puckering the mouth of the bag and placing the loop in position for being tied.

The general object of my invention is to provide a tie-forming machine which will not require any previous cutting or preparation of the tie wire; which will manipulate the wire itself without requiring the latter to be handled or even touched by the operator, thereby leaving the operator free to use both hands in rapidly and accurately puckering and handling the mouth of the bag; which will automatically adjust the length of the wire used for each individual bag to the minimum actually required for the same; which will tie each bag with the same tension upon the wire, and which will enable the desired tension to be readily adjustable; which will form the ties from a continuous supply of wire and which will straighten out any kinks in the said wire before forming the corresponding portions thereof into the tie; which will sever the wire required for each tie from the continuous supply of wire; and which will form the free ends of the tie wire into an auxiliary loop formation whereby the same may readily be manipulated when the mouth of the bag is to be untied. Further objects of my invention are to provide simple mechanism for feeding the wire, and means for adjusting the amount of the said feed according to the peripheral size of the mouth of the bag and the desired tension of the wire tied around the said mouth of the bag; for guiding the wire in a loop formation around the mouth of a bag; for gripping the free end of the wire after being thus guided into loop formation; for releasing the loop wire from the guide means to permit a contraction of the said loop; for twisting the contracted loop wire disposed about the mouth of the bag; and for relatively moving the guide means with respect to the bag to permit the proper positioning of the bag for tying and the removal of the bag after the tie has been formed. Other objects will appear from the following specification and from the accompanying drawings, in which—

Figure 1 is a plan view of a machine embodying my invention and adapted for tying the puckered mouths of bags.

Fig. 2 is a side elevation of the same.

Fig. 3 is a front elevation of the same.

Fig. 4 is a fragmentary view of portions of the wire-retracting mechanism.

Fig. 5 is a vertical section through Figs. 1 and 2 along the line 5—5.

Fig. 6 is a fragmentary view showing the thrust member as used to hold metal bars or crossed wires in position for cross-tying the same with my machine.

Fig. 7 is a horizontal section along the line 7—7 of Fig. 2.

Fig. 8 is a vertical section through Fig. 2 along the line 8—8.

Fig. 9 is a fragmentary side elevation of the wire-twisting head, and of the pawl and spring carried thereby.

Fig. 10 is a front elevation of the same.

Fig. 11 is a plan view of one of the finished wire ties made by the machine of the drawings.

Fig. 12 is an enlarged vertical section through the guide means of Fig. 1 along the line 12—12.

In the embodiment of the drawings, the machine of my invention includes a base plate or table 1 equipped at one end with an entrance tube 2 through which the wire 3 enters from any suitable source of supply. From the tube 2 the wire 3 passes over a plate 4 equipped with a pair of vertical pivots 5 carrying cams 6, which members 6 normally present cam surfaces separated by a space slightly greater than the diameter of the wire 3. After passing between the cam surfaces 7 of the said pivot members 6, the wire passes through a tube formed by opposed grooves in hardened steel blocks 8, which grooves are so disposed as to straighten out any kinks in the wire. The wire then passes between a pair of feed rollers 9 mounted on vertical shafts 10 carried by the base 1 and thereafter into a tube 11 forming part of a series of guides for guiding the free end of the said wire about the mouth portion of the bag when the said wire is fed forwardly by means of the feed rollers 9. In the drawings, the said guide means comprise a tube 11 extending substantially to the forward end of the base plate 1 and a pair of curved guide members 12 and 13, the forward ends of which guide members normally contact with each other so that the said members will coact to afford a substantially horseshoe-shaped tubular guide for the said wire. The guide member 12 first entered by the wire after the latter leaves the tube 11 is preferably made of resilient material and equipped with a slot facing the guide member 13 but slightly smaller in diameter than the wire 3. The other guide member 13 is preferably made of two horizontally separated elements 13 and 13′, both of which elements are pivoted on a horizontal shaft 14, and the inwardly disposed edges of which elements are normally substantially in contact with each other. Each of the said members 12 and 13 is carried by an arm 15 mounted upon a vertical pivot 16 and having a portion adapted to be engaged by a dog 17 carried by a vertical shaft 18, the said dog 17 being preferably in the form of a screw to permit a ready adjustment of its length. Associated with each of the said pivoted arms 15 is a tension spring 19 secured at one end to a pin 20 carried by the base 1 of the machine and continuously tending to press the said arm 15 against the dog 17 and to move the said arm when the said dog is swung out of the way by a partial rotation of the shaft 18.

