Sept. 20, 1927. 1,642,850

H. B. FOULDER

MACHINE FOR TYING WIRE TIES

Filed July 11, 1924 5 Sheets-Sheet 1

Fig. 1.

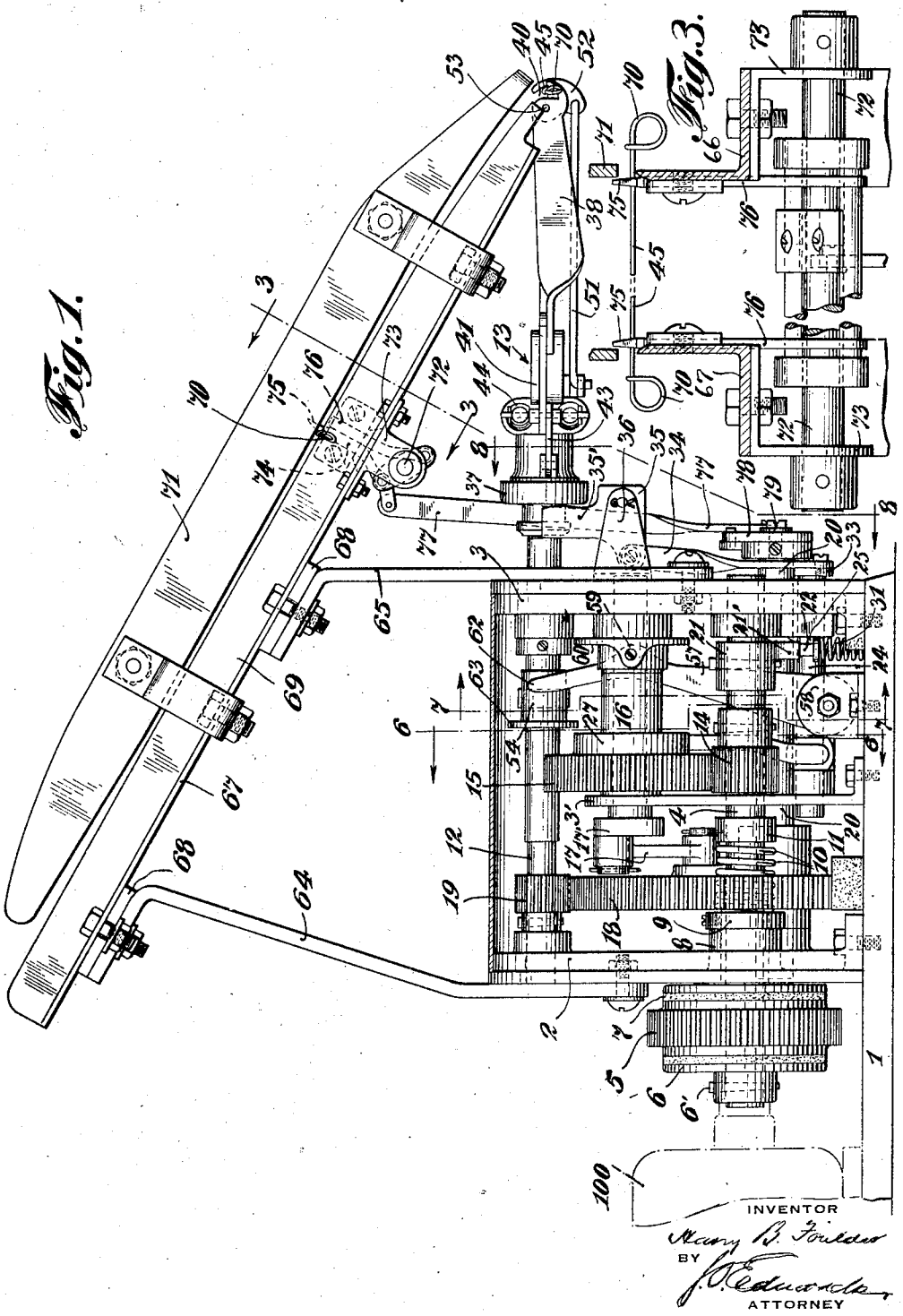


Fig. 3.

INVENTOR

Harry B. Foulder

BY

J. Edwards

ATTORNEY

Sept. 20, 1927. 1,642,850

H. B. FOULDER

MACHINE FOR TYING WIRE TIES

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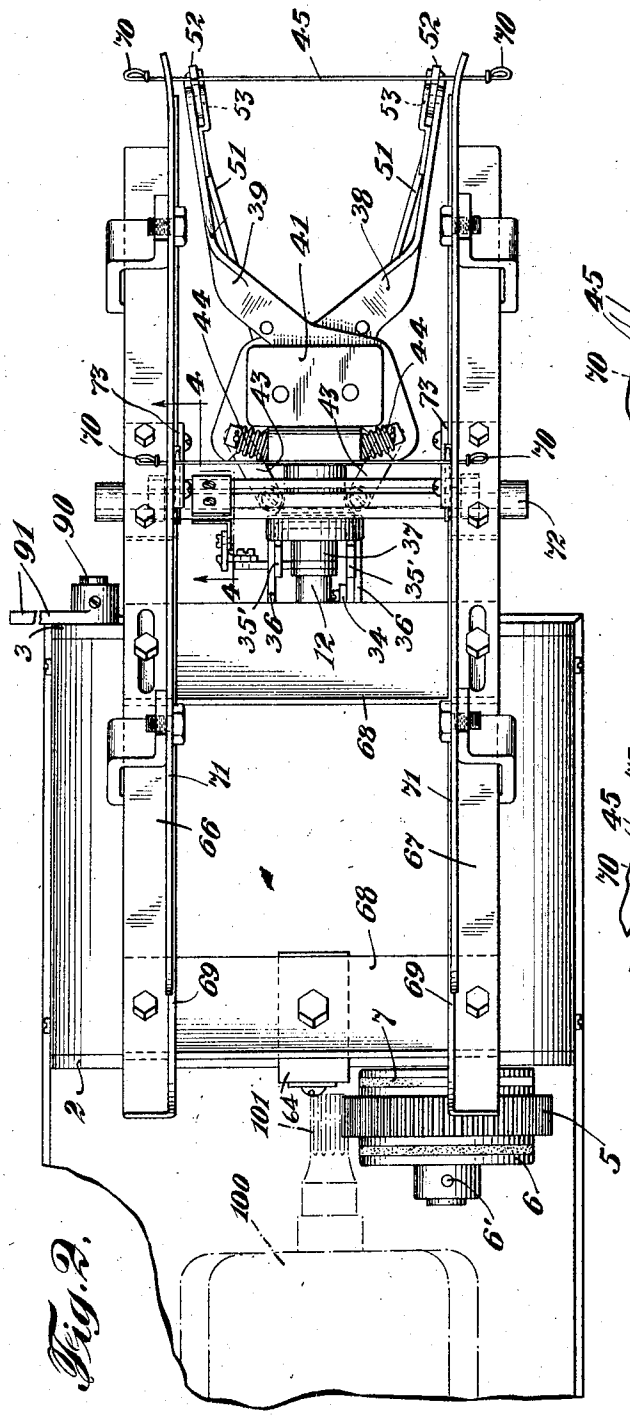


Fig. 2.

