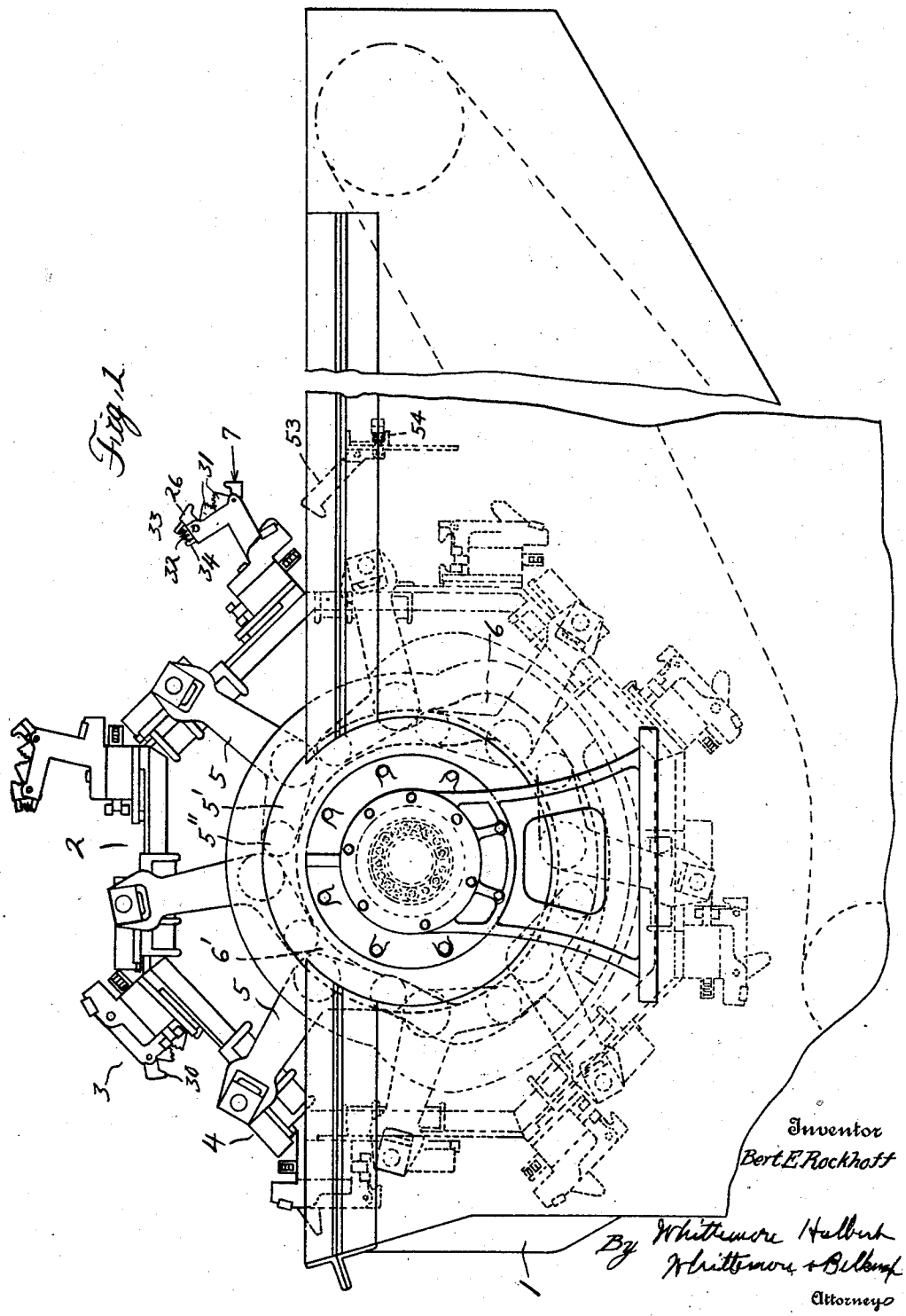
Jan. 7, 1930. B. E. ROCKHOFF 1,742,730

MACHINE FOR FORMING VEHICLE SPRINGS

Filed Aug. 3, 1927 5 Sheets-Sheet 1



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MACHINE FOR FORMING VEHICLE SPRINGS

