(No Model.) 2 Sheets—Sheet 1.

O. S. & W. S. FOSTER.

MACHINE FOR FORMING SPRINGS.

No. 493,428. Patented Mar. 14, 1893.

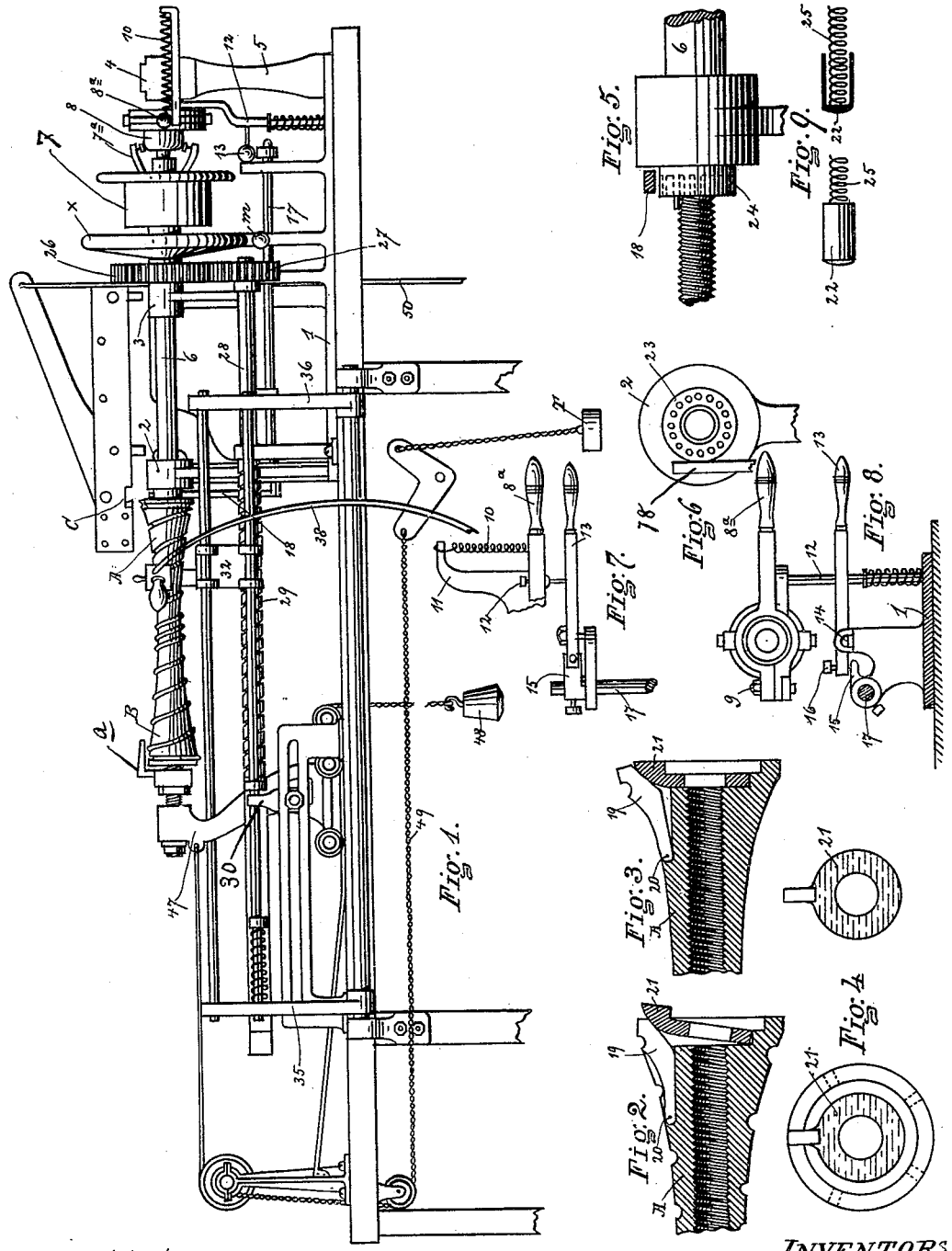

Fig. 1.

Fig. 5.

Fig. 9.

Fig. 6.

Fig. 8.

Fig. 7.

Fig. 3.

Fig. 2.

Fig. 4.