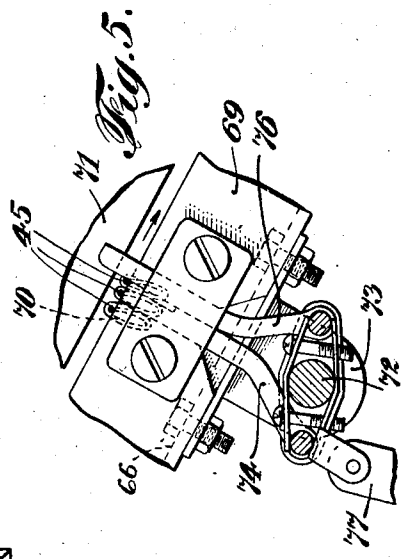


Fig. 5.

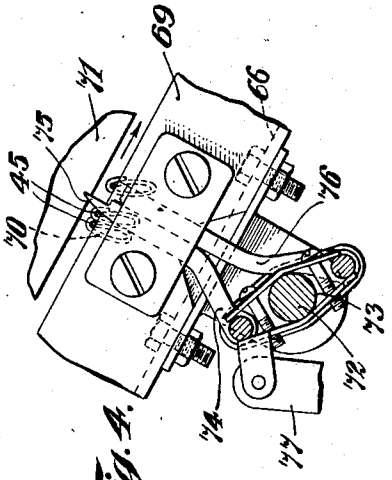


Fig. 4.

INVENTOR
Henry B. Foulder
BY
J. Edwards
ATTORNEY

Sept. 20, 1927. 1,642,850

H. B. FOULDER

MACHINE FOR TYING WIRE TIES

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Fig. 6.

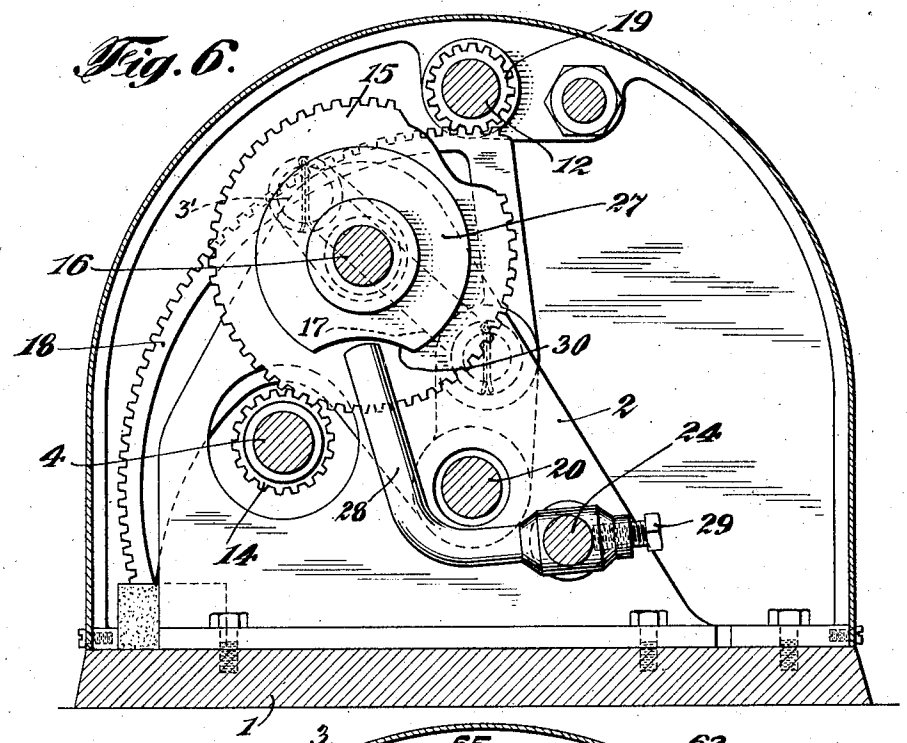
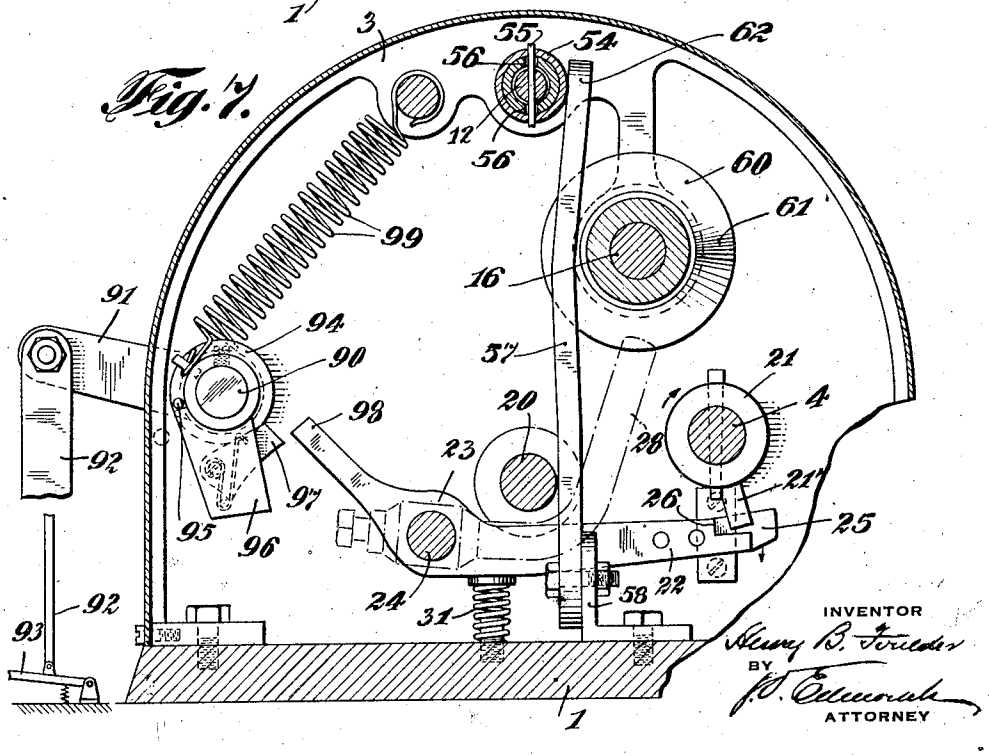


Fig. 7.



