(No Model.) 4 Sheets—Sheet 1.

W. RUNDQUIST.

JEWEL SETTING MACHINE.

No. 500,954. Patented July 4, 1893.

Fig. 1.

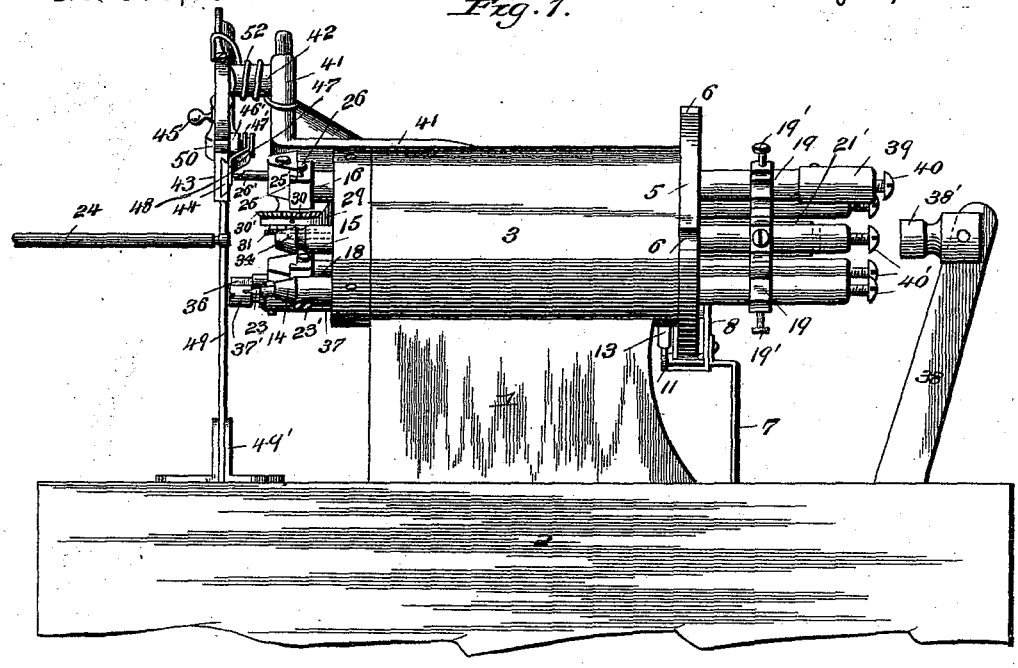
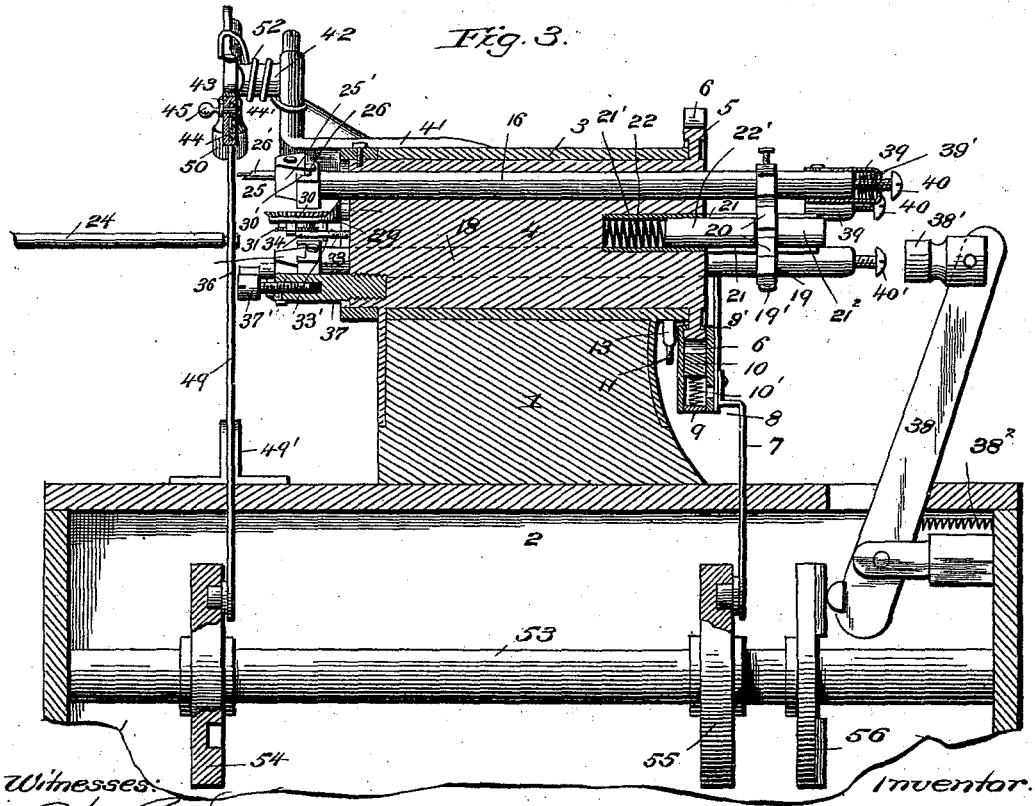


Fig. 3.