Filed Aug. 3, 1927 5 Sheets-Sheet 2

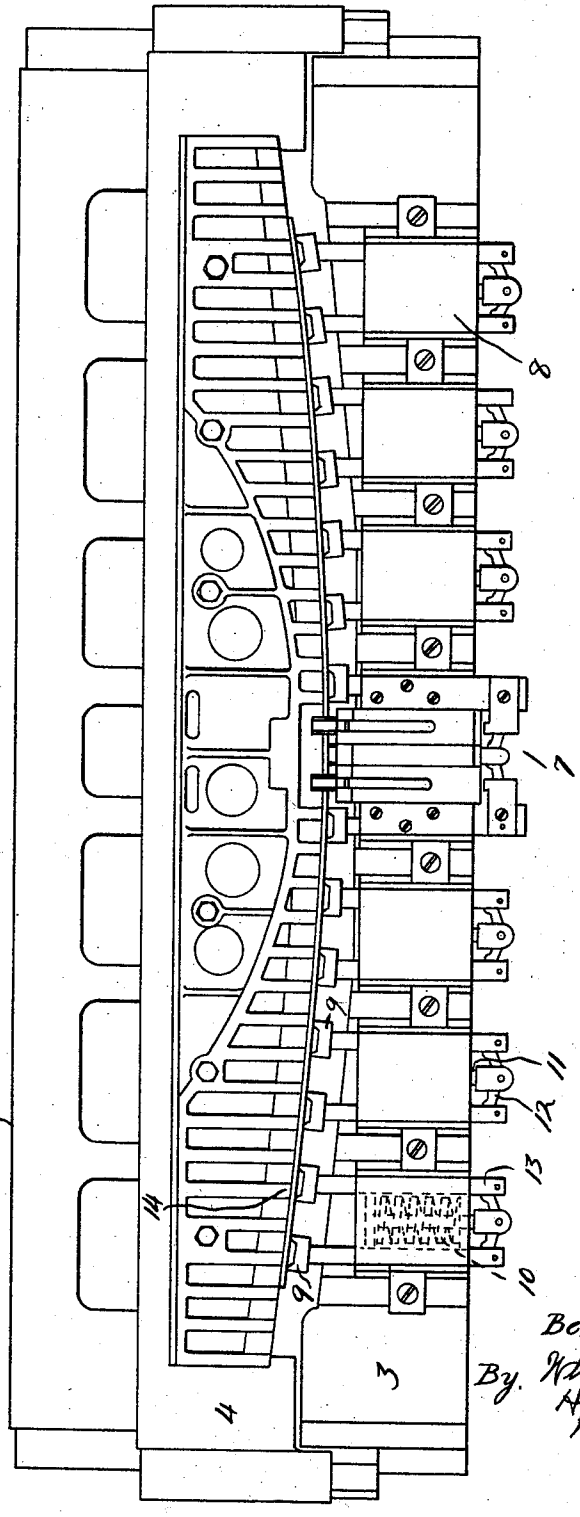


Fig. 2.

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MACHINE FOR FORMING VEHICLE SPRINGS

Filed Aug. 3, 1927 5 Sheets-Sheet 3

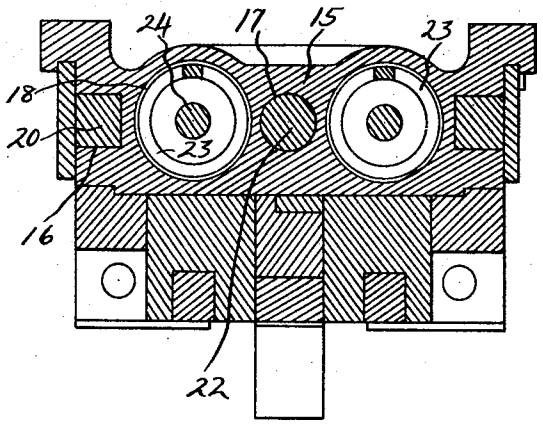


Fig. 7.

Fig. 3.