INVENTOR
Henry B. Foulder
BY
J. B. Edmonds
ATTORNEY

Sept. 20, 1927. 1,642,850

H. B. FOULDER

MACHINE FOR TYING WIRE TIES

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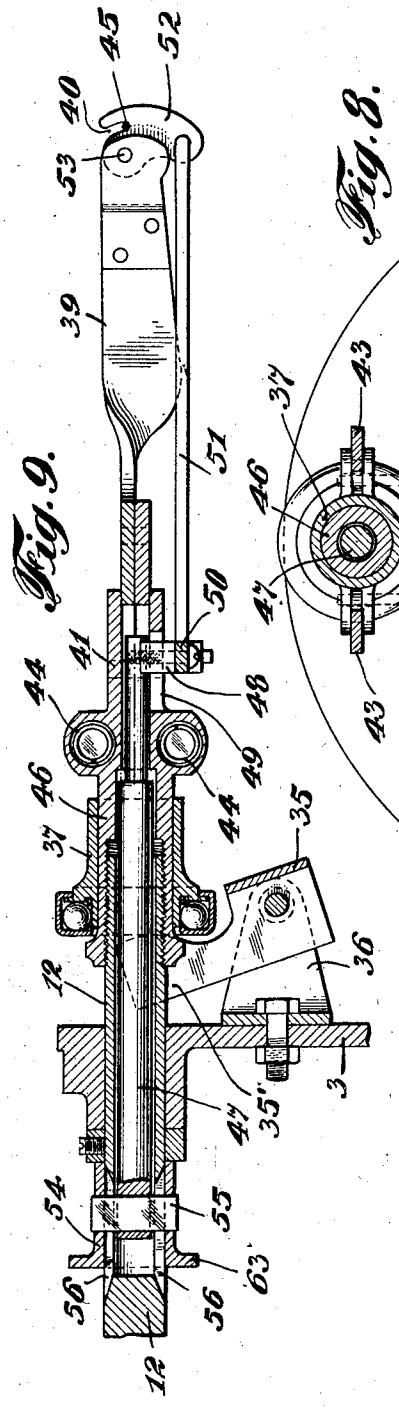


Fig. 9.

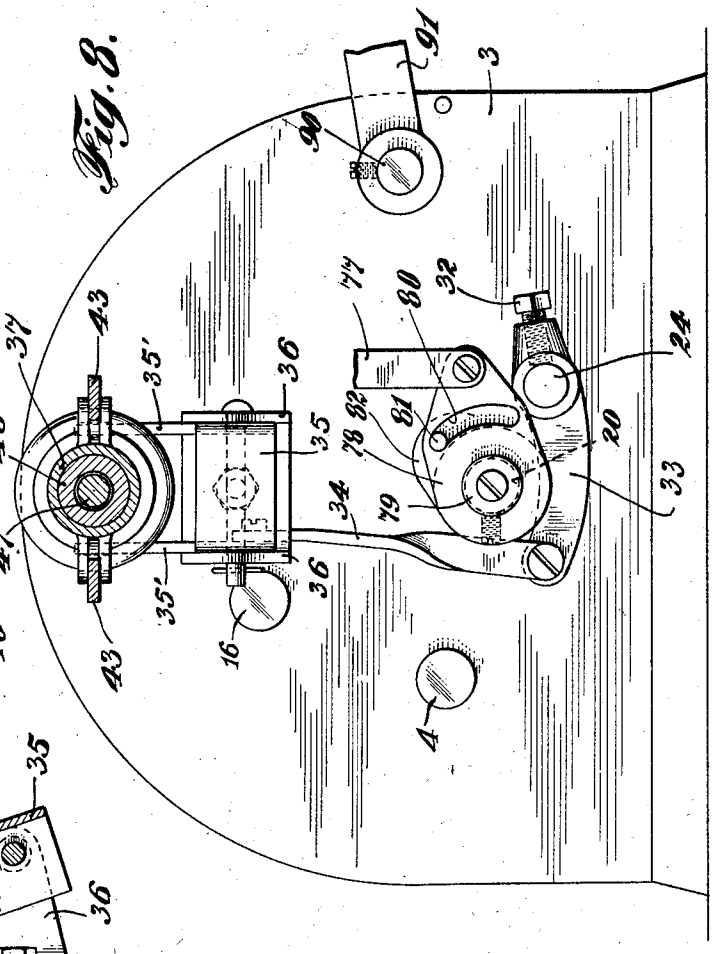


Fig. 8.

INVENTOR
Henry B. Foulder
BY
B. Edwards
ATTORNEY

Sept. 20, 1927. 1,642,850

H. B. FOULDER

MACHINE FOR TYING WIRE TIES

Filed July 11, 1924 5 Sheets-Sheet 5

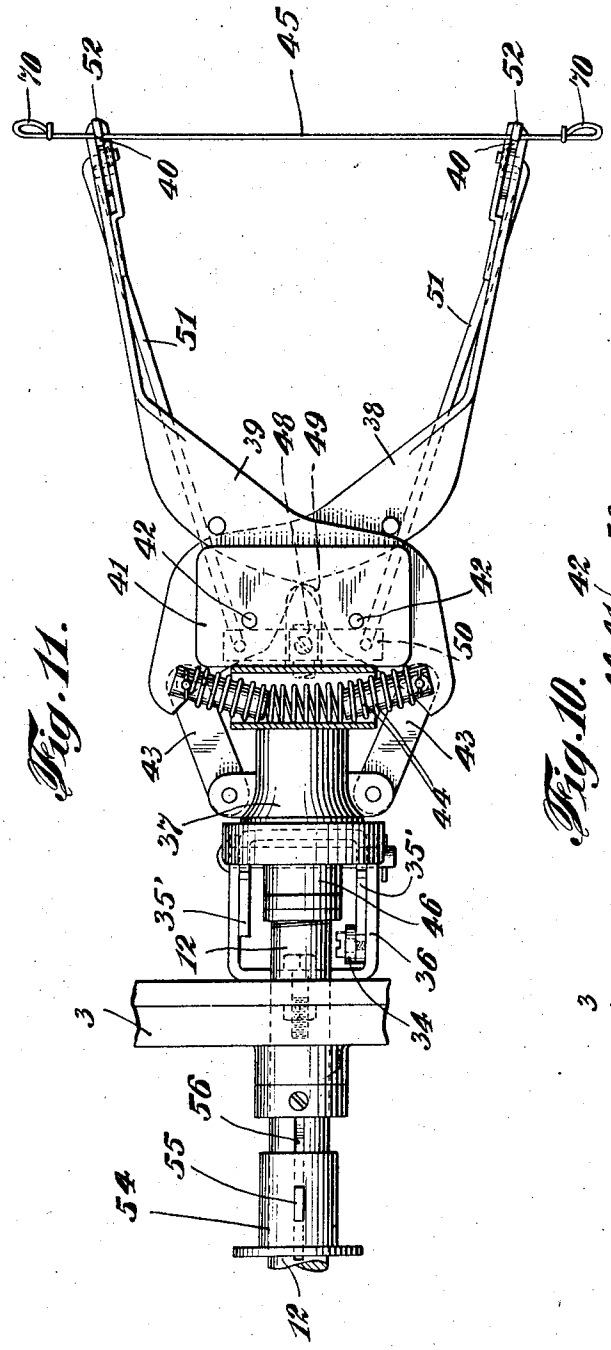


Fig. 11.