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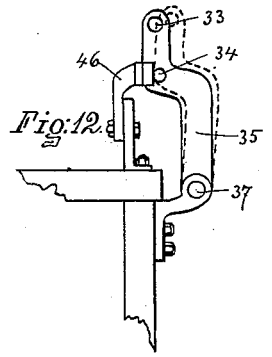

Fig. 12.

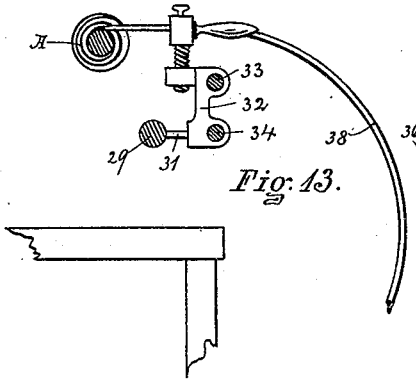

Fig. 13.

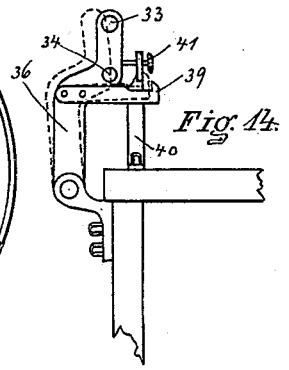

Fig. 14.

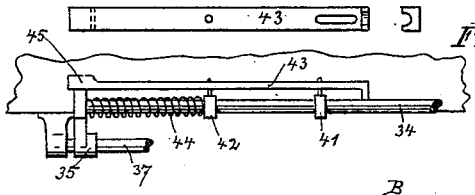

Fig. 15.

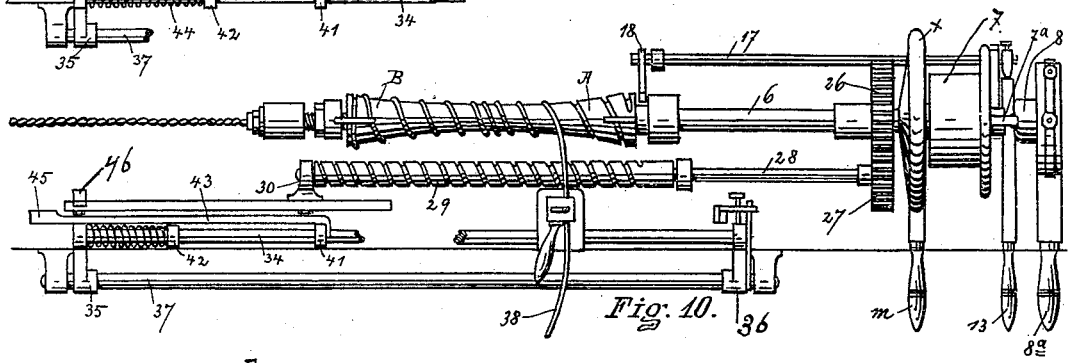

Fig. 10.

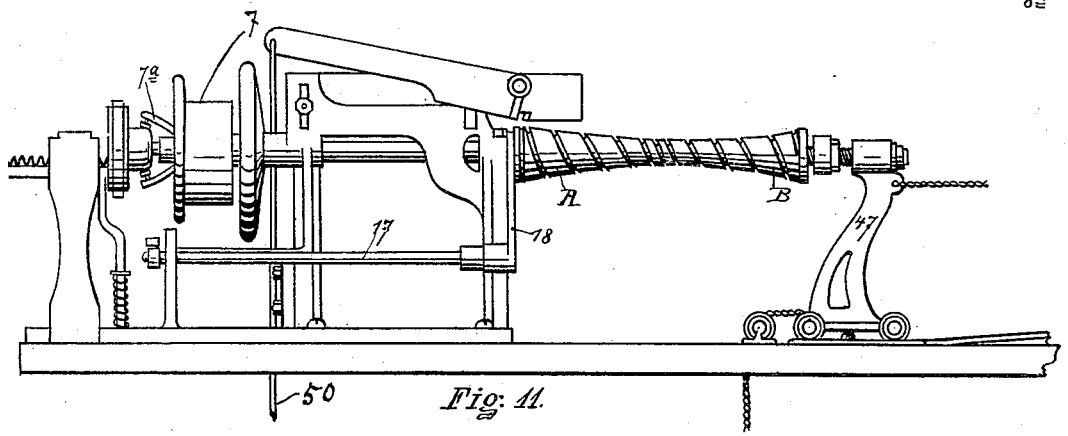

Fig. 11.