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(No Model.) 4 Sheets—Sheet 2.

W. RUNDQUIST.

JEWEL SETTING MACHINE.

No. 500,954. Patented July 4, 1893.

Fig. 2.

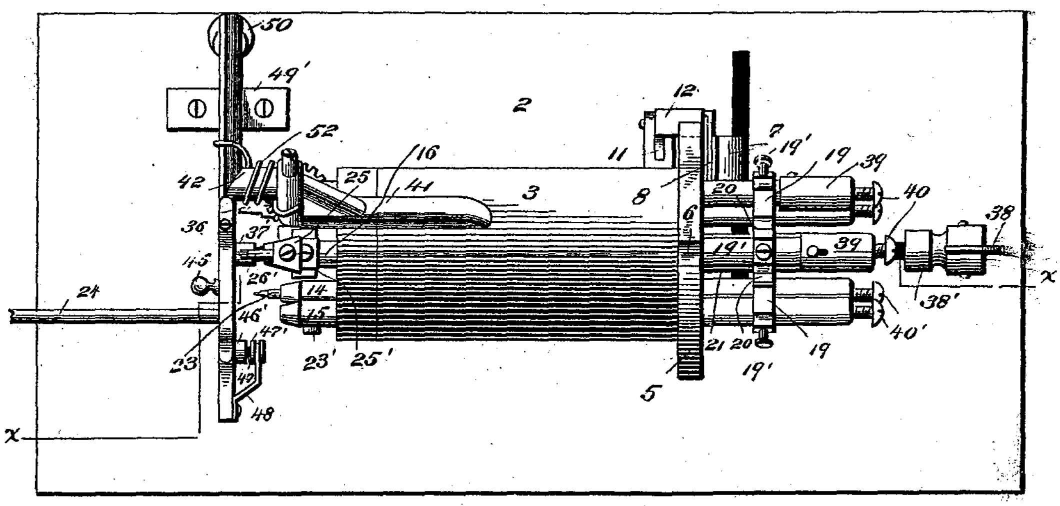


Fig. 8.

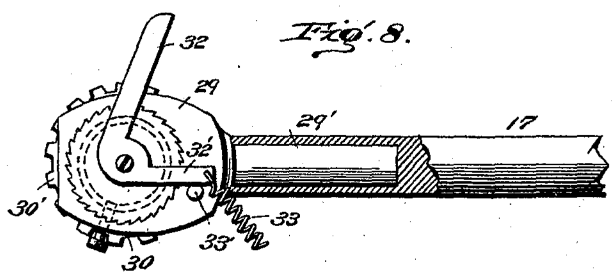
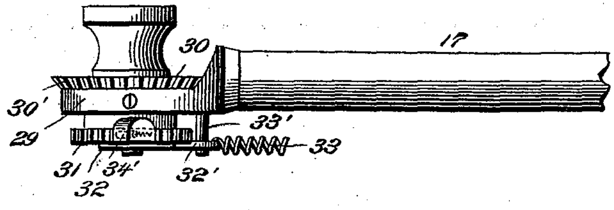


Fig. 9.



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(No Model.) 4 Sheets—Sheet 3.

W. RUNDQUIST.

JEWEL SETTING MACHINE.

No. 500,954. Patented July 4, 1893.

Fig. 4.