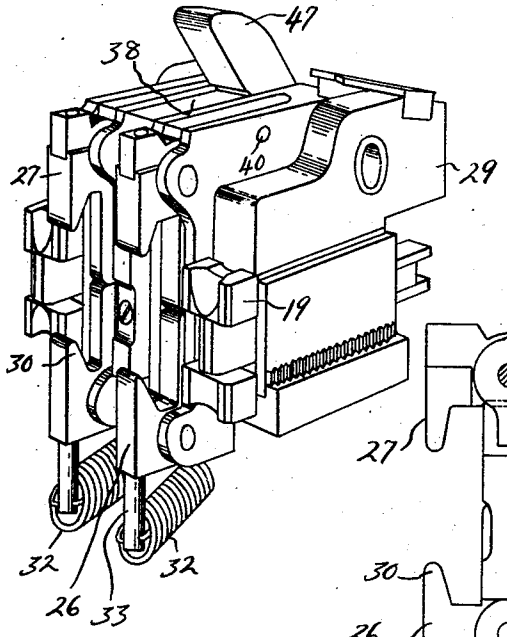
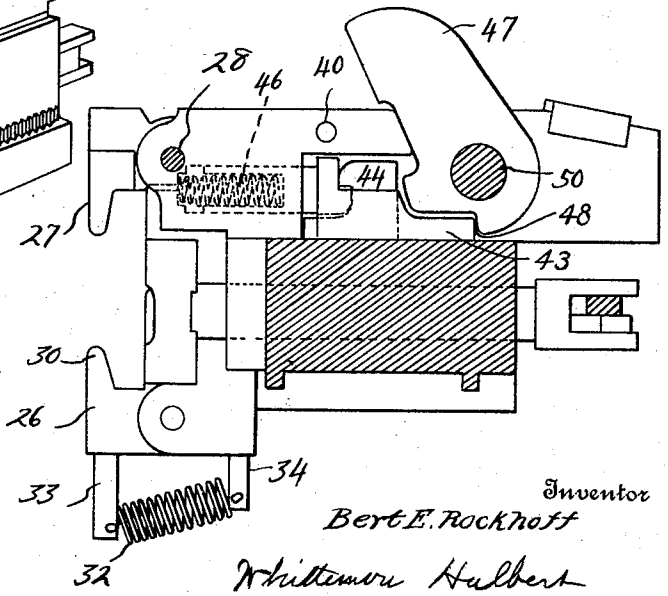


Fig. 8.



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MACHINE FOR FORMING VEHICLE SPRINGS

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Fig. 4.

