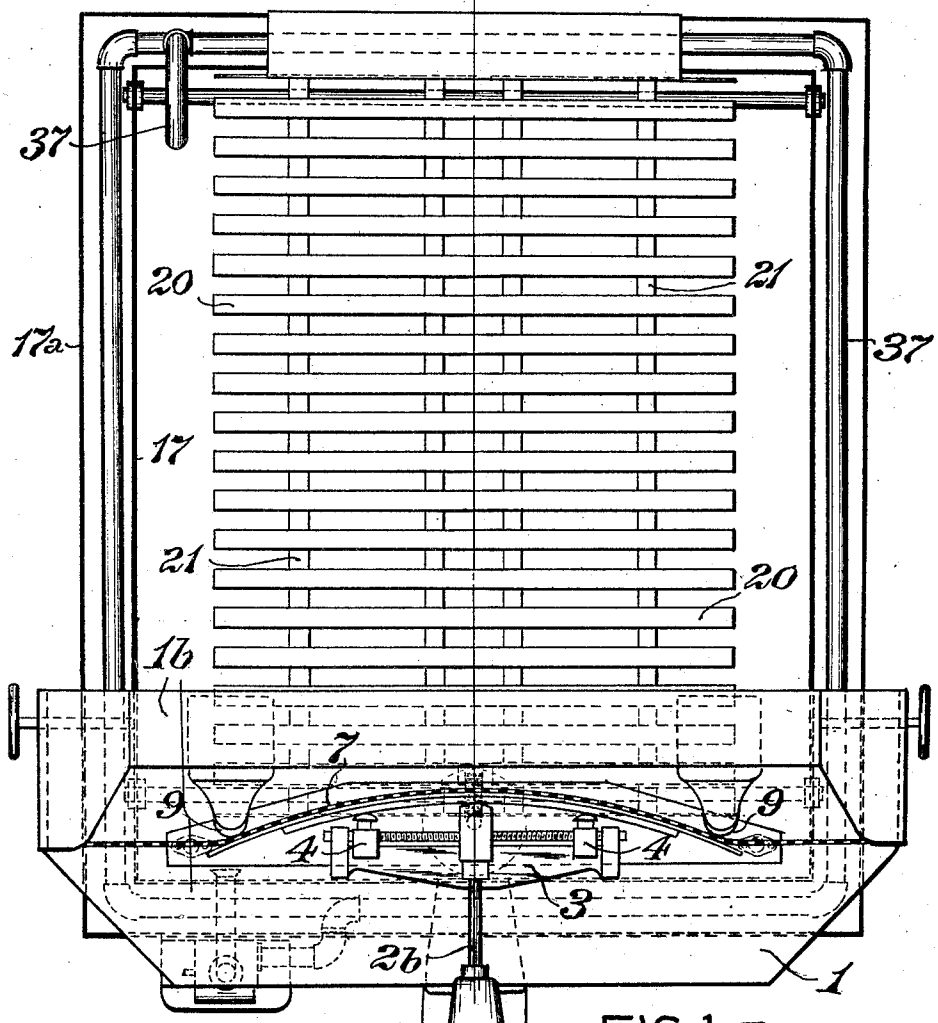
Feb. 9, 1926. 1,572,639

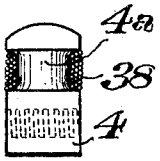
T. F. BUCKLEY

SPRING FORMING MACHINE

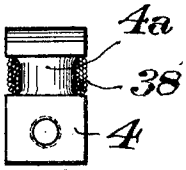
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- FIG. 1. -



