Dec. 1, 1942. M. H. LANGE 2,303,748

MACHINE FOR MAKING LOCK SLIDERS FOR SEPARABLE FASTENERS

Filed Dec. 22, 1939 2 Sheets-Sheet 1

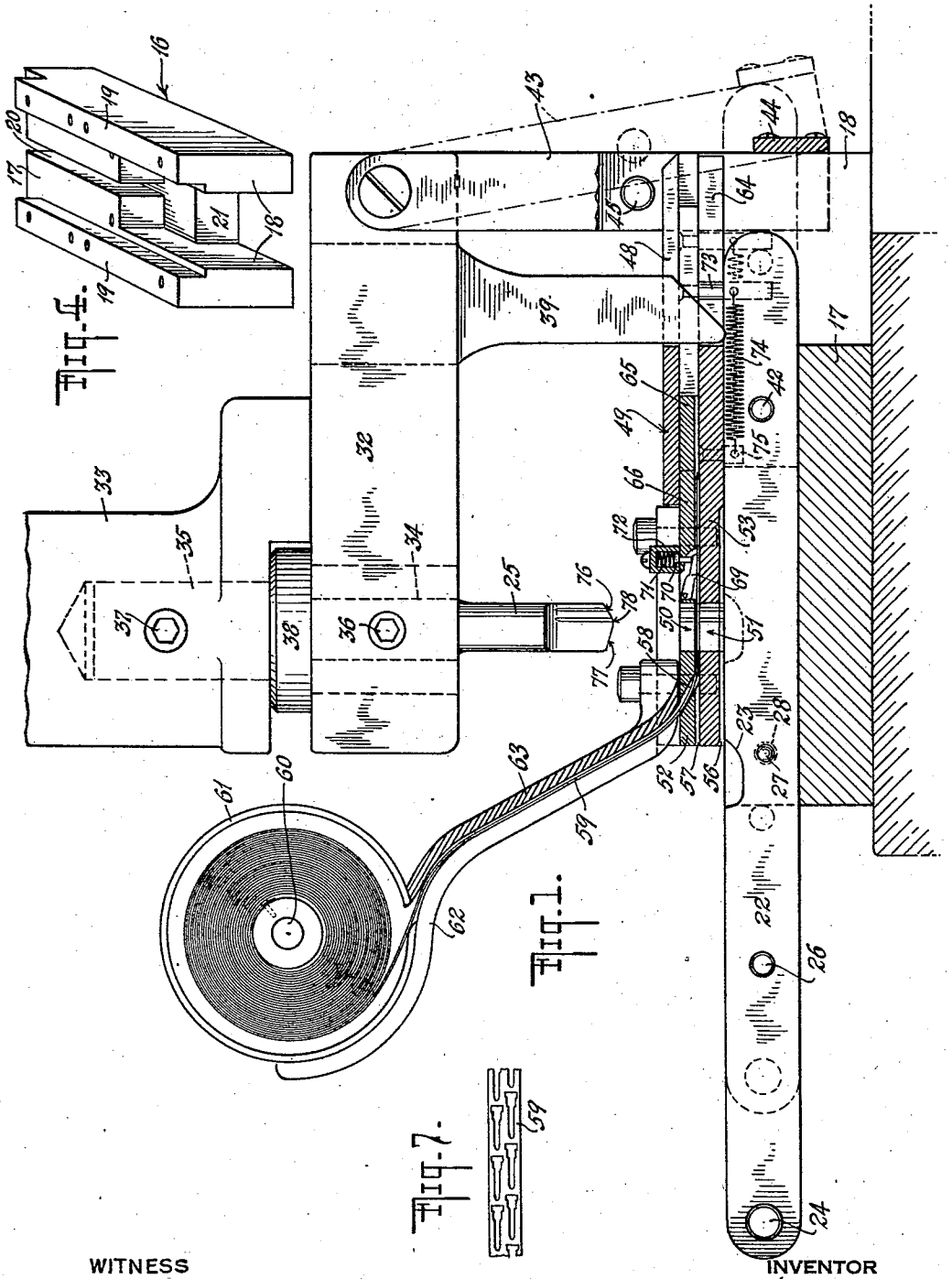


FIG. 4.

FIG. 1.

FIG. 7.