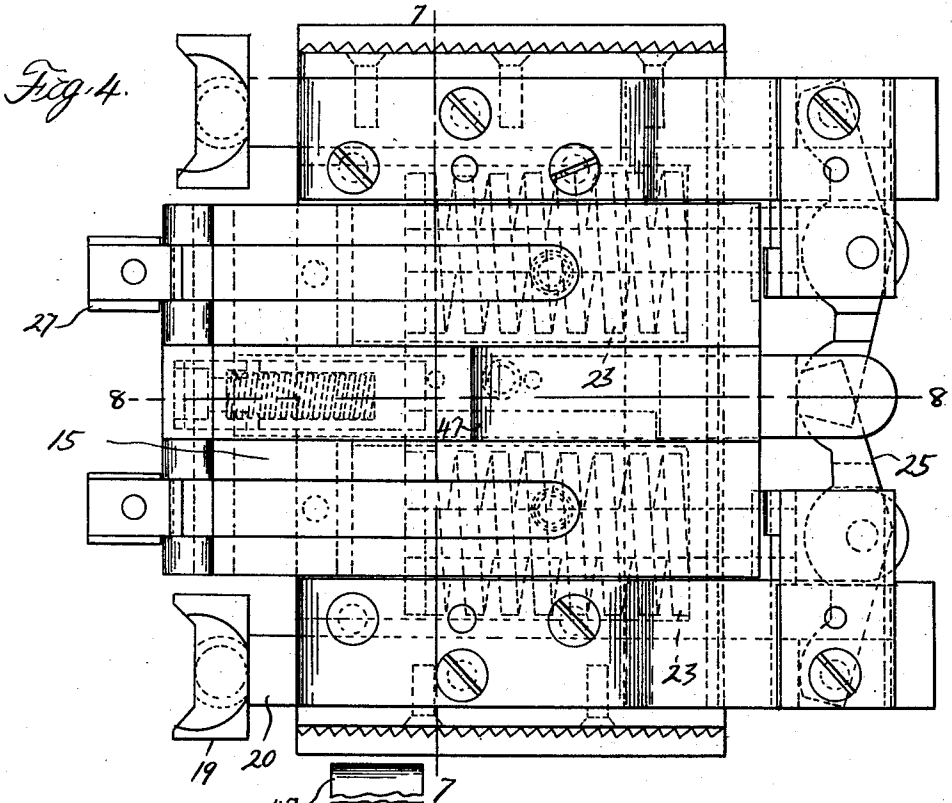
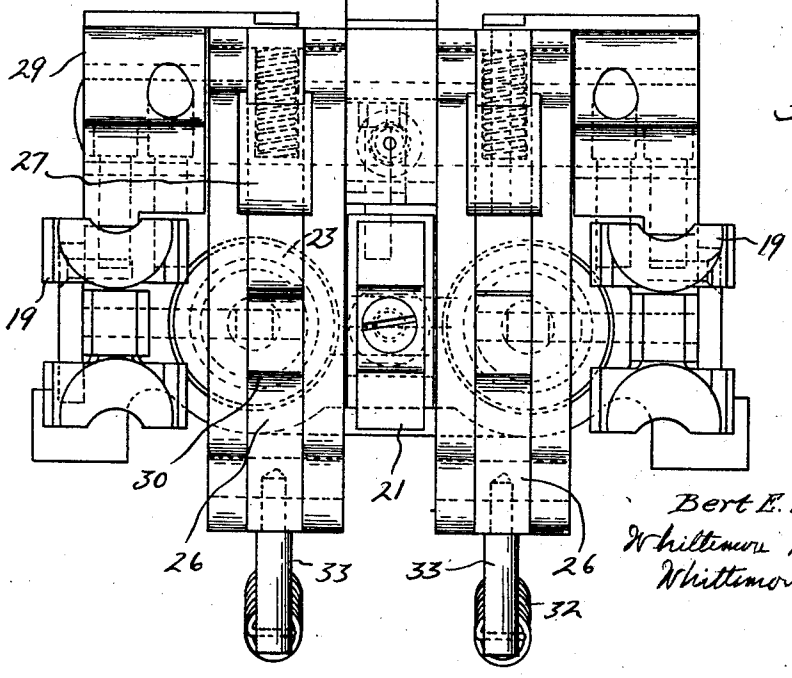


Fig. 6.



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MACHINE FOR FORMING VEHICLE SPRINGS

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Fig. 5.