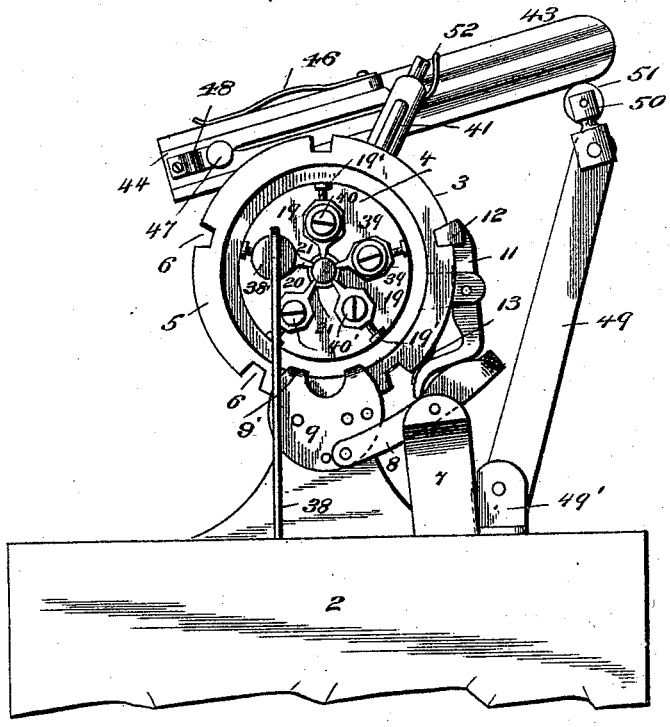
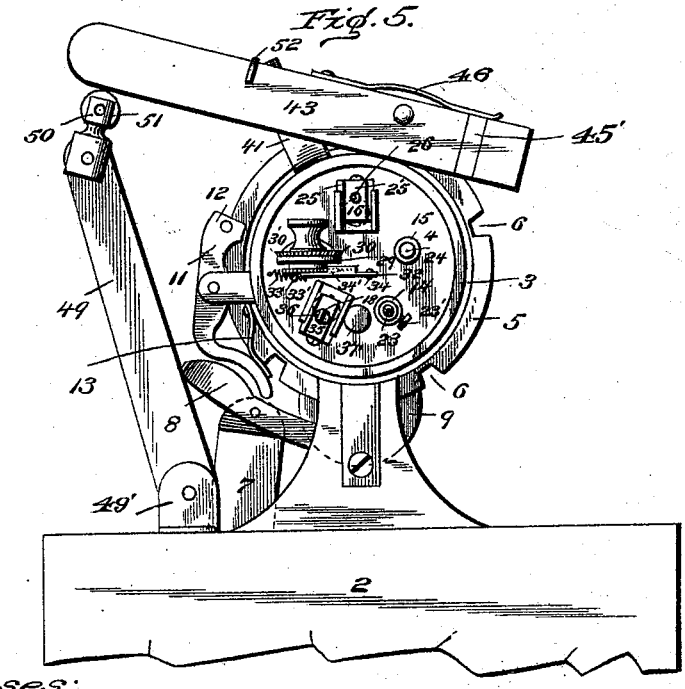


Fig. 5.



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4 Sheets—Sheet 4.

W. RUNDQUIST.

JEWEL SETTING MACHINE.

No. 500,954.

Patented July 4, 1893.

Fig. 6.

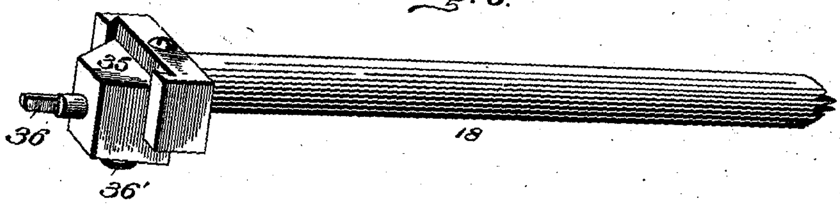


Fig. 7.

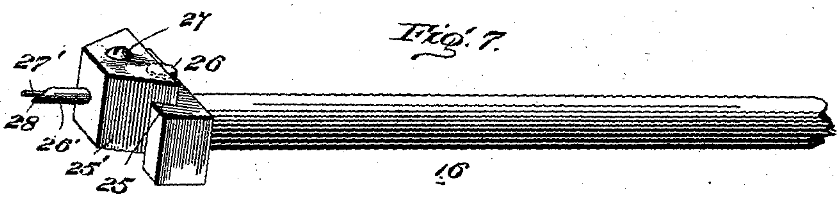


Fig. 10.

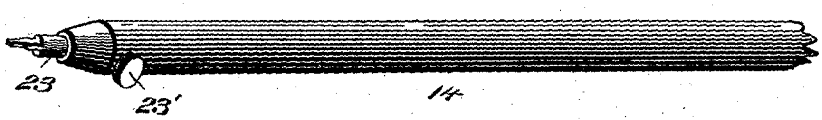


Fig. 11.

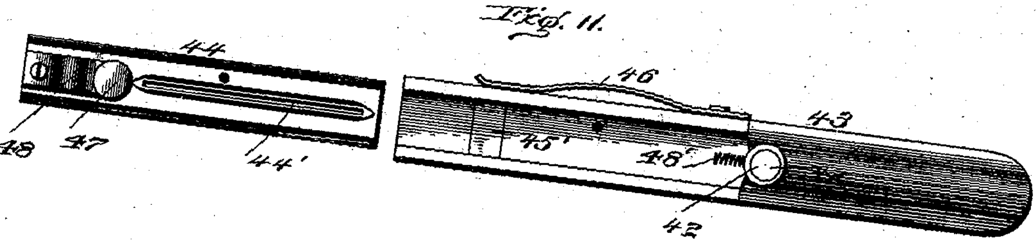


Fig. 12.