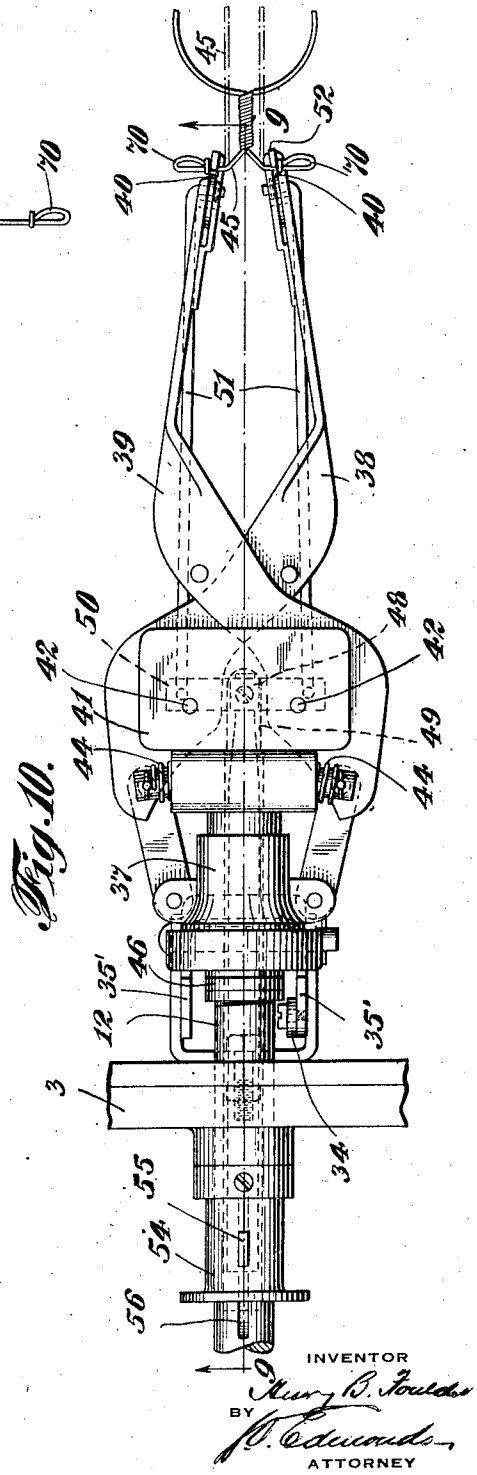


Fig. 10.

INVENTOR
Henry B. Foulder
BY
J. Edwards
ATTORNEY

Patented Sept. 20, 1927. 1,642,850

UNITED STATES PATENT OFFICE.

HENRY B. FOULDER, OF GLENBROOK, CONNECTICUT, ASSIGNOR TO J. P. CURRY MFG. CO., INC., OF STAMFORD, CONNECTICUT, A CORPORATION OF NEW YORK.

MACHINE FOR TYING WIRE TIES.

Application filed July 11, 1924. Serial No. 725,379.

This invention relates to a machine for tying wire ties, and more particularly relates to a power driven bench tool for twisting wire ties about the necks of bags or other articles, the machine being adapted to present ties successively for engagement with successive articles to be tied and to be started by the act of the operator engaging each article with a tie presented by the machine, and adapted to operate automatically to give each engaged tie a predetermined number of twists, thereby tying the tie about the engaged article, and then to release the tie from the machine, automatically stopping and presenting the next tie in such position that the operator may engage the next article with the tie for a repetition of the tying operation.

The principal object of my invention is to provide a machine of the character described, and one which operates positively, rapidly, efficiently and smoothly, and requires little power; one which is small, compact, light and conveniently portable, comprising sturdy parts, compactly assembled, and including a minimum number of delicate parts such as would be apt to break under rough or continued use. Another object of my invention is to provide a tool of the character described, and one in which the parts are so connected that synchronism of movement of all parts of the machine is assured at all times, and the parts are prevented from becoming out of adjustment. Another object of my invention is to provide simple mechanism synchronized with the twisting mechanism, whereby ties are placed automatically and successively in convenient position for engagement about the neck of a bag or other article. Another object of my invention is to provide improved power actuated tie twisting mechanism which is responsive to being started by the act of engaging a tie associated with the machine about the neck of a bag, the tie twisting mechanism operating automatically to give the tie a predetermined number of twists and then to release the tie from the machine and to stop automatically in proper position to receive another tie in such association therewith that the machine may again be started by the act of engaging another bag with said tie. Other objects will be in part obvious and in part pointed out hereinafter.

This invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the constructon hereinafter set forth and the scope of the application of which will be indicated in the following claims.

In order that a clearer understanding of my invention may be had, attention is hereby directed to the accompanying drawings forming a part of this application and illustrating one possible embodiment of my invention. Referring to the drawings, Fig. 1 is a side elevation of a machine embodying my invention; Fig. 2 is a top elevation of the same; Fig. 3 is a sectional view of a portion of the tie feeding mechanism, and is taken on the line 3—3 of Fig. 1, looking in the direction of the arrows; Fig. 4 is a sectional view of a portion of the tie feeding mechanism, and is taken on the line 4—4 of Fig. 2; Fig. 5 is a view similar to Fig. 4 but shows the mechanism in another position; Fig. 6 is a sectional view and is taken on the line 6—6 of Fig. 1; Fig. 7 is a sectional view of the machine and is taken on the line 7—7 of Fig. 1; Fig. 8 is a sectional view of the machine and is taken on the line 8—8 of Fig. 1; Fig. 9 is a longitudinal sectional view through the tie twisting head and is taken on the line 9—9 of Fig. 10; Fig. 10 is an elevation of the tie twisting head in the position assumed when a tie associated with a head is engaged with an article about which the tie is engaged; and Fig. 11 is a view of the tie twisting head, partly in section, showing the head in the position assumed when a tie associated therewith is in position for engagement with an article to be tied. Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring to the drawings, the machine comprises a suitable base plate 1 having suitable spaced supporting standards 2 and 3. A drive shaft 4 is rotatably and slidably mounted on the standards. A gear 5 is mounted on shaft 4 for constant rotation

from a source of power such as motor 100, having a driving gear 101 constantly in mesh with the gear 5. A clutch disc 6 is affixed by pin 6′ to the shaft 4 on one side of gear 5, and on the other side of the gear is a complementary clutch disc 7 which has a hub 8 rotatably extending through standard 2, and a collar 9 is secured to this hub. Shaft 4 rotates and slides in hub 8. A coil spring 10, confined between the collar 9 and another collar 11 secured to shaft 4, constantly urges the shaft 4 and its clutch disc 6 to move toward the front of the machine to cause the gear 5 to be clutched between the discs 6 and 7 so that shaft 4 will rotate with the gear 5.

A tie twisting spindle 12 is mounted for rotation in the standards 2 and 3. This spindle carries a tie twisting head 13 at its forward end. The twisting spindle 12 is caused to be rotated whenever shaft 4 rotates through the intervention of a gear 14 secured to the shaft 4 and in constant mesh with a gear 15 secured to a shaft 16 journaled in standard 3 and bracket 3′. A crank arm 17 at one end is pivotally carried by an arm 17′ which is secured to the end of shaft 16, and at its other end crank 17 is pivotally connected with a sector gear 18, the teeth of which are in constant mesh with a gear 19 pinned on the twisting spindle 12. Sector gear 18 is mounted for rotatable reciprocation on a shaft 20 carried by the standards.