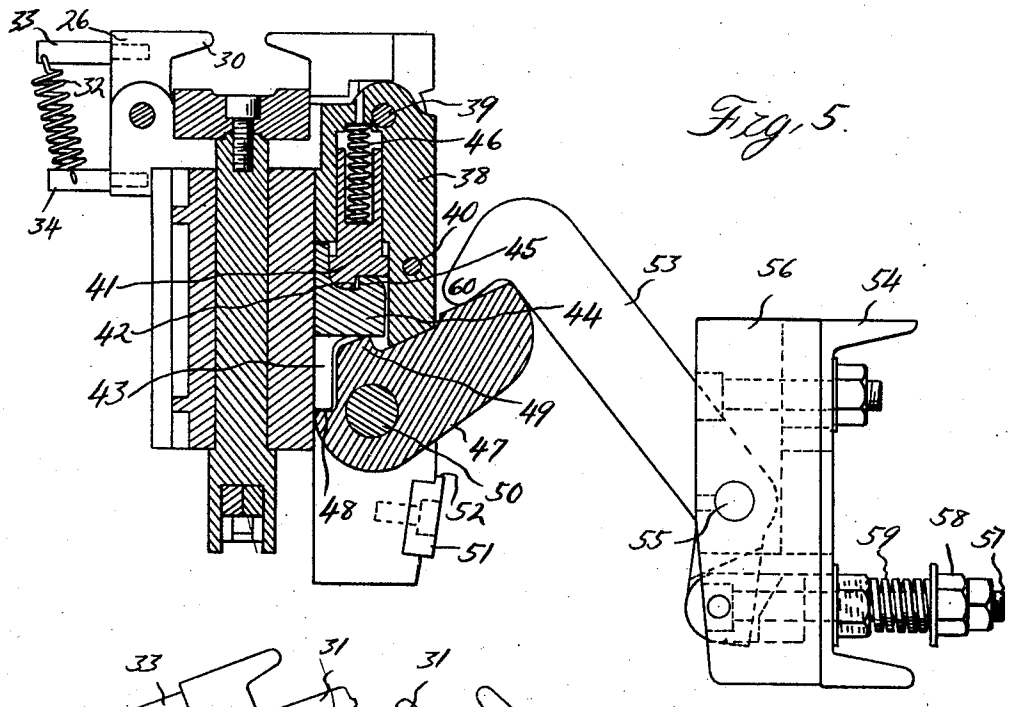
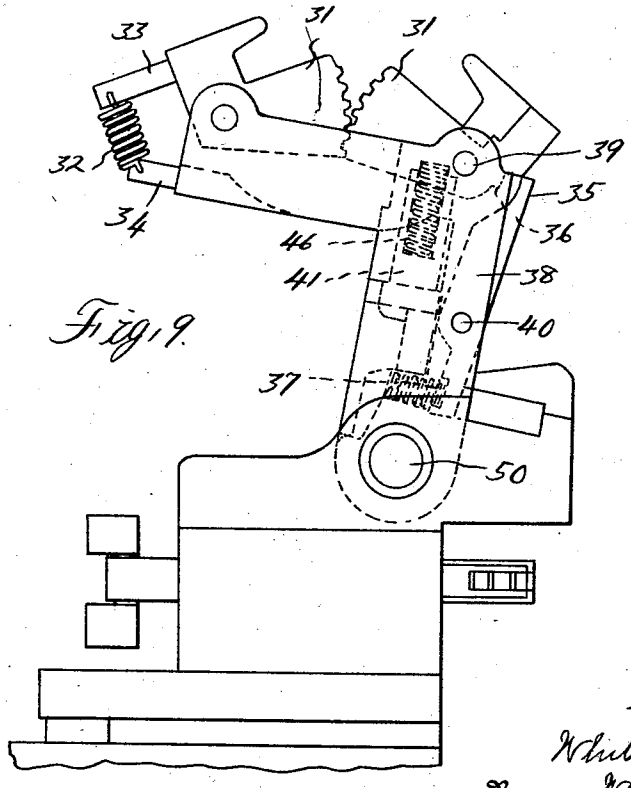


Fig. 9.



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UNITED STATES PATENT OFFICE

BERT E. ROCKHOFF, OF DETROIT, MICHIGAN, ASSIGNOR TO DETROIT STEEL PRODUCTS COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

MACHINE FOR FORMING VEHICLE SPRINGS

Application filed August 3, 1927. Serial No. 210,438.

The invention relates to machines for forming vehicle springs or like articles and refers more particularly to machines for cambering hot flat vehicle spring blanks and quenching the same while cambered. One of the objects of the invention is to provide a machine which will hold a cambered blank throughout its movement through the quenching liquid and then discharge the blank back into the liquid to be completely cooled. Another object is to provide an improved construction of templet for carrying the blank through the quenching liquid and then discharging the blank. Further objects of the invention reside in the novel features of construction and combinations and arrangements of parts as more fully hereinafter set forth.

In the drawings:—

Figure 1 is a side elevation of a spring forming machine, embodying my invention;

Figure 2 is a front elevation of a pair of cooperating spring cambering templets;

Figure 3 is a perspective view of one of the sections of one of the templets;

Figure 4 is a front elevation thereof;

Figure 5 is a sectional side elevation thereof;

Figure 6 is an end elevation thereof;

Figures 7 and 8 are cross sections respectively on the lines 7—7 and 8—8 of Figure 4;

Figure 9 is a view similar to Figure 5, showing the parts in open position.