- FIG. 5. -



- FIG. 6. -

WITNESSES

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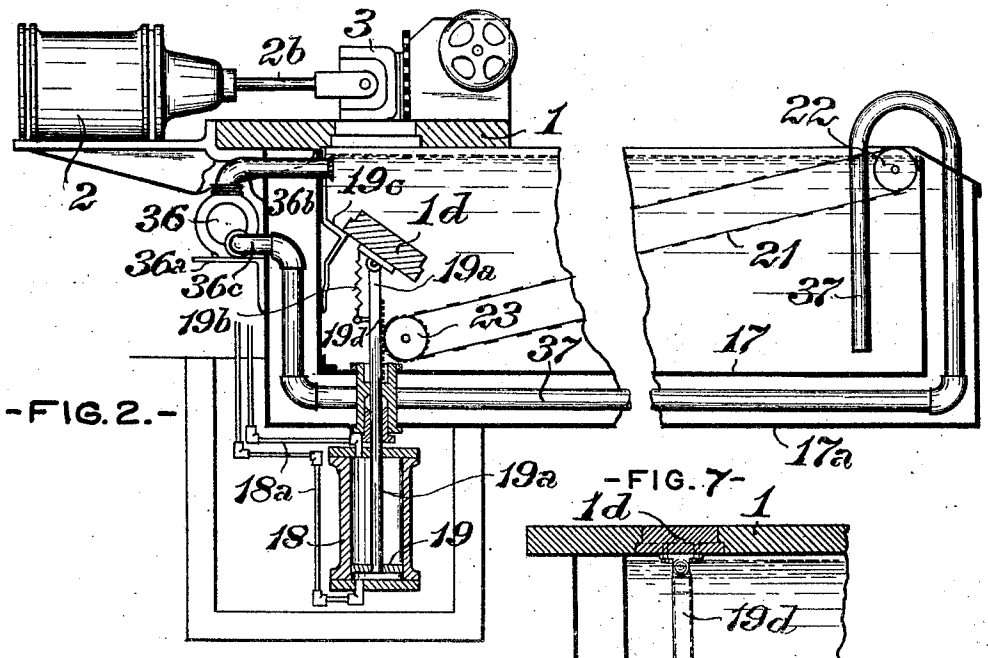
by Townsend Bell Atty.

Feb. 9, 1926. 1,572,639

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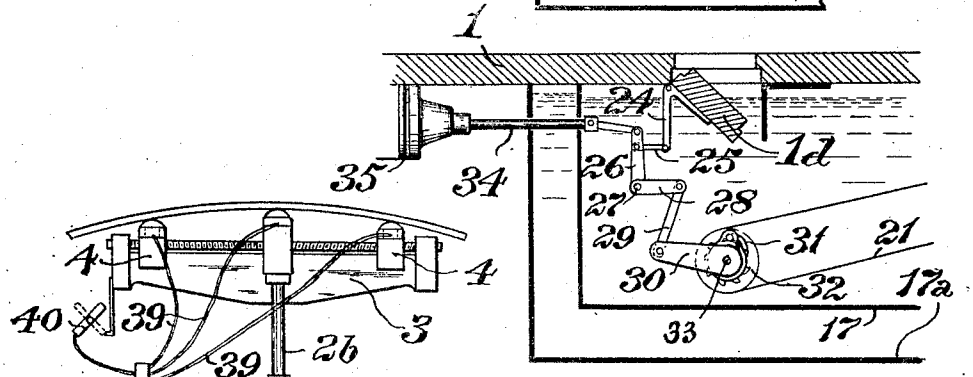
SPRING FORMING MACHINE

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-FIG. 2.-

-FIG. 7-



- FIG. 3.-

-FIG. 4-

WITNESSES

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UNITED STATES PATENT OFFICE.

THOMAS F. BUCKLEY, OF SCRANTON, PENNSYLVANIA.

SPRING-FORMING MACHINE.

Application filed October 9, 1924. Serial No. 742,598.

To all whom it may concern:

Be it known that I, THOMAS F. BUCKLEY, a citizen of the United States, and a resident of Scranton, in the county of Lackawanna and State of Pennsylvania, have invented a certain new and useful Improvement in Spring-Forming Machines, of which improvement the following is a specification.