It will be readily apparent that when the clutch discs 6 and 7 are clutched against the gear 5, the shaft 4 and the gear 14 will rotate, causing the gear 15 and shaft 16 to rotate, which in turn actuates the crank 17 to oscillate the sector gear 18 first in one direction and then in the reverse direction, and that through the engagement of the sector gear with the gear 19 the twisting spindle 12 is rotated first in one direction for a predetermined number of turns and then for the same number of turns in the reverse direction.

The twisting head is so constructed that it is adapted to hold a tie in position for being engaged readily and easily about the neck of a bag or the like. This twisting head is so associated with the mechanism heretofore described that the act of engaging the tie with the neck of a bag or the like causes the clutch members 6 and 7 to so engage the gear 5 that the twisting mechanism of the machine starts to operate. The machine also incorporates means for releasing the tie from the head after it has been given a predetermined number of turns, and also includes mechanism for automatically throwing out the clutch 6, 7 to stop the machine in original position with the twisting head disposed in appropriate position for receiving another tie.

21 is a collar pinned to shaft 4 and has a finger 21′, which is adapted to cooperate with the end of one arm 22 of a lever 23 which is pivoted on a shaft 24 rotatably supported in the standards. Lever arm 22 is adapted to be disposed in the path of rotation of the finger 21′ in such a way that finger 21′ will engage and ride on a beveled surface 25 on the lever. This cams the finger, and consequently the shaft 4, rearwardly and moves the clutch disc 6 away from the gear 5 and out of driving engagement therewith. To positively stop rotation of shaft 4 at this time, finger 21′ is adapted to engage against a stop shoulder 26 formed on lever arm 22. It will be apparent that when lever arm 22 is rocked downward out of engagement with finger 21′, spring 10 will immediately cause shaft 4 and disc 6 to move toward gear 5 and cause the machine to start operating.

In order to automatically stop the machine after a predetermined number of turns of shaft 4, I secure a cam disc 27 to the gear 15 for rotation therewith and associate with this cam disc a lever 28 which is secured to the shaft 24 for adjustment, as by means of set screw 29. The end of lever 28 is adapted to ride on the peripheral surface of cam disc 27, and the engagement is such that while lever 28 rides on the raised portion of the cam, the lever arm 22 will be held out of the path of the finger 21′, but when the lever 28 enters the depression 30 in the cam surface, the lever arm 22 will be in the path of the finger 21′ to stop the machine, including rotation of cam disc 27. A spring 31 compressed between the lever arm 22 and the base 1 constantly urges the levers 22 and 28 upwardly.

Shaft 24 extends outside of standard 3, and to this end of the shaft is adjustably secured by means of set screw 32 a lever 33, to which is pivotally secured a link 34, which in turn is pivoted to a bell crank lever device 35 pivotally carried by brackets 36 secured to standard 3. The bell crank lever 35 has two arms 35′ which engage against a collar 37 which is part of the twisting head, and which is longitudinally movable on the spindle 12, so that, through the action of levers 33 and 35 and link 34, when collar 37 is moved rearward on spindle 12, lever arm 22 is placed out of engagement with the finger 21′, and the twisting mechanism starts operation.

Collar 37 is adapted to be moved to start the machine by the operation of placing a bag or the like in engagement with a tie held in the twisting head. To this end the twisting head includes two arms 38 and 39 provided at their outer ends with slots 40 adapted to receive a wire tie. The arms 38 and 39 are pivoted to a base 41, as at 42, and each has a portion extending beyond its pivot which is pivotally connected by means of a link, such as 43, to the sleeve 37. A

spring 44 compressed between the tails of the arms 38 and 39 normally holds the forward ends of the arms separated and the collar 37 in forward position. When the arms 38 and 39 are drawn together, as by the action of placing the neck of a bag behind a tie 45 held by the arms and pulling outwardly on the bag to engage the tie therewith, the collar 37 is moved rearwardly and the machine is automatically started. Collar 37 is slidably mounted on a tubular rear portion 46 of the base 41. Portion 46 is screw threaded upon the forward end of the spindle 12. The forward end of the spindle 12 and the base 41 is hollow, and in this hollow space is slidably seated a rod 47 which at its forward end carries a plate 48 which extends through a slot 49 in the base 41. Plate 48 carries a cross plate 50, to which is secured at opposite sides of the center line of the head, two links 51 which at their forward ends engage end pieces 52, one of which is pivoted, as at 53, to each of the arms 38 and 39, and which have the tie receiving slots 40. Toward the rear end of rod 47 there is a sleeve 54 mounted for movement along the spindle 12, this sleeve being secured to the shaft 47 by a pin or plate 55 which engages these members and extends through slots 56 provided in the spindle 12. Thus it will be seen that when sleeve 54 is drawn rearwardly on spindle 12 the arm ends 52 will be rocked downwardly to take the slots 40 into such position that a tie seated in the slots will be released. This collar 54 is moved rearwardly on spindle 12 automatically during the operation of the machine to cause a twisted tie to be automatically released after it has been given a certain number of twists. This release is accomplished by means of a lever 57 which is pivoted to brackets 58 secured to base 1. A portion 59 of lever 57 rides against a cam disc 60 which is secured to shaft 16 for rotation therewith and carries a raised cam portion 61 which strikes the lever 57 to move it rearwardly, thus causing the upper end 62 of lever 57 to engage a flange 63 of sleeve 54 and to carry sleeve 54 rearwardly, thus effecting the downward rocking of the arm ends 52 and the release of a tie engaged therein.

The machine is adapted to stop automatically with the arms 38 and 39 spread apart and the end portions 52 in tie receiving position. I associate with the machine an apparatus or attachment for automatically placing ties singly and successively in the slots 40 of the tie twisting head after each operation of the machine. This attachment may conveniently be supported on brackets, such as 64 and 65, secured to the standards 2 and 3, and comprises two slides 66 and 67 suitably secured to cross pieces 68. Each slide includes a vertical flange 69, the vertical flanges of the two slides being spaced apart a suitable distance to allow ties to rest on both flanges with their heads 70 outside of the flanges. Above each flange 69 is preferably secured a vertical retaining strip 71, the slot between the flanges 69 and the strips 71 being of such width that a tie may readily and easily slide through the slot in the direction of the flanges, but is so narrow that the heads 70 of the ties cannot pass therethrough. The slides are appropriately inclined, so that the ties will automatically feed toward the front of the machine, and the delivery ends of the slides are so positioned with respect to the slots 40 of the tie twisting head that each tie leaving the slides will automatically become seated in the slots 40 and across the two arms 38 and 39.