The machine shown in the present instance is designed particularly for forming and quenching vehicle leaf springs and comprises the tank 1 containing the quenching liquid, such as oil, and the rotatable table or drum 2 carrying the angularly spaced relatively movable spring cambering templets 3 and 4. The axis of rotation of this table is so located that the table carries the templets downwardly into and upwardly out of the quenching liquid. The templets 3 are fixedly mounted upon the table, while the templets 4 are reciprocably mounted upon the table to move toward and away from the templets 3. For moving the templets 4, there is the rock arm 5 in the form of a bell crank lever pivotally connected to the table and having one arm pivotally connected to each templet. The other arm 5′ of the lever 5 is provided with a roller 5″ engageable in an irregular groove 6′ formed in the stationary cam 6. The shape of the groove is such that upon rotation of the table the roller 5″ will engage the cam surface of the groove and actuate the lever 5 to move each templet 4 toward its cooperating templet 3 to clamp a spring therebetween prior to the two templets being carried into the quenching liquid and is moved away from its cooperating templet prior to the two templets being carried out of the quenching liquid. For the purpose of holding the spring in cambered position through as long a time as possible, means is provided for holding the spring to one of the templets during the travel of the spring downwardly into and upwardly out of the quenching liquid. Also, for the purpose of providing for finally cooling the spring in the quenching liquid, the means for holding the spring to one of the templets is formed to eject or discharge the spring back into the quenching liquid and in a manner to clear the rotatable table and templets thereon.

In the present instance, the springs are clamped to the templets 3 during their movement through the quenching liquid and these templets include the central section 7 and the sections 8 at the sides of the central section, each section 8 having a plurality of spring engaging abutments 9, which are normally yieldably forced against the spring by suitable means such as the coil spring 10 acting through the center rod 11 and the evener 12 upon the abutment rods 13. Each section 8 has a suitable housing for each coil spring and portions of the center rod and abutment rods, which is detachably and adjustably clamped to the rotatable table. The templet 4 has the series of spring engaging abutments 14 which are preferably cast integral and the ends of which form a contour corresponding to the desired completed contour of the spring.

The central section 7 of the templet 3 is provided with means for clamping the spring leaf to this templet, this means being operable after the spring has been carried upwardly out of the quenching liquid to release the

spring and to allow the same to drop back into the quenching liquid. In detail, the central section comprises the housing 15 which is adapted to be detachably clamped to the rotatable table in the same manner as the housings of the sections 8. This housing has the longitudinally extending grooves 16 in its opposite edges and the central longitudinally extending bore 17 as well as the longitudinally extending cylindrical recesses 18 between the grooves 16 and the bore 17. 19 are spring engaging abutments similar to the abutments 9, and 20 are abutment rods slidably extending through the grooves 16. 21 is a centrally located spring engaging abutment upon the center abutment rod 22. For yieldably forcing these abutments 19 and 21 against the spring, there are the coil springs 23 arranged within the recesses 18 and exerting a pull upon the rods 24, each of which is connected to an evener 25 having one end fulcrumed upon an abutment rod 20 and the other end fulcrumed upon the center rod 22, the two eveners having the ends fulcruming upon the center rod 22 in overlapped relation.

For clamping the spring against the abutments 19 and 21, the pairs of inner and outer cooperating jaws 26 and 27, are provided, these jaws being pivotally mounted upon the bases of the L-shaped arms 28. The bases of these arms extend along one end of the housing 15, while the stems of the arms extend longitudinally at the outer side of the housing. These arms are pivotally mounted upon the bearing blocks 29, which extend longitudinally at the outer side of the housing 15 and are rigidly secured thereto at its edges. Each of the jaws 26 and 27 is provided with the projecting portion 30, which is adapted to engage the side of the spring opposite that engaged by the abutments 19 and 21 and with the projecting portion 31 adapted to engage the same side of the spring as the abutments 19 and 21. The abutment portions 31 are in the nature of gear segments which intermesh so that the jaws of each pair simultaneously rock and by reason of these abutment portions the jaws are automatically swung to locked position when the spring is inserted in the machine and the table is rotated to bring the templets into clamping position. For normally rocking the jaws to open position to release the spring, there are the coil springs 32 which are connected to the pins 33 extending from the jaws and the pins 34 extending from the bases of the arms 28 at their ends.

For normally locking the jaws in closed position to secure the spring against the abutments 19 and 21, there are the pivotal pawls 35, which extend longitudinally within the outer edges of the stems of the arms, these pawls having ends engageable with the shoulders 36 upon the outer jaws 27. To normally swing these pawls to engage their ends with the shoulders 36, there are the coil springs 37 extending between the arms and the inner sides of the pawls at their opposite ends, the pawl pivotes being intermediate their ends.