To effect the forward feed of the wire, which in each case starts with its free end at the forward end of the guide tube 11, I provide the feed wheels 9 with cylindrical portions cut away for a part of their periphery, the integral peripheral portion being of a length equal to the maximum length of wire required for forming the general size and type of tie which is to be made by my machine. Mounted at some distance above the wire-guiding means heretofore described and supported by brackets or standards 21 and 22 carried by the base 1 is a shaft 23 extending longitudinally of the machine, which shaft is continuously rotated when the machine is in operation. Secured to the said shaft near the forward end thereof is a disk 24 carrying a toothed segment 25, the teeth of which segment are adapted to intermesh with the teeth of a gear 26 secured to a shaft carrying a bevel gear 27, which in turn transmits its motion through a companion bevel gear 28 and a spur gear 29 to a gear 30 rigid with respect to one of the feed wheels 9. A companion to the latter feed wheel preferably also has a gear wheel 31 rigid therewith and intermeshing the teeth of the said wheel 30, so that the said feed wheels 9 will at all times rotate in unison but in opposite directions. It will be evident from Fig. 5 that as the teeth of the segment 25 correspond to only a small portion of the circumference of the wheel 24, the wire-feeding mechanism actuated by the said segment will only be in operation during a fraction of each revolution of the shaft 23 carrying the said disk 24 and toothed segment 25.

The distance between the cylindrical portions of the two feed wheels 9 corresponds approximately to the diameter of the wire 3, so that when the said feed wheels are rotated, they will coöperate to propel the wire 3 for a distance corresponding to the peripheral length of the said opposed portions of the feed rollers, whereupon the guide members 12 and 13 will cause the forward portion of the wire to be disposed in loop formation (as indicated in Fig. 7) and will feed the tip of the wire into a horizontal

bore 32 in the head 33 carrying the guide tube 11. The said head is rotatably mounted in a journal 34′ carried by the base 1, the axis of said journal being in alinement with the rear portion of the guide tube 11 and the entrance tube 2 of the machine. The member 33 carries at one end a pinion 34 adapted to intermesh with teeth 35 disposed upon a portion of the periphery of the disk 24, whereby the said member 33 (which forms the twisting head of the machine) will be rotated several times during each rotation of the shaft 23 carrying the disk equipped with the peripheral teeth 35. To prevent the extreme tip of the wire from slipping out of the said bore 32 while the head 33 is being rotated to twist the ends of the wire loop about each other, I preferably provide a pawl 36 pivotally mounted in the forward end of the twisting head 33 adjacent to the said bore 32, the said pawl being continuously moved in one direction by a spring 37 and being equipped with a forwardly projecting lug 38. When the free end of the wire is being fed into the bore 32, it moves the said pawl 36 slightly against the pressure of the spring 37, after which the said spring and pawl coöperate to prevent a retraction of the tip portion of the wire from the said bore 32. However, the said tip may be released by moving the pawl 36 through pressure on the lug 38, for which purpose I provide a plunger 39 carried by an arbor-carrying slide 40 which will be described hereinafter, and which plunger is adapted to engage the said lug 38 to swing the pawl 36 about its pivot and release the tip of the wire.

When the machine is to be used for tying the mouths of bags, I preferably equip the base 1 with a forwardly curved projection 42′ which will aid the operator of the machine in placing the bag in the desired position, and against which the mouth of the bag will bear when the wire looped around the said mouth is being tightened by a twisting operation. It will be obvious, however, that the strain thus put upon the thrust member 42′ and upon the wire of the loop while the latter is being twisted will vary with any variation in the exterior diameter of the mouth portion of the bag, and likewise with the difference in compressibility afforded by bags of substantially the same size but made of different materials.