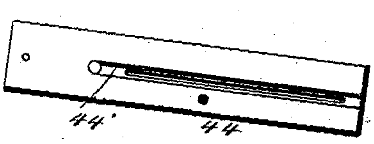
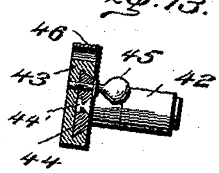


Fig. 13.



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UNITED STATES PATENT OFFICE.

WILLIAM RUNDQUIST, OF ELGIN, ILLINOIS.

JEWEL-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 500,954, dated July 4, 1893.

Application filed August 27, 1892. Serial No. 444,253. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM RUNDQUIST, a citizen of the United States, and a resident of Elgin, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Jewel-Setting Machines for Watch-Jewels; 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.

The nature of this invention consists in mechanism for forming a setting for watch jewels, introducing the jewel therein, and in finishing the jewel and setting, the several mechanisms being all arranged for automatic and successive action.

With these ends in view, my invention consists of the novel combination of devices, and in the peculiar construction and arrangement of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings:—Figure 1 is a side elevation of a machine constructed in accordance with my invention. Fig. 2 is a plan view of the same. Fig. 3 is a longitudinal vertical sectional view on the plane indicated by the dotted line *x*—*x* of Fig. 2. Fig. 4 is a rear elevation. Fig. 5 is a front elevation. Fig. 6 is a detail view of the head of the cutting spindle. Fig. 7 is a similar view of the head of the jewel burnisher. Figs. 8 and 9 are detail views of the truing head. Fig. 10 is a detail view of the cutter for truing the jewel setting; and Figs. 11, 12 and 13 are detail views of the jewel feeding mechanism.

Like numerals of reference denote corresponding parts in all the figures, referring to which—

1 designates a base or supporting bed which is firmly secured on top of a suitable work table or bench 2, and to this supporting bed 1 is firmly and rigidly secured a tubular casing or cylinder 3. Within the cylinder or casing 3 is fitted a revoluble cylindrical carrier 4 which projects slightly beyond the ends of the casing 3 and which is provided at its rear end with a projecting annular flange 5, that abuts against the end of the casing 3 and in the periphery of which is formed a series of notches or recesses 6. Through a slot in the upper surface or top 2 is fitted a lever 7 and on said lever, near its upper end, is fulcrumed a transverse lever 8, one end of which is connected to a casing 9 fitted to slide on the flange 5 of the cylinder 4. The casing 9 is, preferably, fitted on the carrier 4 by means of lips 9′, formed integral with the sides of said casing, which flanges or lips take over the inner edge of the flange 5 and enable the carrier to be revolved without moving the casing 9, if desired. Within said casing 9 is arranged a dog or detent 10 which fits in a suitable way or groove in the case 9 and which is adapted to be projected into one of the notches 6, in the flange of the carrier 4, by a coiled pressure spring 10′ arranged within the casing 9 below the dog therein.

The cylindrical carrier 4 is arranged to be locked rigidly in any desired position by means of a locking detent 11 fulcrumed between suitable lugs attached to the fixed casing 3 and provided at one end with a laterally projecting finger or stud 12 adapted to take into one of the peripheral notches 6 in the flange 5 of the cylindrical carrier. The cylindrical carrier is kept stationary or fixed by a flat spring 13 attached at one end to the casing 3 and bearing, at its free end, against the under side of the locking detent 11, below the fulcrum thereof, to keep the finger or stud 12, in one of the notches 6. The free end of the lever 8 is bent at right angles to its length and extends across the lower portion of the locking detent 11 and when the lever 7 is oscillated, by any suitable means, the casing 9 will be moved on the flange 5 and the dog, 10, therein, will take into one of the peripheral notches 6 and operate to turn the cylindrical carrier one step or notch, the finger or stud 12 being elevated out of engagement with the flange 5 by pressure of the hook portion of the lever 8 on the lower end thereof. When the lever 7 has reached the limit of its forward movement and starts back to its original position, the casing 9 will be moved on the flange 5, the dog 10 having its upper surface inclined to permit of such rearward movement; and, as soon as pressure is removed from the lower end of the detent 11 such lever will be returned to its normal po-

sition and the stud or finger 12 forced into one of the notches 6 by the action of the spring 13.