My present invention relates to spring forming machines of the general class or type set forth in Letters Patent of the United States No. 1,275,377, granted to Samuel S. Riegel and myself, August 13, 1918, and Nos. 1,428,626 and 1,459,045, granted to me September 12, 1922, and June 19, 1923, respectively. The object of my invention is to further improve the means for operating the table and delivering the hot plate therefrom to an oil vat.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a plan or top view of a spring forming machine, illustrating an embodiment of my invention; Fig. 2, a vertical longitudinal section; Fig. 3, a partial similar section, showing a structural modification; Fig. 4, a plan view of a modified form of presser blocks; Figs. 5 and 6, views, partly in elevation, and partly in section, taken at a right angle one to the other, of one of said presser blocks; and, Fig. 7, a view, partly in elevation and partly in section, of a vertical guide for the drop section of the table.

In the practice of my invention, referring descriptively to the specific embodiment thereof which is herein exemplified, the leading and characteristic features of the means for bending or shaping the plates are substantially similar to those of the several Letters Patent hereinbefore specified. Said bending means are located on the top of a table, 1, which is supported on, and overlies a portion of an oil tank, 17. They comprise, as heretofore, a rigid abutment member, 1^b, supporting abutment members, 9, a flexible resistance member, 7, and a cross head, 3, actuated by a piston, working in a cylinder, 2, fixed on the table, the outer end of the rod, 2^b, of said piston, being secured to the cross head. The specified forming mechanism noted is not therefore claimed as of my present invention, and any other suitable and preferred form may be applied without departure therefrom.

In accordance with my present invention, the section, 1^d, of the table, upon which the spring plate rests, while and after it is bent to shape, is downwardly movable, either bodily, as in Fig. 2, or by being hinged or pivoted at one edge, as in Fig. 3. The object of affording the capacity of downward movement to this section, of the table, is to permit the shaped spring plates to be dropped into a bath of oil in the tank, 17. Different specific means for effecting this result may be adopted, one being shown in Fig. 2, and another in Fig. 3.

In the construction shown in Fig. 2, the movable section, 1^d, of the table, is pivoted to the upper end of the rod, 19^a, of a piston, 19, which is fitted in a vertical cylinder, 18, located below the tank. Fluid under pressure, as steam or compressed air, is supplied to, and exhausted from, opposite ends of the cylinder, 18, through valve governed pipes, 18^a, opening thereinto. The table section, 1^d, is normally held in horizontal position, by a spring, 19^b, but on being lowered in and by the downward movement of the piston, 19, it is brought into contact with a fixed abutment, 19^c, located in the oil tank, by which contact it is tilted to an angle of about 45 degrees, as indicated in Fig. 2. The spring plate which it carries, thereupon slides off into the oil tank, falling upon a conveyor therein, by which it is carried upwardly through, and out of, the bath of oil in the tank. The rectilineal traverse of the movable table section, in its depression and its return to normal position, as well as its lateral support, are ensured by vertical guides, located adjacent to its ends, and comprising sections of steel tubing, 19^d, pivotally connected to the table section, 1^d, and telescoping in sections of tubing, 19^e, secured on the bottom of the oil tank.

The conveyor comprises a plurality of slats or bars, 20, extending transversely to the table, and carried by endless chains, 21, which run over sprocket wheels 22, at the upper and lower ends of their loops, and is actuated by a pinion, 23, having a pawl and ratchet connection with the shaft of the lower sprocket wheels, such as indicated in Fig. 3, and meshing with rack teeth, 19^d, on the piston rod, 19^a.

The alternative means for actuating the movable table section and conveyor, which is shown in Fig. 3, is of the following construction. The movable table section, 1^d, is hinged to the main body of the table, and

carries an arm, 24, which is coupled, by a link, 25, to the upper arm, 26, of a bell crank lever, journalled on a shaft, 27, extending transversely in the oil tank. The lower arm, 28, of the bell crank lever, is coupled, by a link, 29, to a lever arm, 30, carrying a pawl, 31, which engages a ratchet wheel, 32, on the shaft, 33, carrying the lower ends of the conveyor chains. The upper arm, 26, of the bell crank lever, is coupled, by links, to the rod, 34, of a piston, working in a horizontal cylinder, 35, supported on the lower side of the table. It will be obvious that other specific means for moving the table section and actuating the conveyor, may be applied, without departure from the spirit of my invention.