To allow for such variations without using a surplus of wire and without imposing an excessive strain upon the wire forming the loop, I provide spring-regulated means for contracting the loop to the necessary size and tension required for each particular bag before performing the twisting operation. For this purpose, I mount upon the shaft 23 near the rear end of the machine a disk 41 equipped upon its forward face with a segmental cam 42 for engaging the head 43 of a tension lever 44 pivotally mounted upon brackets 45 carried by the standard 21 at the rear of the machine. The lever 44 is preferably formed with a loop portion permitting the shaft 23 to pass freely therethrough and is provided near its lower end 46 with a perforation housing the shank of a bolt 47. The bolt 47 also passes loosely through a perforation in a lever 48 likewise pivoted upon the brackets 45 and equipped at its lower end with a toe portion 49 of sufficient width for simultaneously engaging upwardly projecting lugs 50 carried respectively by the two cams 6. Surrounding a portion of the shank of the bolt 47 and interposed between the nut 51 of the said bolt and the forward face of the lever 48 is a compression spring 52 which may be adjusted as to its compression by varying the position of the nut 51 upon the said bolt. This spring is normally adjusted to a compression corresponding to a power considerably in excess of that required for moving the cams 6 and forcibly retracting the wire 3 by the engagement thereof between the opposed surfaces of the said cams. Consequently, when the disk 41 is rotated so that the head 43 is moved from the position shown in Fig. 2 to that shown in dotted lines in the same figure, the jointly pivoted levers 44 and 48 will move together as if they had been rigidly bolted to each other. However, as soon as the resistance afforded either by the engagement of the wire loop with the mouth of the bag or by the forward pull on the wire caused by the strains of twisting the ends of the said loop exceeds the pressure for which the spring 52 is adjusted, the said spring will permit the lower end of the lever 44 and the adjacent portion of the lever 48 to separate as shown in Fig. 4. Consequently, the extent to which the wire loop is contracted by the coöperating action of the cam 42, levers 44 and 48 and cams 6 will be automatically varied or adjusted for each individual loop which is to be tied; and likewise the retraction of the wire for contracting the loop will be relaxed whenever necessary so as to prevent an overstraining of the wire while the latter is being twisted. A similar automatic loop-tensioning will also be accomplished when using my machine for tying the crossed wires 79 of iron rods as used for making concrete reinforcements, in which case the thrust member 80 is provided with grooved tips 81 as shown in Fig. 6.

The shaft 23 also has secured thereto at the forward end of the machine a cam 53 presenting a raised portion 54 adapted successively to engage rollers 55 and 56, which rollers are carried respectively by levers 57 and 58 pivotally mounted at the forward

end of the framework of the machine. The other ends of the said levers are equipped with forks respectively engaging pins 59 and 60 projecting from horizontally disposed slides 61 and 62 disposed in guideways at the front of the machine and adapted when moved to engage the free end portions of the wire loop. The slide 62 is equipped upon the edge facing the wire loop with a cutting edge, to sever the adjacent portion of the wire loop from the adjacent part of the supply of wire as housed by the tube 11. The forward end of the frame is also equipped with vertically disposed guideways 63 housing the slide 40 carrying the arbor 64, the said slide together with the levers 57 and 58 being normally held in operative position by interconnected springs 65.

To maintain the twisting head of the machine stationary except during the above described twisting operation, I equip a portion of the said twisting head with a peripheral recess 66 adapted to be engaged by a pawl 67 and thereby kept from rotation as long as the said pawl is interlocked therewith. The pawl 67 is carried by a lever 68 pivoted near its center upon the framework of the machine and is normally pressed toward the said raised portion of the twisting head by a spring 69. The other end of the lever 68 carries a roller 70 adapted to be engaged by a segmental cam 71 mounted upon the rear of the disk 24, the said engagement serving to rock the said lever so as to disengage the pawl 67 and permit the twisting head to be rotated by the coöperation of the teeth 35 and the pinion 34.

The disk 24 also carries upon its rear face two arcuate cam formations 72 and 73 so disposed as substantially simultaneously to engage rollers 74 and 75 respectively, the said rollers being mounted at the upper end of bell-cranks 76 and 77 terminating in the arms or dogs 17 heretofore described as bearing against the pivoted arms 15 which support the members of the substantially horseshoe-shaped guide mechanism. The said formations 72 and 73 are relatively so disposed that they will simultaneously engage and leave the rollers 74 and 75 respectively, thereby spreading simultaneously and closing the halves 12 and 13 to grasp the object which is to be surrounded by the loop of the tie, and thereafter permitting the springs 19 to simultaneously open the same.

While the resiliency of the jaws of the guide member 12 will readily permit the looped wire to be forcibly drawn out of the said guide member when the wire is being retracted to contract the loop of the tie, the two halves 13 and 13′ of the companion member may require a suitable mechanism for spreading them apart. This I effect by means of a dog 78 secured to the pivot 14 and having its tip disposed near a peripheral portion of the disk 24, so that the said tip may enter a recess 82 in the said disk, thereby temporarily rotating the said pivot 14 and opening the jaws (as shown in Fig. 12), the said jaws being normally held closed by a spring 83.

It will be obvious from Fig. 11 that the shape of the secondary loop 84 formed by the coöperation of the slide 40 with the slides 61 and 62 will depend on the shape of the said arbor 64, and that the said auxiliary loop will afford a convenient means for untwisting the main loop 85 of the tie when the bag is to be opened. However, the formation of the secondary loop may easily be avoided by merely removing the arbor 64 around which the said loop is formed, thereby also adapting my machine for tying objects (like the crossed wires 29 of Fig. 6), where it is not desired to afford means for untying the main loops. Moreover, it will be evident that the various details of construction herein disclosed might be varied in many ways without departing from the spirit of my invention, hence I do not wish to be limited to the precise embodiment herewith pictured and described.