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UNITED STATES PATENT OFFICE.

OSCAR S. FOSTER AND WILLIAM S. FOSTER, OF UTICA, NEW YORK.

MACHINE FOR FORMING SPRINGS.

SPECIFICATION forming part of Letters Patent No. 493,428, dated March 14, 1893.

Application filed April 22, 1892. Serial No. 430,168. (No model.)

To all whom it may concern:

Be it known that we, OSCAR S. FOSTER and WILLIAM S. FOSTER, of Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Machines for Forming Springs; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form part of this specification.

Our invention relates to an improvement in machines for forming spiral springs.

In the drawings which accompany and form part of this specification and in which similar letters and figures of reference refer to corresponding parts in the several figures: Figure 1 shows a front view of the spring forming machine. Figs. 2 and 3 show in section a portion of one of the formers with the catch and latch in their various positions. Fig. 4 shows an end view of the former with the catch in position and also shows the catch in detail. Fig. 5 shows a portion of the mandrel on which one of the formers is mounted together with one of the bearings in which the mandrel is mounted, as seen from the top and also in section a tripping lever used in connection therewith. Fig. 6 shows an end view of the same mandrel and box together with a portion of the tripping lever in its relative position. Fig. 7 shows in details portions of the mechanism connecting with the tripping lever and which connect with and operate a clutch. Fig. 8 shows in detail the same parts shown in Fig. 7 from a side view in connection with the clutch and the clutch handle. Fig. 9 shows a spring and button used in connection with the mandrel and catch in the former shown in Figs. 2 and 3. Fig. 10 shows a plan view of a portion of the machine. Fig. 11 shows a rear side view of parts of the machine. Figs. 12, 13 and 14 show details relating to the wire feeding carriage. Fig. 15 shows partially in plan and partially in detail an automatic catch or holder used in connection with the wire feeding carriage and the ways thereof.

Referring more particularly to the reference numerals marked on the drawings in a more specific description of the device, 1 indicates a head block mounted on a suitable frame or table and provided with main bearing boxes 2 and 3 and a rear supporting box 4 mounted upon a post 5 and in which three boxes is mounted mandrel 6. On the mandrel 6, between the bearings 3 and 4 is provided a band pulley 7, which runs free on the mandrel and is provided with clutch arms 7^a adapted to be engaged by the movable clutch part 8, which clutch part is feathered or splined onto the mandrel and is provided with an operating lever handle 8^a which surrounds a projecting ring on the clutch and is secured loosely thereto and is pivoted at 9 to a suitable projection on the frame or head block.

Of course any of several well known forms of clutches could be used in lieu of the clutch here shown and would operate in the same manner as herein described.

To the clutch lever handle 8^a is secured a spiral spring 10 at one end, which extends substantially in the same direction with the mandrel and is connected at its opposite end to a projection 11 from the head block and the spring is tensioned to draw the clutch part 8 out of engagement with the clutch arms 7^a. There is also provided, secured to the head, a spring actuated catch 12, which is provided with a shoulder adapted to engage the lever handle 8^a and extends so as to engage the pivoted catch lever 13, the lever being pivoted at 14 to the frame and provided with a portion projecting to the opposite side of the pivotal point in position to be engaged by a cam toe 15. There may be provided at the point of engagement a set screw 16 whereby the parts may be adjusted. The cam toe 15 is mounted on a rocking shaft 17 mounted in suitable bearings on the head and which extends to a position near the end of the formers and carries tripping lever 18, which stands close to the mandrel and near to the end of one of the spring formers.

The machine shown is designed to form a double cone shaped spring and is provided with two formers A and B, one of which, A, is mounted upon the end of mandrel 6 and