Through the cylindrical carrier 4 extends a series of spindles 14, 15, 16, 17 and 18, and these spindles project slightly beyond the ends of the cylindrical carrier. On each of these spindles is fitted a collar 19, which is held in position on the spindle by means of a set screw 19′. A finger 20, formed integral with each collar 19, extends through one of a series of longitudinal slots 21 formed in a tube 21′ which is rigidly attached to the rear end or head of the cylindrical carrier 4. The outer end of the tube 21′ is closed by a plug 21^2 and within said tube, in advance of the fingers 20, is arranged a coiled spring 22, and between said fingers and the rear end of the coiled spring 22 is situated a block 22′, so that as either of the spindles is moved forward, by means to be hereinafter pointed out, the spring 22 will be compressed, and when pressure is removed from the rear end of said spindle the spring 22 will return the spindle to its normal position.

In a suitable socket formed in the outer end of the spindle 14, is fitted a cutter 23 which is held firmly in place by means of a set screw 23′. This cutter is adapted to form in one end of a wire 24 a socket or recess adapted to receive a jewel, said wire 24 being rotated and carried by a lathe in the ordinary manner.

The forward solid end of the spindle 15 is conical or tapered as shown, and said spindle is adapted, when the cylindrical carrier is turned to bring the same in line with the projecting end of the wire 24, and it is moved forward by means to be hereinafter described, to force a jewel carried by a suitable holder, into the socket or recess previously formed by the cutter 23 in the end of the wire 24.

In the forward end or head of the spindle 16, (which head is enlarged) is formed a groove or way 25 in which is fitted a movable block 25′. The block 25′ is held in position in the groove or way formed in the head of the spindle referred to, by a screw 26, which is screwed into such head and has its enlarged head extending into a groove or recess formed in the rear side of the movable block 25′. A burnisher 26′ is fitted in a socket formed in the outer face of the block 25′ and is held firmly in such socket by a set screw 27. The burnisher is preferably made in the form shown in Fig. 7, in which it consists of a blunt central spring pressed pin 27′ and a cutting or burnishing edge or point 28 arranged slightly in rear of the blunt point of the pin 27′ and extending at an acute angle to the length of said pin. When the spindle 16 is brought in line with the wire 24, and is projected forward, the blunt end of the pin 27′ bears against the center of the jewel which has been previously secured in the socket, formed in the end of the wire by the cutter 23 on the spindle 15, and keeps the jewel in place in the socket while the cutting or burnishing edge 28 trims or smooths the outer surface of the metal surrounding the jewel.

To the forward end of the spindle 17 is secured another cutter, preferably by having its stem or shank seated in a socket formed in the end of said spindle. This cutter of the spindle 17, consists, as shown in Figs. 8 and 9, of a body 29 provided with an integral stem or shank 29′ designed to be inserted into a suitable socket formed in the forward end of the spindle 17. On the upper side of the body 29 is centrally pivoted a circular cutting blade 30, provided with a series of peripheral teeth 30′. The central pivot of the blade 30 extends through a slot in the body 29 and on said pivot pin, near the lower end thereof, is rigidly secured a ratchet wheel 31. Below the wheel 31 is fulcrumed a bell crank lever 32, the shorter arm 32′ of which is connected with the front end or head of the cylindrical carrier 4 by a coiled spring 33. To the body 29, in rear of the short arm of the lever 32, is secured a downwardly projecting pin or stud 33′ adapted to limit the play or movement of the bell crank in one direction. To the front end or head of the cylindrical carrier is attached a projecting pin 34 arranged in the path of the long arm of the bell crank. When the spindle 17 has been brought into line with the wire 24 and projected forward the required distance, the cutting blade 30 will operate to remove from the end of the wire the surplus material which has been raised up or formed by the action of the burnisher carried by the spindle 16. As the spindle 17 is withdrawn to its normal position, the longer arm of the bell crank 32 comes in contact with the fixed pin 34 and as the spindle moves rearwardly the said arm of the lever 32 will be forced forward and a pawl or dog 34′ thereon takes into the teeth of the ratchet wheel 31 and turns the same, thus bringing into operative position another tooth on the cutting blade 30. When the spindle 17, is moved forward again, the coiled spring 33 operates to return the lever 32 to its normal position.

The head or forward end of the spindle 18 is similar to the head of the spindle 16 and is provided with a movable block 35. A trimming blade 36 is held in place in a socket formed in the movable block 35 by means of a set screw 36′. The blade 36 operates when brought to bear against the end of the wire 24 to trim or reduce such wire to the desired size to form the setting of the jewel.

At the forward end or head of the cylindrical carrier 4, between the spindles 14, 18, is arranged a stationary stud 37 provided at its outer free end with an internally threaded socket in which is fitted a screw 37′. The end of the wire 24 abuts against the screw 37′ and said screw can be adjusted to vary the length of said wire from the lathe.