I claim as my invention:

1. Apparatus for tying objects with wire, including mechanism coacting with the object for forming and contracting a loop of wire about said object, said mechanism including wire feeding means, wire bending means whereby the wire is looped around the object to be tied, means for subsequently contracting the wire tightly about the object, and mechanism for tying said wire while so contracted.

2. Apparatus for tying objects with wire, including mechanism for forming a loop of wire adapted to receive an object, mechanism coacting with the object for contracting said loop around the latter, and mechanism for tying said loop while contracted.

3. Apparatus for tying the puckered mouth of a bag, comprising feed mechanism for propelling wire, guide means disposed to receive the said mouth of the bag and coacting with the said feed mechanism to dispose the end portion of the wire in a loop about the same; clamping means for gripping the end of the wire when thus disposed, mechanism for partially retracting the wire to contract the said loop about the mouth of the bag and withdraw the same from the said guide means, mechanism for relatively twisting the wire portions forming the ends of the said contracted loop, and cutting means for severing the wire from the said relatively twisted portions thereof.

4. Bag tying apparatus including feed mechanism for propelling wire, guide means disposed near the said mouth of the bag and adapted to receive the end portion of the

wire when propelled by the said feed mechanism and to guide said end portion of the wire to form a loop about the mouth of the bag; clamping means disposed near the free end of the resulting loop, mechanism for actuating the said clamping means to grip the said free end of the wire, mechanism for partially retracting the main portion of the wire to contract the said loop about the mouth of the bag, mechanism for relatively twisting the wire portions forming the ends of the said contracted loop, cutting means for severing the body of wire from the said twisted portions thereof, and mechanism for releasing the said clamping means after the said severing of the wire.

5. Apparatus for making a tie of wire, including mechanism for propelling the wire, guide means coöperating with the said feed mechanism to dispose the end portion of the wire in the form of a loop, mechanism for retracting the main portion of the wire to effect a contraction of the said loop, and means coacting with the object to be tied actuated substantially simultaneously with the said retraction of the wire for releasing the said guide means from the said loop portion of the wire.

6. Wire tie-forming apparatus, including, in combination wire feed mechanism and guide means for disposing the end portion of the wire in loop formation, mechanism for relatively twisting the portions of the wire forming the ends of the said loop, cutting means for severing the supply of wire from the portion connecting the same to the said twisted loop, and mechanism for forming the ends of the said relatively twisted portions of the wire into auxiliary loops.

7. Wire tie-forming apparatus including, in combination, wire feed mechanism and guide means for disposing the end portion of the wire in loop formation, mechanism for relatively twisting the portions of the wire forming the ends of the said loop, cutting means for severing the supply of wire from the portion connecting the same to the said twisted loop, and mechanism for forming the ends of the said relatively twisted portions of the wire into auxiliary loops relatively disposed to form a key for manually opening the tie.

8. Apparatus for making a tie of wire, including mechanism for propelling wire, guide means coöperating with the said feed mechanism to dispose the end portion of the wire in the form of a loop, mechanism coacting with the object to be tied for retracting the main portion of the wire to effect a contraction of the said loop, and spring means controlling the said retraction of the wire.

9. Apparatus for tying the puckered mouth of a bag, comprising in combination, feed mechanism for propelling the wire, guide means disposed near the said mouth of the bag and coacting with the said feed mechanism to dispose the end portion of the wire in a loop about the mouth of the bag; clamping means for gripping the end of the wire when thus disposed, mechanism coacting with the object to be tied for partially retracting the wire to contract the said loop about the mouth of the bag, and into engagement with the latter, means associated with the said means effecting engagement of the loop with the mouth portion of the bag for controlling the said retraction of the wire, and means for relatively twisting the wire portions of the said contracted loop.

10. Apparatus for making a tie of wire, including mechanism for propelling wire, guide means coöperating with the said feed mechanism to dispose the end portion of the wire in the form of a loop, mechanism coacting with the object to be tied for retracting the main portion of the wire to effect a contraction of the said loop, the said guide means including a pair of relatively movable members normally engaging the said loop to prevent contraction of the latter: and means for relatively moving the said members to permit the said loop to be drawn out of engagement therewith, thereby permitting the said wire-retracting mechanism to contract the said loop.