I provide means for automatically delivering a single tie through the slides after each complete operation of the machine. To this end I associate with each slide a rock shaft 72 which carries adjacent each slide a member 73, to which are pivotally secured on opposite sides of the shaft 72, a finger 74 which has a pointed end 75 adapted to penetrate between the two adjacent ties in the slides, and another finger 76, which is adapted to block the passage of ties down the slides. Fingers 74 and 76 are adapted to reciprocate across the tie slides in opposite directions and on opposite sides of the next tie in line for delivery to the head. This releases the one tie behind which the finger 75 will be disposed, the finger 75 blocking the forward feed of the remaining ties. Finger 76 then rides across the slide while finger 74 is withdrawn, thus allowing the ties to feed forward only as far as the finger 76 and placing another tie in position for being released to the twisting head by another alternate reciprocation of the fingers 74 and 76. A link 77 at one end is connected eccentrically to one of the members 73, and at the other end is connected to a plate 78 which is mounted for revolution on a reduced end 79 of the shaft 20 to which sector gear 18 is secured. This plate 78 has a slot 80 in which engages a pin 81 provided on a collar 82 which is secured to the shaft 20. As before stated, shaft 20 rocks into one position during tie twisting movement of sector gear 18, and then rocks back into original position with the return movement of gear 18. As shaft 20 rocks into original position, the pin 81 moves links 77 upwardly to raise finger 74 and lower finger 76 to cause a tie to be fed to the tie twisting head. When the shaft 20 rocks into its other position, the pin 81 engages the opposite end of slot 80 and moves the link 77 downwardly, thus placing finger 76 in the path of the ties in the slides and retracting finger 74. This does not permit any tie to be fed to the twisting head, but as soon as shaft 20 is rocked into

original position again, the pin 81 will engage the upper end of the slot 80 and will effect the forward feed of a single tie to the twisting head in the manner above described.

The operation of the machine is as follows:—A supply of suitable wire ties 45 are disposed in the slide of the tie dispensing attachment, and the first tie may be released by grasping the member 77 in the fingers and moving it up and down once. This reciprocates the dispensing fingers 74, 76, and the released tie will automatically fall across the tie twisting arms 38 and 39 and will seat itself in the slots 40. The operator then takes a bag and after gathering the neck together inserts it behind the tie seated in the twisting head, and then engages the bag neck with the tie by moving the bag neck outwardly of the head. This movement causes the tie 45 to be bent about the bag neck, and, the heads 70 of the tie being too large to pass laterally through the slots 40, causes the twisting fingers 38 and 39 to collapse toward each other. This movement of the twisting fingers causes sleeve 37 to move rearwardly, which movement in turn causes the stop lever 22 to be moved downward out of engagement with the finger 21', whereupon shaft 4 is released to move forwardly under the action of spring 10 and the clutch 6, 7 is closed upon the rotating gear 5, thus starting the machine in operation. During such operation the sector gear 18 is first moved a full stroke in one direction to rotate the spindle 12 and twisting head 13 a predetermined number of turns in tie twisting direction. At the end or immediately after the end of this stroke of sector gear 18, the lever 57 is actuated by the projection 61 of cam 60 to retract the rod 47 to upset the pivoted end pieces 52 on the twisting fingers 38 and 39 and effect the release of the twisted tie from the twisting head. Also when the sector gear 18 has completed its tie twisting stroke, the link 77 will be raised to release the next tie for movement down the slide toward the twisting head. Sector gear 18 now rocks back into original position and at this time the machine will be automatically stopped by reason of lever 28 having entered the cutaway portion 30 of cam disc 27, and thus allowing stop lever 22 to be raised and positioned in the path of the finger 21'. Also when sector gear 18 arrives in original position the link 77 will have been lowered, thus effecting reciprocation and reversal of position of the tie dispensing fingers 74, 76, and placing the tie dispensing attachment in condition to release the next tie when the sector gear 18 has rocked forwardly to the end of its next tie twisting stroke. The return movement of sector gear 18 rotates the empty tie twisting head 13 in reverse direction and into proper position to receive and catch in its recesses 40 the tie which was released at the end of the forward stroke of sector gear 18. The reverse movement of sector gear 18 restores the twisting head 13 into original position quickly enough to receive this release tie. Thus it will be apparent that so long as an adequate supply of ties is provided in the dispensing attachment, all that is required of an operator is to take successive bags and engage them properly in successive order with the ties presented by the twisting head.

Obviously, the timing of the various movements of the machine may be varied considerably without departing from the scope of my invention. For instance, although preferably a tie is released at the start of the reverse movement of the sector gear and the tie twisting head, the release of the tie may be effected at or before the end of the twisting movement. This adjustment may be made by merely adjusting the cam 60 about the shaft 16. The time of dispensing a tie down the slide may also be varied by adjusting the members 78 and 82 on the shaft 20. It is also apparent that the gearing ratios between the various parts may be adjusted so that different numbers of turns will be given to the ties. I have found that for ordinary requirements it is satisfactory to so arrange the gearing that the tie twisting head 13 will have two and a half revolutions in each direction.

If for any reason a tie should fail to be dispensed, or, having been dispensed, is not properly received by the twisting head, another tie may be dispensed readily and easily by the operator giving the lever 77 a single up-and-down reciprocation manually. The pin and slot engagement between the members 78 and 82 permits this.

I also preferably provide an auxiliary arrangement whereby the machine may be started in operation by the operator without manipulating the tie twisting head. This attachment, as shown, comprises a shaft 90 journaled in the bracket 3 and to one end of which is secured an arm 91 connecting through a link 92 with a suitable foot treadle 93. Also to the shaft 90 I securely attach a collar 94 which has a pin 95 engaging a plate 96 pivotally mounted on the shaft 90. Plate 96 carries a spring pressed pivoted pawl 97 adapted to engage a heel portion 98 of the lever 23. A spring 99 engaging the member 96 and a stud on the standard 3 normally retains the parts in inoperative position. When it is desired to start the machine by means of this attachment, it is merely necessary to depress the link 92 either manually or by means of the treadle 93. The depression of link 92 rocks shaft 90 and brings the pawl 97 into such engagement with the end 98 of the lever 23 that the opposite arm 22 of the lever 23 will be moved out of the path of the finger 21'

of the member 21 and the machine will start to operate. The manual starting attachment is such that pawl 97 and lever end 98 will only have a temporary engagement, pawl 97 being arranged to slide off the end 98 when the lever 23 has been moved a sufficient amount to release the finger 21'. Thus the machine will automatically stop after the usual cycle of operations even if the link 92 should remain depressed. In view of the pivotal mounting of pawl 97 on the member 96, this starting attachment can move into original position irrespective of the position of the lever 23.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departng from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What I claim is:—

1. In an apparatus of the character described, in combination, a magazine for wire ties, a rotatable spindle having a head adjustable to receive and hold a tie for twisting and adjustable to discharge the tie, means normally maintaining the head adjusted to receive and hold a tie, a device for feeding ties singly and successively from said magazine into engagement with said head, and means for actuating the tie feeding device to deliver a tie into engagement with the head and for rotating said spindle to twist a tie held by the head and for then adjusting the head momentarily to discharge the tie.

2. In an apparatus of the character described, in combination, a magazine for wire ties, a rotatable tie twisting head adjustable to receive and hold a tie for twisting and adjustable to discharge the tie, means normally maintaining said head adjusted to receive and hold a tie, a device for feeding ties singly and successively from said magazine into engagement with said head, and a main actuator for actuating the tie feeding device to deliver a tie into engagement with the head and for rotating said head to twist a tie held thereby and for adjusting said head to discharge a tie twisted thereby.