The oil tank, 17, is jacketed, or surrounded on its sides, ends, and bottom, by an outer casing, 17ª, which is provided and adapted for being kept filled with cold water, from any suitable source of supply. The oil in the tank, 17, naturally becomes overheated, and as the mere application of a water jacket, will not be adequate to sufficiently cool it, means are provided for circulating the heated oil through the outer casing water jacket, 17ª. For this purpose, a pump, 36, actuated by any suitable motor, which is not shown, is supported on a bracket, 36ª, below the table, and is provided with an inlet pipe, 36ᵇ, opening into the oil tank near its top, and an outlet pipe, 36ᶜ, communicating with a connected series of cooling pipes, 37, extending through the space between the oil tank and its outer casing, and discharging into the oil tank, near the bottom thereof. A circulation of the hot oil is thereby maintained, and the main body of oil is kept relatively cool.

Figs. 1, 4, 5 and 6 illustrate an improvement in the presser blocks, 4, through which pressure is transmitted from the cross head, 3, to the spring plates, in bending them to the proper forms. As most clearly shown in Figs. 5 and 6, cylindrical seats, 4ª, are formed on the presser blocks around which are wound coils of wire, 38, whereby they may be converted into electro-magnets. The circuit, 39, of said coils, is connected to an automatic switch, 40, located in position to be opened and closed by the cross head, 3, in its reciprocating movements, the circuit being closed when the cross head moves back after forming a spring plate, whereby the magnetized presser blocks draw back with them, the relatively cold formation plate, leaving the spring plate, if at the requisite temperature, on the relatively cool movable table section. Should said spring plate, however, be at a temperature below that required for its proper hardening in the oil bath, it will also be subject to the magnetic, attraction of the presser blocks, and be withdrawn with them and the foundation plate instead of being dropped into the oil tank. A valuable check is provided upon the degree of heating of the spring plates. If desired, the magnetic circuit may be maintained during the operation of the machine, subject to manual control, and the automatic switch be omitted.

My invention provides a machine for the shaping and tempering of spring plates, by which the labor and expense of operation will be substantially reduced, without material structural cost, certain features of the invention being also applicable in machines of the older type.

I claim as my invention and desire to secure by Letters Patent:

1. In a spring-forming machine, the combination with an oil tank, a table above the same, and spring-shaping means on said table, of a separate movable section in said table, means to raise and lower said section, and means fixed in the tank to tilt said section as it is lowered.

2. In a spring-forming machine, the combination with an oil tank, a table above the same, and spring-shaping means on said table, of a section in said table capable of being lowered into said tank and tilted, a conveyor in said tank, a common means to actuate said section and conveyor, and means on the tank to tilt said section as it is lowered.

3. In a spring-forming machine, the combination with an oil tank, and a table comprising a downwardly movable section on which the spring is supported while being shaped, of means to raise and lower said section, and an abutment in said tank to tilt said section as it is lowered.

4. In a spring-forming machine, the combination of an oil tank, a table above the same, spring-forming means on said table, a power cylinder outside said tank, the piston-rod of which passes through a wall of the tank, a section of said table being downwardly movable to deposit the finished springs in the tank, and connections between said section and said piston-rod to so move said section.

5. In a spring-forming machine, the combination of an oil tank, a table above the same, spring-forming means on said table, a power cylinder below said tank, the piston-rod of which passes up into the tank, a movable section of said table pivoted to the top of said rod, and an abutment in said tank to tilt said section as it is lowered by said piston-rod.

THOMAS F. BUCKLEY.