11. In a wire-tie forming machine, mechanism for moving a wire, comprising a pair of pivoted cams disposed on opposite sides of the said wire, each thereof equipped with a projection, a pivoted lever engaging both of the said projections, an auxiliary pivoted lever, a spring connecting the said levers, and a cam engaging the said auxiliary lever.

12. In a wire-tie forming machine, mechanism for moving a wire, comprising a pair of pivoted cams disposed on opposite sides of the said wire, each thereof equipped with a projection, a pivoted lever engaging both of the said projections, an auxiliary pivoted lever, a spring connecting the said levers, a cam engaging the said auxiliary lever, and means for adjusting the tension of the said spring.

13. Apparatus for tying the puckered mouth of a bag, comprising in combination, feed mechanism for propelling the end portion of the wire, guide means disposed near the said mouth of the bag and coacting with the said feed mechanism to dispose the end portion of the wire in a loop about the mouth of the bag; the said guide means including a pair of relatively movable guide members normally coöperating to form a continuous and substantially horseshoe-shaped guide about the said mouth of the bag; means for relatively moving the said guide members to separate their adjoined ends, thereby permitting the normal positioning of the said

mouth of the bag, and means for returning the said guide members to their normal cooperating position.

14. Apparatus for tying the puckered mouth of a bag, comprising in combination, feed mechanism for propelling the end portion of the wire, guide means disposed near the said mouth of the bag and coacting with the said feed mechanism to dispose the end portion of the wire in a loop about the mouth of the bag; the said guide means including a guide member having a slot facing the said mouth of the bag and narrower than the diameter of the said wire, the portions of the said member on opposite sides of the said slot being adapted to be sprung apart upon a pull on the wire to permit the passage of the wire through the said slot.

15. Wire tie-forming apparatus including, in combination, feed mechanism and guide means for disposing the free end of the wire in loop formation, mechanism for relatively twisting the portions of the wire forming the ends of the said loop, cutting means for severing the supply of wire from the portion connecting the same to the said twisted loop, and means for locking the said twisting mechanism against movement during the actuation of the said feed and cutting mechanisms.

16. Bag tying apparatus including, in combination wire feed mechanism, guide means disposed near the mouth of the bag and adapted to receive the end portion of the wire when propelled by the said feed mechanism and to guide an end portion of the wire to form a loop about the mouth of the bag; clamping means disposed near the free end of the resulting loop, mechanism for actuating the said clamping means to grip the said free end of the wire, mechanism coacting with the mouth of the bag for partially retracting the main portion of the wire to contract the said loop about the mouth of the bag, mechanism for relatively twisting the wire portions forming the ends of the said contracted loop, cutting means for severing the supply of wire from the said twisted portions thereof, and mechanism for releasing the said clamping means proximate to the said severing of the wire, and bending mechanism for forming the resulting free ends of the wire tie into auxiliary loops.

17. Wire tie-forming apparatus including, in combination, a support for the object, a thrust member adapted to engage the said object, mechanism for feeding the wire from the said supply thereof, guide means for guiding the wire in loop formation about a portion of the said object adjacent to the thrust member, tension means for retracting the wire to draw the said loop into forcible engagement with the said portion of the object, and twisting means for twisting the ends of the said loop, the said thrust member so disposed with respect to the loop and object supporting means as to maintain the object in a predetermined position during the said retracting of the wire.

18. In a wire-loop forming machine, the combination with a rotatable twisting head equipped with a wire-duct terminating at one side of the axis of the head and equipped with a wire tip receiving recess disposed on the head diametrically opposite the said terminus of the duct, means for feeding wire, of guide means for guiding the end portion of a wire in loop formation from the said terminous to the said recess, means carried by the twisting head for clamping the said free end of the wire, means for releasing the wire from feeding means as the same is engaged by said clamping means, and means for rotating the twisting head to effect a relative twisting of the end portions of the said loop.

19. In a wire-loop forming machine, the combination with means for feeding wire, and means for disposing an end portion of the same in loop formation, of means for gripping the free end of the wire, means coacting with the object to be tied for retracting the main portion of the wire to afford a loop of the desired size, means for holding the said main portion of the wire under tension, and means for relatively twisting wire portions constituting ends of the said loop while maintained under said tension.

20. Apparatus for tying objects with wire, including mechanism for forming a tie, object-engaging means, mechanism for engaging the tie with the object and for drawing the latter under tension tightly about the object, and mechanism for closing the tie while under tension.

In testimony whereof I have signed my name in presence of two subscribing witnesses.

ROGERS M. WARWICK.

Witnesses:
G. M. NEVILLE,
ALBERT SCHEIBLE.