3. In an apparatus of the character described, in combination, a magazine for wire ties, a rotatable spindle having a head adjustable to receive and hold a tie for twisting and adjustable to discharge a tie, a device for feeding ties singly and successively from said magazine into engagement with said head, driving means for actuating the tie feeding device to deliver a tie into engagement with the head and for rotating said spindle and for adjusting said head to discharge a tie, and means maintaining said head adjusted to receive and hold a tie when the spindle is at rest and during tie-twisting rotation thereof.

4. In an apparatus of the character described, a magazine for wire ties, a rotatable tie-twisting device normally in tie-holding condition, means for adjusting the device out of tie-holding condition, mechanism for feeding wire ties singly and successively from said magazine and into engagement with said members for twisting, actuating means for operating said tie-feeding mechanism and for rotating said device and for adjusting said device out of tie-holding condition, and a clutch connecting said actuating means with the tie-feeding mechanism, said tie-twisting device, and said device adjusting means.

5. In an apparatus of the character described, a magazine for wire ties, a rotatable tie-twisting device normally in tie-holding condition, means for adjusting the device out of tie-holding condition, mechanism for feeding wire ties singly and successively from said magazine and into engagement with said members for twisting, actuating means for operating said tie-feeding mechanism and for rotating said device and for adjusting said device out of tie-holding condition, a clutch connecting said actuating means with the tie-feeding mechanism, said tie-twisting device and said device adjusting means, and mechanism operated by said actuating means and adapted automatically to maintain said clutch engaged until said device has rotated to a predetermined extent and adapted automatically then to disengage said clutch.

6. In an apparatus of the character described, in combination, a magazine for wire ties, a rotatable tie twisting head adjustable to receive and hold a tie for twisting and adjustable to discharge the tie, means for dispensing ties singly and successively from the magazine into engagement with the head, means normally holding the head adjusted to receive and hold a tie, a main actuator for actuating the tie feeding means and for rotating the head and for adjusting the head to release a tie, a clutch, and means for manipulating the clutch to connect the actuator with the tie feeding means and tie twisting head, to actuate the tie feeding means to deliver a tie to the head, to rotate the head to twist a tie, and to adjust the head momentarily to release a twisted tie.

7. In an apparatus of the character described, in combination, a magazine for wire ties, a rotatable tie twisting head adjustable to receive and hold a tie for twisting and adjustable to discharge the tie, means for dispensing ties singly and successively from the magazine into engagement with the head, means normally holding the head adjusted to receive and hold a tie, a main actuator for

actuating the tie feeding means and for rotating the head and for adjusting the head to release a tie, a clutch, means for manipulating the clutch to connect the actuator with the tie feeding means and tie twisting head, to actuate the tie feeding means to deliver a tie to the head, to rotate the head to twist a tie, and to adjust the head momentarily to release a twisted tie, and means for automatically disengaging the clutch.

8. In an apparatus of the character described, in combination, tie-feeding means, tie-twisting means including a rotatable head, a main actuator for operating both of said means, a clutch, means operable from said head for manipulating the clutch to connect the main actuator with both of said means, and means for automatically manipulating the clutch to disconnect the actuator from both of said means.

9. In an apparatus of the character described, in combination, tie-feeding means, tie-twisting means including a rotatable head, a main actuator for operating both of said means, a clutch, means operable from said head for manipulating the clutch to connect the main actuator with both of said means, and means for automatically manipulating the clutch when the head has rotated a certain extent to disconnect the actuator from both of said means.

10. In an apparatus of the character described, in combination, tie-feeding means, tie-twisting means including a rotatable head, a main actuator for operating both of said means, a clutch, means operable from said head for manipulating the clutch to connect the main actuator with both of said means, means for automatically manipulating the clutch when the head has rotated a certain extent to disconnect the actuator from both of said means, and automatically actuated means adapted to release a tie from said head after said tie has been twisted thereby.

11. In an apparatus of the character described, a rotatable head adapted to hold wire ties singly for twisting, mechanism for feeding ties singly and successively into engagement with said head for twisting, an actuator for operating said feeding mechanism and for rotating the head to twist each tie engaged thereby, a clutch connecting said actuator with said head and said mechanism, and means operable from said head for engaging said clutch to cause said actuator to operate said feed mechanism and to rotate the head.

12. In an apparatus of the character described, a rotatable head adapted to hold wire ties singly for twisting, mechanism for feeding ties singly and successively into engagement with said head for twisting, an actuator for operating said feeding mechanism and for rotating the head to twist each tie engaged thereby, a clutch connecting said actuator with said head and said mechanism, means operable from said head for engaging said clutch to cause said actuator to operate said feed mechanism and to rotate the head, and means for automatically disengaging said clutch mechanism when the head has rotated a certain extent.

13. In an apparatus of the character described, a rotatable head adapted to hold wire ties singly for twisting, mechanism for feeding ties singly and successively into engagement with said head for twisting, an actuator for operating said feeding mechanism and for rotating the head to twist each tie engaged thereby, a clutch connecting said actuator with said head and said mechanism, means operable from said head for engaging said clutch to cause said actuator to operate said feed mechanism and to rotate the head, means for automatically disengaging said clutch mechanism when the head has rotated a certain extent, and automatically actuated means adapted to release a tie from said head after said tie has been twisted by the rotation of the head.

14. In an apparatus of the character described, a rotatable tie-twisting device, including collapsible tie-holding arms, mechanism for feeding wire ties singly and successively into engagement with said arms for twisting, an actuator, and a clutch engaged in response to collapsing of said arms to connect said actuator with the feed mechanism and tie-twisting device.

15. In an apparatus of the character described, a rotatable tie-twisting device, including collapsible tie-holding arms, mechanism for feeding wire ties singly and successively into engagement with said arms for twisting, an actuator, a clutch engaged in response to collapsing of said arms to connect said actuator with the feed mechanism and tie-twisting device, and automatically operating means for maintaining said connections during an extent of rotation of said device.

16. In an apparatus of the character described, a rotatable tie-twisting device, including collapsible tie-holding arms, mechanism for feeding wire ties singly and successively into engagement with said arms for twisting, an actuator, a clutch engaged in response to collapsing of said arms to connect said actuator with the feed mechanism and tie-twisting device, automatically operating means for maintaining said connections during an extent of rotation of said device, and automatically operating means for disengaging the clutch when said device has rotated to a predetermined extent.

17. In an apparatus of the character described, a rotatable device, including collapsible tie-holding arms, an actuator, a clutch, and means operated by said arms as they are collapsed for engaging said clutch

to connect said device to said main actuator for rotation thereby.

18. In an apparatus of the character described, a rotatable device, including collapsible tie-holding arms, an actuator, a clutch, means operated by said arms as they are collapsed for engaging said clutch to connect said device to said main actuator for rotation thereby, and means for automatically disengaging said clutch mechanism when said head has rotated a certain extent.

19. In an apparatus of the character described, a rotatable head, including collapsible arms having tie-holding ends adjustable on the arms, an actuator, a clutch, means, operated by said arms as they are collapsed, for engaging said clutch to cause said head to be rotated by said actuator, means for automatically disengaging said clutch mechanism when said head has rotated a certain extent, and automatically actuated means adapted to adjust said arm ends to release a tie from said head after said tie has been twisted by the rotation of said head.