38 designates a lever which works through a longitudinal slot in the top of the table 2.

On said lever, near the upper end thereof, is pivotally mounted a pushing finger 38′ provided in its forward free end with a socket which, when the lever 38 is oscillated, by suitable mechanism, and the upper end thereof moved forward, receives the rear end of one of the series of spindles 14, 15, 16, 17, 18. The spindle which is in line with the pushing finger 38′ is moved forward as such finger advances, and the implement carried by said spindle is brought into proper position for operation. When the upper end of the lever 38 moves rearwardly the spindle with which it is in contact is also returned to its normal position by the action of the spring 22.

Over the rear ends of the spindles 16 and 17, carrying the burnisher 26′ and cutter 30, respectively, are fitted sleeves 39 which are closed at their rear ends and held in place on the spindles by screws 40 which extend through longitudinal slots formed in said sleeves. Within the sleeves 39, between the closed rear ends thereof and the ends of the spindles, are arranged coiled cushion springs 39′. The object of this construction is to prevent the burnisher or the cutter from being pressed against the jewel with sufficient force to damage or injure the same.

In the rear ends of all of the longitudinally movable spindles mounted in the carrier 4, I preferably secure a screw 40, the head of which is of such size as to fit snugly in the socket in the forward end of the pushing finger 38′ and said screws can be adjusted to lengthen or shorten said spindles.

To the fixed casing 3, at the forward end thereof, is rigidly secured a bracket 41 and through a suitable aperture formed in the upwardly extending arm of said bracket is passed a pivot lug or stud 42 of an arm 43. In the rear face of the arm 43, below the pivot point thereof, is formed a longitudinal guide way in which is fitted a jewel carrying slide 44, which is held in position within the guide way in the arm 43 by a pin 45. In the inner face of the slide 44 is formed a groove or channel 44′ designed to receive a number of jewels of the proper size to fit in the socket which is formed in the end of the wire 24 by the cutter 23; and the lower end of this groove or channel communicates with a transverse channel or groove formed in the front face of the arm 43. This latter channel is of greater diameter at its upper than at its lower end and in it is fitted a block or slide 45′ which is held in place by a flat spring arm 46 secured at one end to the arm 43 and extending across the upper end of said block 45′.

To the outer face of the slide 44 is attached a short outwardly projecting sleeve 46′, the inner end of which communicates with the longitudinal channel 44′ in rear of the slide 44; and in said sleeve 46′ is fitted a pin 47 provided with an enlarged head. On the pin 47, between the head thereof and the end of the sleeve 46′, is formed an annular flange 47′. The pin 47 is normally held out of the channel 44′ by means of a flat spring arm 48 which is attached at one end to the outer face of the slide 44 and has its free end bifurcated and extending on opposite sides of the pin 47, between the enlarged head thereof and the annular flange 47′. In the upper end of the longitudinal guide way in the arm 43, and bearing against the upper end of the slide 44, is arranged a coiled spring 48′.

In advance and at one side of the axially turning carrier 4 and the supporting fixed casing 3 thereof, is arranged another lever 49 which is fulcrumed between lugs 49′, secured on the top of the table 2, and said lever extends down through a short transverse slot formed in such top. To the upper end of the lever 49 is attached a finger 50 which extends upwardly and laterally from the lever 49 and has its outer end bifurcated. In such bifurcated end is journaled a roller 51 provided with a peripheral groove in which the lower edge of the arm 43 fits. The arm 43 is kept pressed against the roller 51 by means of a spring 52 which is coiled around the pivot stud 42 and has one end extending across the upwardly extending arm of the bracket 41 on the fixed casing 3 and its other end extending across the upper side or edge of the arm 43 above the pivotal point of the same. The spring 52 serves to keep the upper end of the arm, 43, elevated and the jewels carried by the slide 44 near the lower forward end thereof.

Below the top of the table 2 is preferably arranged a longitudinal shaft 53, which is journaled in suitable bearings and provided with suitable driving means, not shown. On the shaft 53 are rigidly secured three disks 54, 55, 56. In one face of the disk 55 is formed a cam groove having as many offsets as there are notches in the flange 5 at the rear end of the cylindrical carrier 4, and in said groove rides a guide roller attached to the lever 7 and which, as the shaft 53 is rotated, causes the lever 7 to oscillate and rotate the carrier with a step by step motion to bring the different implements carried by the spindle successively in line with the projecting end of the wire 24. The other disk 54 on the driving shaft is also provided in one face with a cam groove in which rides a roller attached to the lever 49 to oscillate the same as the shaft 53 is rotated and thus alternately raise the rear upper end of the arm 43. The remaining disk 56 is provided with a proper cam surface against which the lower end of the lever 38 bears and as the shaft 53 is rotated the lever 38 is oscillated and the spindle in line with the finger 38′ is moved forward to bring the implement carried at its forward end into operative position.