may be secured thereto by screw threads or in any suitable manner, the power being applied to the former A and the former B being driven by its connection with the former A. Former A is provided with a longitudinal recess adjacent to its end in which is mounted a latch 19 pivoted at 20 and adapted to be projected at its free end outside of the regular line of the former. Latch 19 is adapted to engage a catch 21, which catch is formed of a washer shaped ring provided with a projecting ear, the ring adapted to lie in a circular recess in the end of the former and the ear of the catch being adapted to lie in the same recess with latch 19. The catch 21 is held in its normal position by spring button 22, which consists of a cylindrical shell having one head and is adapted to be received by a series of holes or pockets 23 provided on the collar 24 on the mandrel and is operated by a coil spring 25. The button 22 engages against the washer surface of the catch 21 and operates to hold it normally in the position shown in Fig. 3. The tripping lever 18 projects close to the collar 24 and adjacent to the end of the former and so that when the catch 21 is thrown into the position shown in Fig. 2 the projecting ear thereof will engage and operate the tripping lever 18. On the mandrel 6 there is also provided a gear 26, which engages with a gear pinion 27 mounted upon a shaft 28, the shaft being mounted in suitable bearings on the head, and to this shaft is attached a feeding screw or worm 29, which is mounted at its outer end in the bearing 30.

In the screw threaded groove in the feeding screw 29 is adapted to engage a projecting finger 31 fixed in feeding carriage 32 (see Fig. 13). The carriage 32 is mounted upon ways 33 and 34, which ways are carried by projecting arms 35 and 36 mounted on rocking shaft 37 which shaft is mounted in suitable bearings at either end thereof on the frame. On the carriage is mounted a suitable eye through which the wire 38 is fed to the machine to form the springs.

On the arm 36 carrying the feeding carriage ways is provided a stop 39 adapted to engage a projection 40 on the frame and limit the movement of the carriage ways in one direction, and in the projection 40 is provided a set screw 41 for limiting the movement in the opposite direction.

Upon one of the wire carriageways 34 is provided a fixed collar 41 and a movable collar 42. In the collar 41 is provided a pin, which engages the movable stopper 43 within a slotted opening in the end thereof, and in collar 42 is provided a pin which is secured in movable stopper 43 so that the collar and stopper move together. Between collar 42 and arm 35 of the carriage is provided a spring 44 tensioned to throw the collar 42 from the arm 35. The stopper 43 is provided at one end with a thickened end 45 adapted to be introduced between the arm 35 and fixed stop 46 secured to the frame.

The former B is mounted on a former carriage 47, which is moved in a direction to bring the formers together by weight 48 and cord passing over suitable pulleys and former B is moved away from former A to allow the spring to be removed from the formers by treadle T attached to cord 49 connected through suitable pulleys with the former carriage.

At C is shown a cutter for cutting the wire after the spring is formed, which is operated by a treadle not shown attached to rod 50.

X is a hand and balance wheel used in operating the mandrel and on which the brake M. operates.

The operation of the device is substantially as follows: The formers being together in the position shown and the carriage in its position farthest to the left of the machine as shown in Fig. 1, the wire 38 to be formed into springs is passed through suitable openings in the wire carriage and engaged under clasp a of former B, and power being applied to the pulleys 7 by means of a suitable belt or otherwise, the operator grasps the handle 8^a and draws it toward the left, as shown in Fig. 1, which throws the clutch part 8 into engagement with the arms 7^a from the pulley 7 and puts the mandrel and formers into operation. As the formers rotate the wire feeding carriage is moved along its ways 33 and 34 from the left toward to the right of Fig. 1 by reason of the pin 31 engaging in feeding screw 29. When the carriage has made its complete movement the pin 31 is run out of the end of the groove of the feeding screw and further travel of the carriage ceases. By the pin running out of the feeding screw the carriage ways are thrown or tilted backward on the shaft 37, as a fulcrum, and as it is so thrown back the spring 44 on the lower carriageway throws the stopper 43 to the right introducing the thick portion 45 thereof between the stop 46 and the arm 35, which prevents the carriage being again moved into position to throw the pin 31 into engagement with the groove in the feeding screw. At the time that the last convolution of the spring goes onto the former the wire 38, of which the spring is formed, becomes engaged with the latch 19 projecting at the time above the contour of the former and depresses the same into its recesses in the former, which movement, by reason of the inclined end of the latch engaging on the backside of the catch 21 throws the catch from the position shown in Fig. 3 into that shown in Fig. 2, and as it passes around in its revolution the projecting ear thereof becomes engaged with tripping lever 18 and moves the same to rock shaft 17, which shaft by means of cam toe 15 operates the catch-lever 13 and

throws catch 12 out of engagement with the lever 8^a (it having become engaged therewith and secured at the time that clutch was thrown into operation) and the lever 8^a is immediately retracted by the spring 10 throwing the clutch out of operation and further rotation of the former instantly ceases. The spring is then severed from the wire by means of the cutter C, the formers are separated and the spring removed after which they are allowed to come together and the machine is ready for the formation of another spring. The wire carriage is then moved to its extreme left hand position and as it nearly completes its movement in that direction the side of the carriage becomes engaged with stopper 43 throwing it to the left against the tension of the spring 44 and removing the thick end 45 thereof from between the arm 35 and stop 46, which permits the pin 31 on the carriage to become engaged again with the feeding screw and as the end of the wire is inserted under the clasp *a* the clutch is again thrown into engagement and the operations before described are repeated.