20. In an apparatus of the character described, a rotatable head, including collapsible arms having tie-holding ends adjustable on the arms, an actuator, a clutch, means, operated by said arms as they are collapsed, for engaging said clutch to cause said head to be rotated by said actuator, means for automatically disengaging said clutch mechanism when said head has rotated a certain extent, and automatically actuated means adapted to adjust said arm ends to release a tie from said head after said tie has been twisted by the rotation of said head and before rotation of said head by said actuator ceases.

21. In an apparatus of the character described, in combination, a rotatable tie-twisting device, including collapsible tie-holding arms, an actuator, a clutch, and a control member for said clutch connected with said arms, whereby collapsing movement of said arms engages the clutch and causes said actuator to rotate said tie-twisting device.

22. In an apparatus of the character described, in combination, a rotatable tie-twisting device, including collapsible tie-holding arms, an actuator, a clutch, a control member for said clutch connected with said arms, whereby collapsing movement of said arms engages the clutch and causes said actuator to rotate said tie-twisting device, and means coming into operation automatically for maintaining said clutch engaged during an extent of rotation of said device.

23. In an apparatus of the characer described, in combination, a rotatable tie-twisting device, including collapsible tie-holding arms, an actuator, a clutch, a control member for said clutch connected with said arms, whereby collapsing movement of said arms engages the clutch and causes said actuator to rotate said tie-twisting device, means coming into operation automatically for maintaining said clutch engaged during an extent of rotation of said device, and means for disengaging said clutch automatically when said device has rotated to a predetermined extent.

24. In an apparatus of the character described, in combination, a rotatable tie-twisting device, including collapsible arms having tie-engaging ends movable on the arms out of tie-holding position, an actuator for rotating said device and for moving said arm ends out of tie-holding position, and a clutch engaged in response to the collapsing of said arms to cause said actuator to rotate said device and to move said arm ends out of tie-holding position.

25. In an apparatus of the character described, in combination, a rotatable tie-twisting device, including collapsible arms having tie-engaging ends movable on the arms out of tie-holding position, an actuator for rotating said device and for moving said arm ends into and out of tie-holding position, a clutch, engaged in response to the collapsing of said arms, to cause said actuator to rotate said tie-twisting device, and mechanism operated by said actuator and adapted automatically to maintain said clutch engaged until said device has rotated to a predetermined extent, and adapted automatically then to disengage said clutch, said mechanism being also adapted to maintain said arm ends in tie-holding position during a predetermined extent of the rotative movement of said arms.

26. In an apparatus of the character described, in combination, a rotatable tie-twisting device, including collapsible arms having tie-engaging ends movable on the arms out of tie-holding position, an actuator for rotating said device and for moving said arm ends into and out of tie holding position, a clutch, engaged in response to the collapsing of said arms, to cause said actuator to rotate said tie-twisting device, and mechanism operated by said actuator, and adapted automatically to maintain said clutch engaged until said device has rotated to a predetermined extent, and adapted automatically then to disengage said clutch, said mechanism being also adapted to maintain said arm ends in tie-holding position during a predetermined extent of the rotative movement of said arms, and to move said arm ends automatically out of tie-holding position after a predetermined extent of said rotation.

27. In an apparatus of the character described, in combination, a rotatable tie-twisting device, including collapsible arms having tie-engaging ends movable on the arms out of tie-holding position, an actuator for rotating said device and for moving said

arm ends into and out of tie-holding position, a clutch, engaged in response to the collapsing of said arms, to cause said actuator to rotate said tie-twisting device, and mechanism operated by said actuator, and adapted automatically to maintain said clutch engaged until said device has rotated to a predetermined extent, and adapted automatically then to disengage said clutch, said mechanism being also adapted to maintain said arm ends in tie-holding position during a predetermined extent of the rotative movement of said arms, and to move said arm ends automatically out of tie-holding position after a predetermined extent of said rotation, and to subsequently adjust said arm ends automatically back into tie-holding position.

28. In an apparatus of the character described, in combination, a rotatable tie-twisting device, including collapsible arms having tie-holding ends movable on the arms into and out of tie-holding position, mechanism for moving said arm ends into and out of tie-holding position, an actuator for rotating said device and for operating said mechanism, and a clutch engaged in response to the collapsing of said arms to cause said actuator to rotate said tie-twisting device and then to operate said mechanism.

29. In an apparatus of the character described, in combination, a tie-twisting device, including collapsible arms having tie-holding ends movable on the arms into and out of tie-holding position, mechanism for moving said arm ends into and out of tie-holding position, actuating means for operating said mechanism, a clutch connecting said actuator with said mechanism, and means, responsive to the collapsing of said arms, for engaging said clutch to cause said actuator to operate said mechanism.

30. In an apparatus of the character described, in combination, a tie-twisting device, including collapsible arms having tie-holding ends movable on the arms into and out of tie-holding position, mechanism for moving said arm ends into and out of tie-holding position, actuating means for operating said mechanism, a clutch connecting said actuator with said mechanism, means, responsive to the collapsing of said arms, for engaging said clutch to cause said actuator to operate said mechanism, and means operated by said actuator for automatically disengaging said clutch.

31. In an apparatus of the character described, in combination, a rotatable tie-twisting device, including collapsible arms, adjustable into and out of tie-holding condition, mechanism for adjusting said device into and out of tie-holding condition, an actuator, a clutch connecting said actuator with said mechanism, means, responsive to the collapsing of said arms, for engaging said clutch, and means automatically operated by said actuator to disengage said clutch when said twisting device has rotated a predetermined extent.

32. In an apparatus of the character described, in combination, a rotatable tie-twisting device, including collapsible arms, adjustable into and out of tie-holding condition, mechanism for adjusting said device into and out of tie-holding condition, an actuator, a clutch connecting said actuator with said tie-twisting device and said mechanism, means, responsive to the collapsing of said arms, for engaging said clutch, and means automatically operated by said actuator to disengage the clutch when said twisting device has rotated a predetermined extent.

33. In an apparatus of the character described, in combination, a rotatable tie-twisting device, including collapsible arms, adjustable into and out of tie-holding condition, mechanism for adjusting said device into and out of tie-holding condition, an actuator, a clutch connecting said actuator with said tie-twisting device and said mechanism, means, responsive to the collapsing of said arms, for engaging said clutch, and means automatically operated by said actuator to disengage the clutch when said twisting device has rotated a predetermined extent and after said mechanism has been actuated to adjust said twisting device out of tie-holding condition.

34. In an apparatus of the character described, in combination, a rotatable tie-twisting device, including collapsible arms, adjustable into and out of tie-holding condition, mechanism for adjusting said device into and out of tie-holding condition, an actuator, a clutch connecting said actuator with said tie-twisting device and said mechanism, means, responsive to the collapsing of said arms, for engaging said clutch, means automatically operated by said actuator to disengage the clutch when said twisting device has rotated a predetermined extent and after said mechanism has been actuated to adjust said twisting device out of tie-holding condition, and means adjusting said tie-twisting device so that said device is in tie-holding condition when said rotation of said device from said actuator ceases.

This specification signed and witnessed this 9th day of July, 1924.

HENRY B. FOULDER.