To normally hold the arms in closed position or adjacent to the housing 15, there is the latch block 38 between the arms and forming therewith a frame. This latch block is movable as a unit with the arms, the pin 39 forming the pivot for the outer jaws 27 extending through the arms and the latch block and the pin 40 forming the pivot for the pawls extending through the arms, pawls and latch block. 41 is a latch longitudinally movable within the latch block and having the transverse locking shoulder 42 and the extension 43 extending adjacent to the outer side of the housing 15. 44 is a catch rigidly secured to the outer side of the housing 15 and having the shoulder 45 for engaging the shoulder 42. The latch is normally held in position to engage the shoulder 42 with the shoulder 45 by means of the coil spring 46 which abuts the latch and the latch block. 47 is a pivotal rock lever having the shoulder 48 engageable with the end of the latch extension 43 to move the latch shoulder 42 from registration with the catch shoulder 45. This rock lever also has the shoulder 49 which is so positioned that after the latch 41 has been moved to release the frame formed of the arms and latch block this shoulder 49 engages the latch block to rock or swing the frame. The pivot for the frame, as well as the rack lever, is the pin 50, which extends through the bearing blocks 29, ends of the stems of the arms 28, and the rock lever 47. 51 are trips upon the bearing blocks 29 and extending laterally to provide projections 52 which are engageable with the free ends of the pawls 35 upon rocking or swinging of the frame to rock or swing these pawls, thereby disengaging their locking ends from the shoulders 36 upon the outer jaws 27. As a result, these jaws are released and may be then rocked or swung to open position by means of the coil springs 32, as well as the action of the spring being operated upon through the efforts exerted by the spring pressed abutments 29 and 31 of the central section and the abutments 9 of the other sections of the templet.

For actuating the rock lever 47, there is the trip 53 which is supported upon the cross bar 54 extending between the sides of the tank 1 in rear of the rotatable table or drum 2. This trip, as shown, is in the nature of a bell crank and is pivoted at 55 upon the supporting block 56, which is rigidly secured to the cross bar. One end of this trip is pivotally connected to the threaded member 57, which extends through the cross bar and has threaded on its rear end the nut 58, which is abutted by the coil spring 59 encircling the threaded

member and also abutting the rear of the cross bar. The free end of the trip is provided with the hook 60 which is positioned to engage the rock lever after the rotatable table has carried the templet upon which this rock lever is mounted upwardly out of the oil. As the rotable table continues to rotate the rock lever is rocked first releasing the frame and then rocking the latter rearwardly and outwardly away from the rotatable table. Then when the frame has rocked to a position such that its center of gravity is outside the vertical plane through the axis of its pivot, the projections 52 engage the pawls to release the dogs, at which time they are swung to open position and discharge the spring rearwardly over the cross bar 54 and back into the quenching liquid.

What I claim as my invention is:

1. A templet for forming a spring, including an abutment for engaging one side of a spring, a rockable frame, movable means upon said frame for engaging the opposite side of the spring, means for normally holding said frame from rocking, means for normally holding said first mentioned means from movement relative to said frame, and means for causing said second mentioned means to release said frame, said frame to then rock and said third mentioned means to finally release said first mentioned means.

2. A templet for forming a spring, including an abutment for engaging one side of a spring, a rockable frame, a rockable jaw upon said frame and having a portion engageable with the opposite side of the spring, a latch for normally holding said frame from movement, a pawl for normally holding said jaw from movement, and means for causing said latch to release said frame, said frame to then rock and said pawl to finally release said jaw.

3. A templet for forming a spring including an abutment for engaging one side of a spring, a support, a rockable frame upon said support, a rockable jaw upon said frame and having a portion engageable with the opposite side of the spring, a latch for normally holding said frame from rocking relative to said support, a pawl for normally holding said jaw from rocking relative to said frame, and means for causing said latch to release said frame, said frame to then rock relative to said support and said pawl to finally release said jaw.

4. A templet for forming a spring, including an abutment for engaging one side of a spring, a support, a rockable frame upon said support, a rockable jaw upon said frame and having a portion engageable with the opposite side of the spring, a latch for normally holding said frame from rocking relative to said support, a pawl for normally holding said jaw from rocking relative to said frame, a rockable lever for moving said latch to release said frame and subsequently rocking said frame relative to said support, and means upon said support for engaging said pawl upon rocking of said frame to release said jaw.