A spring, 38^2, is arranged below the top of the support, 2, and one end of said spring is attached to the rear wall of said support and the other end to the lever, 38, above the fulcrum thereof.

The operation of my invention is as fol-

lows: The wire 24, or the material from which it is desired to form the jewel settings, and which is carried and adapted to be revolved by a suitable lathe in the ordinary manner, is advanced until the free end thereof comes in contact with the end of the fixed stationary stud 37. The shaft 53 is then slowly revolved and as the lever 7 moves forward, the dog or detent 10 takes into one of the notches 6 and turns the cylinder one step to bring the spindle 14 in line with the wire 24. As the spindle 14 reaches its proper position, the lever 7 moves back to its normal position and the casing 9, attached to such lever, moves on the flange 5, the inclined upper end of the dog 10 permitting the same to free itself from the notch 6; and the lever 38 is moved forward. As the lever 38 moves forward, the rear end of the spindle 14 enters the socket in the free end of the finger 38′ and said spindle is moved endwise until the cutter carried at the forward end thereof contacts with the end of the revolving wire 24 and speedily forms therein a socket of proper dimensions and form to receive a jewel. As the lever 7 starts forward again to rotate the carrier 4 another notch or step, the lever 38 and spindle 14 regain their normal positions by action of the springs 38^2 and 22, respectively, and the spindle 15 is brought into line with the wire 24. As the carrier is turning to bring the spindle 15 into operative position, the lever 49 is moved and the upper end of the arm 43 elevated. As the upper end of the arm 43 is raised, the lower end of said arm is depressed and the projecting end of the wire 24 contacts with and moves the block 45′ longitudinally to expose the lower portion of the groove or way in which it is fitted and the lower end of the longitudinal jewel receiving channel 44′. As the block 45′ is raised to thus expose the jewel receiving channel 44′, the spindle 15 is moved forward by the lever 38 and the outer end of said spindle bears against the enlarged head of the pin 47 and forces said pin forward. The forward motion of the pin 47 forces a jewel from the channel 44′ into the socket, previously formed in the end of the wire 24 by the cutter 23. As the lever 49 returns to its normal position, the upper end of the arm 43 is depressed by the action of the spring 52 and as the lower end thereof moves upwardly the block or slide 45′ is returned to its normal position by the spring arm 46, the pin 47 having been withdrawn, as soon as the spindle 15 has been moved rearwardly out of contact therewith, by the spring arm 48. The carrier 4 is then rotated to bring the different implements successively into operative positions. After the jewel has been secured in its setting, and such setting trimmed to the desired size, it is cut from the body of the wire 24 by any suitable cutting mechanism and is ready to be placed in the works of a watch, clock, &c. The jewel receiving slide 44 can be removed from the arm 43, to enable the channel 44′ therein to be fitted with jewels, by withdrawing the pin 45.

From the foregoing description and drawings it will be seen that I have provided a simple, and compact machine for automatically preparing the jewel setting, securing the jewel in place therein, and finishing the setting.

I am aware that changes in the form and proportion of parts and details of construction of the devices herein shown and described as an embodiment of my invention can be made without departing from the spirit or sacrificing the advantages thereof. For instance although I have described one form of mechanism adapted to operate my machine from a common driving shaft, yet I am aware that many other forms can be substituted with equally good results, and I do not therefore wish to be understood as intending to limit myself to the specific construction and arrangement of parts herein shown and described.

Having thus fully described my improvements, what I claim as new, and desire to secure by Letters Patent, is—

1. In a jewel setting machine, the combination of a jewel feeder, a revoluble carrier provided with a longitudinally slotted tube, and with a series of longitudinally movable spindles carrying a series of implements, a coiled spring arranged in the longitudinally slotted tube, and fingers attached to said spindles and extending into the longitudinally slotted tube beyond the end of the coiled spring therein, substantially as described.

2. In a jewel setting machine, the combination of a jewel feeder, a revoluble carrier provided with a longitudinally slotted tube and a series of longitudinally movable spindles arranged concentric with said tube and carrying a series of implements, a coiled spring fitted in the tube, and fingers adjustably mounted on the spindles and having their free ends inserted in the longitudinally slotted tube in rear of the spring therein, substantially as described.

3. In a jewel setting machine, the combination of a jewel feeder, a revoluble carrier provided at one end with a longitudinally slotted tube, a series of longitudinally movable spindles carried by the cylinder and provided with a series of implements, a spring arranged within the tube, collars secured on the spindles by set screws and each provided with a projecting finger which enters the longitudinally slotted tube in rear of the spring therein, substantially as described.