It is often found advisable and necessary to lengthen or shorten the amount of wire used at the last formed end of the spring, and to this end we provide a former which may have several recesses for receiving the latch 19 and the projecting ear of the catch 21, as shown in the dotted lines in Fig. 4, and there is also provided in the collar 24 of the mandrel a series of openings 23 so that the spring button 22 may be moved around in position to engage the washer portion of the catch 21 adjacent to the projecting ear thereof and hold it normally flat against the end of the former.

It is evident that many modifications and changes in and from the construction described and other than those herein mentioned may be made without departing from the equivalents of this construction.

What we claim as new, and desire to secure by Letters Patent, is—

1. In a spring forming machine the combination of a spring former, a feeding screw and a wire feeding carriage mounted on movable ways to adapt it to be thrown into and out of engagement with the feeding screw, substantially as set forth.

2. The combination in a spring forming machine of a spring former, a feeding screw, movable carriage ways parallel with the screw and a movable carriage on the ways adapted to be thrown in and out of engagement with the screw, substantially as set forth.

3. The combination in a spring forming machine of a spring former, a feeding screw substantially parallel with the former, a feeding carriage mounted on movable ways parallel with the feeding screw and adapted to be thrown into and out of engagement with the feeding screw and a stopper adapted to be engaged and operated by the carriage for holding the carriage and ways in position so that the carriage can become engaged with the feeding screw, substantially as set forth.

4. The combination in a spring forming machine of a rotating spring former, a rotating screw parallel with the former, a carriage adapted to engage with the screw and mounted upon movable ways and a catch or stopper adapted to be engaged and operated by the carriage on the ways and operating to hold the carriage out of engagement with the feeding screw, substantially as set forth.

5. The combination in a spring forming machine of a former mounted on a mandrel, a clutch for driving the mandrel a catch for securing the clutch, a tripping lever connecting with the clutch catch, a washer shaped tripping catch located at the end of the former and surrounding the mandrel and a latch for operating the catch and projecting from a recess in the former, substantially as set forth.

6. The combination in a spring forming machine of a spring former mounted on the mandrel, a recess in the former containing a latch, a washer shaped tripping catch engaged by the latch and having an ear adapted to be projected in position to engage the tripper, substantially as set forth.

7. The combination in a spring forming machine of a spring former, a latch located in the former and adapted to be engaged by the wire forming the spring on the former, a washer shaped tripping catch contained in a recess in the end of the former and adapted to engage a tripping lever operating the clutch and driving the former and a spring for holding the tripping catch in its normal position and projecting the latch, substantially as set forth.

8. The combination in a spring forming machine of a spring former mounted on a shaft, a movable latch on the former adapted to be engaged by the wire on the former, a catch located in the end of the former and surrounding the shaft and provided with a projecting ear adapted to be operated by the latch and tripping mechanism operated by said tripping catch and operating to arrest the movement of the former, substantially as set forth.

9. The combination in a spring forming machine of a mandrel, a former mounted on the mandrel, a projecting latch on the former, a washer shaped tripping catch provided with projecting ear and surrounding the mandrel and adapted to operate a tripping mechanism and arrest the movement of the former, and a spiral spring lying in the plane of the mandrel and engaging on the washer shaped catch, substantially as set forth.

10. The combination in a spring forming machine of a mandrel, a former mounted on the mandrel, a latch piece projecting out of the former, a washer shaped tripping catch located in the end of the former and adapted

to be engaged and operated by the latch and held in normal position by a coil spring and thimble projecting from a pocket in the collar of the mandrel and a tripping mechanism for arresting the movement of the former operated by the tripping catch, substantially as set forth.

In witness whereof we have affixed our signatures in presence of two witnesses.

OSCAR S. FOSTER.
WILLIAM S. FOSTER.

Witnesses:
RICH. A. GEORGE,
M. E. ROBINSON.