5. A templet for forming a spring, including an abutment for engaging one side of a spring, a support, a rockable frame upon said support, including an arm and a block movable as a unit, a rockable jaw upon one of said frame members and having a portion engageable with the opposite side of the spring, a latch upon said block for normally holding said frame from rocking relative to said support, a pawl upon said arm for normally holding said jaw from rocking relative to said frame, a rockable lever upon said support and having a portion engageable with said latch to release said frame and a second portion subsequently engageable with said block to rock said frame, and means upon said support engageable with said pawl upon rocking of said frame to release said jaw.

6. A templet for forming a spring, including an abutment for engaging one side of a spring, a support, a frame pivotally mounted upon said support and including a latch block and arms at opposite sides of said block movable as a unit, jaws pivotally mounted upon said arms and having portions engageable with the opposite side of the spring, a latch upon said latch block for normally holding said frame from rocking relative to said support, pawls upon said arms for normally holding said jaws from rocking relative to said frame, a rockable lever having a portion for engaging said latch and a portion for subsequently engaging said latch block to first actuate said latch to release said frame and second rock said frame, and means upon said support and operable upon rocking of said frame to actuate said pawls to release said jaws.

7. A templet for forming a spring, including an abutment for engaging one side of a spring, a support, a frame comprising a latch block and arms at opposite sides of said latch block, a pivot upon said support for said frame comprising a pin extending through said arms near one end thereof, jaws having portions engageable with the opposite side of the spring, a pivot upon said frame for said jaws, including a pin extending through said arms, jaws and latch block, pawls upon said arms for normally holding said jaws from movement, a pivot for said jaws, including a pin extending through said arms, pawls and latch block, said two last mentioned pins also operating to move said arms and latch block as a unit, a latch upon said latch block for normally holding said frame from rocking relative to said support, a rockable lever pivoted upon said first mentioned pin and having a portion initially engageable with said latch to release said frame

and a portion subsequently engageable with said latch block to rock said frame, and means upon said support engageable with said pawls upon rocking of said frame to rock the same and release said jaws.

8. A templet for forming a spring having a section, including a support, an abutment slidably mounted upon said support for engaging one side of a spring, a rockable frame upon said support, a rockable jaw upon said frame having a portion engageable with the opposite side of the spring, means for normally holding said frame from rocking relative to said support, means for normally holding said jaw from rocking relative to said frame, and means for actuating said first mentioned means to release said frame and for subsequently rocking said frame relative to said support and for finally actuating said second mentioned means to release said jaw.

9. A templet for forming a spring, including an abutment for engaging one side of a spring, a support, a movable frame upon said support, a movable jaw upon said frame and having a portion engageable with the opposite side of the spring, a latch for normally holding said frame from movement relative to said support, a pawl for normally holding said jaw from movement relative to said frame, means for causing said latch to release said frame, said frame to then rock relative to said support and said pawl to then release said jaw, and means for moving said abutment to discharge the spring from the templet.

10. A templet for forming a spring, including an abutment for engaging one side of a spring, means for yieldably forcing said abutment against the spring, a support, a movable frame upon said support, a movable jaw upon said frame and having a portion engageable with the opposite side of the spring, a latch for normally holding said frame from movement relative to said support, a pawl for normally holding said jaw from movement relative to said frame, and means for successively actuating said latch to release said frame for moving said frame relative to said support and for actuating said pawl to release said jaw.

11. A templet for forming a spring, including an abutment for engaging one side of a spring, a support, a movable frame upon said support, a movable jaw upon said frame having portions engageable with the opposite sides of the spring, a latch for normally holding said frame from movement relative to said support, a pawl for normally holding said jaw from movement relative to said frame, and means for successively actuating said latch to release said frame for moving said frame relative to said support and for actuating said pawl to release said jaw.

12. A templet for forming a spring, including an abutment for engaging one side of a spring, a support, a rockable frame upon said support, a rockable jaw upon said frame and having portions engaging opposite sides of the spring, a latch for normally holding said frame from rocking relative to said support, a pawl for normally holding said jaw from rocking relative to said frame, means for successively actuating said latch to release said frame for rocking said frame relative to said support and for actuating said pawl to release said jaw, and means for rocking said jaw relative to said frame upon actuation of said pawl.

In testimony whereof I affix my signature.

BERT E. ROCKHOFF.