4. In a machine of the character described, the combination of a revoluble carrier, a series of longitudinally movable spindles carried by the carrier and provided at their forward ends with suitable implements, a thrust lever adapted to move the spindles longitudinally, as they are successively brought into line therewith, a spring for returning the spindles to their normal position, and auxiliary

cushion springs arranged between the rear ends of one or more of the spindles and the thrust lever, substantially as described.

5. In a jewel setting machine, the combination of a jewel feeder, a carrier provided with an annularly peripherally notched flange and a series of longitudinally movable spindles carrying suitable implements, a casing 9 loosely supported on the flange on the carrier, a spring pressed dog arranged within said sliding casing, an oscillating lever connected with said casing, and a detent fulcrumed at one side of the carrier and provided with a laterally projecting lug adapted to take into the notches in the flange on the carrier, substantially as and for the purpose described.

6. In a jewel setting machine, the combination of a jewel feeder, a carrier provided with an annular flange, having a series of notches formed in its periphery, and a series of longitudinally movable implement carrying spindles, a casing 9, loosely supported on the annular flange of the cylinder, a spring pressed dog arranged in said casing, a locking detent fulcrumed at one side of the carrier and adapted to take into the notches formed in the periphery of the flange, a spring for normally holding the detent out of engagement with said notches, and an oscillating lever connected with the casing 9, and provided with a projecting arm which extends across the locking detent at one side of its fulcrum, substantially as described, for the purpose specified.

7. In a machine of the character described, the combination of a revoluble carrier, a series of longitudinally movable implement carrying spindles carried by and extending beyond the rear end of the carrier, sleeves adjustably connected to and extending rearwardly from one or more of said spindles, coiled springs arranged within said sleeves and bearing against the rear ends of the spindles therein, and means for moving the implement carrying spindles longitudinally, substantially as and for the purpose described.

8. In a jewel setting machine, the combination of a jewel feeder, a revoluble carrier, a series of longitudinally movable spindles carrying suitable implements mounted in laterally movable blocks, a fixed pin attached to the cylinder and extending parallel to the spindles, and means for holding the cylinder against rotation, substantially as described.

9. In a jewel setting machine, the combination of a revoluble carrier provided with a series of longitudinally movable implement-carrying spindles, a main oscillating feeder arm provided in one face with a longitudinal guide way, and in its other face with an intersecting transverse way, a slide fitted in said longitudinal way and provided in one face with a jewel receiving channel which communicates with the transverse way in the main arm, and means for turning the main arm on its pivot, substantially as described.

10. In a jewel setting machine, the combination of a tubular support, a revoluble carrier fitted in said support and provided with a series of longitudinally-movable implement-carrying spindles, a main oscillating feeder arm provided in one face with a longitudinal guide or way and in its opposite face with a transverse intersecting way, a slide arranged in said longitudinal way and provided with a jewel receiving channel which communicates with the transverse way in the main arm, a spring pressed pin extending into said jewel receiving channel, a movable block fitted in the transverse way in the main arm, a spring arm attached to said arm and extending across the upper end of the block in the transverse way, and means for moving said arm on its pivot, substantially as described.

11. In a jewel setting machine, the combination of an oscillating feeder arm provided with intersecting longitudinal and transverse ways, a jewel carrier arranged in the longitudinal way in the feeder arm and having an expelling pin arranged in line with the transverse way in said arm, a revoluble carrier provided with a series of longitudinal movable spindles which support implements for forming and finishing a jewel setting, and mechanism for automatically bringing the expelling pin of the jewel carrier into line with one of the spindles and the jewel setting, whereby the said spindle can move the expelling pin longitudinally and force a jewel through the transverse way in the feeder arm and into the setting, substantially as described.

12. In a machine of the character described, the combination with a revoluble carrier provided with a series of longitudinally movable spindles, and implements carried by said spindles and adapted to form and finish a jewel setting, of an oscillating feeder bar, a jewel carrier carried by the feeder bar and adapted to be moved vertically by contact with the work as the expelling pin is brought into alignment with one of the spindles and the jewel setting, whereby as the said spindle is moved longitudinally a jewel will be forced, by the expelling pin, into the setting, substantially as described.

13. In a jewel setting machine, the combination of the axially-turning carrier, a jewel carrier, and a series of spindles mounted in said axially-turning carrier, one of said spindles having a pivoted cutter provided with a ratchet and a positive feed mechanism for turning the cutter each time the spindle is reciprocated, as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM RUNDQUIST.

Witnesses:
JOHN L. HEALY,
JAMES KIRBY.