WITNESS

G. V. Rasmussen

INVENTOR

MAX H. LANGE

BY Briesen & Schurck,

ATTORNEYS

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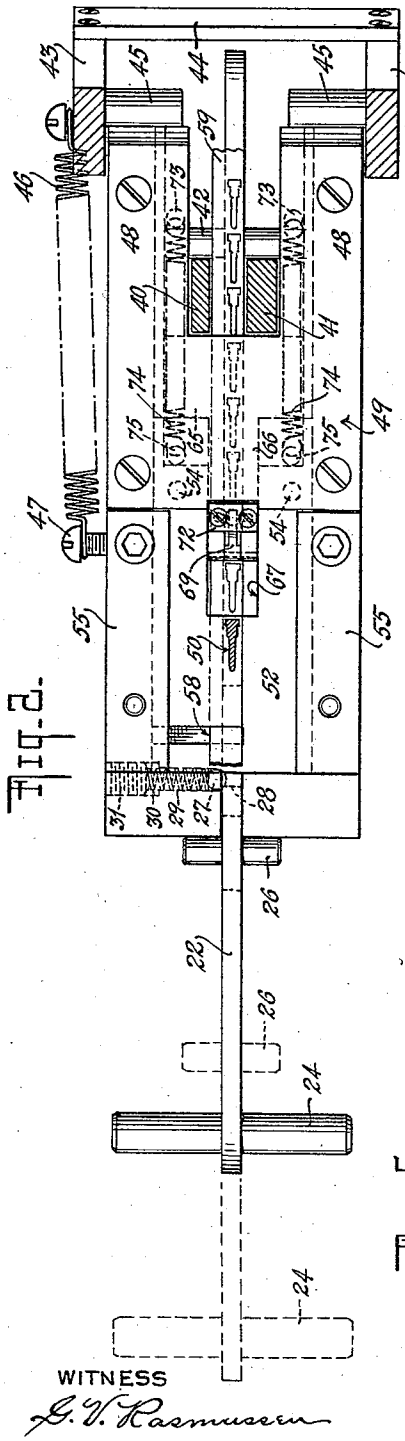


Fig. 2.

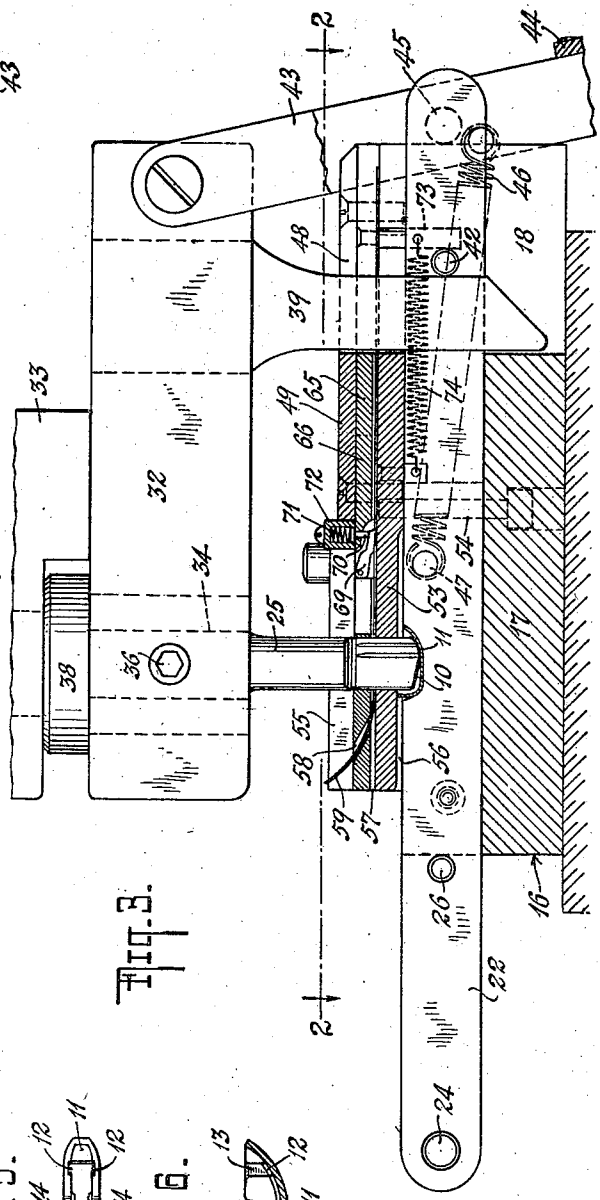


Fig. 3.

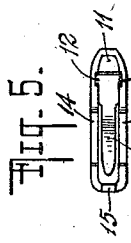


Fig. 5.

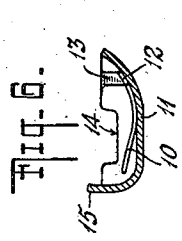


Fig. 6.

WITNESS

G. V. Rasmussen

INVENTOR

MAX H. LANGE

BY

Briesen & Schenk,

ATTORNEYS

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2,303,748

UNITED STATES PATENT OFFICE

2,303,748

MACHINE FOR MAKING LOCK SLIDERS FOR SEPARABLE FASTENERS

Max H. Lange, New York, N. Y., assignor to Waldes Koh-I-Noor, Inc., New York, N. Y., a corporation of New York

Application December 22, 1939, Serial No. 310,503

7 Claims. (Cl. 113—1)

This invention relates to machines for use in the manufacture of lock sliders for fastener structures of the type in which opposed rows of flexibly mounted locking elements are formed to be progressively interlocked and disengaged by the movements of the slider longitudinally of the rows. The invention relates more particularly to a machine for forming and setting a spring member adapted to control the locking element of the slider in a shell or housing to which the pull tab of the slider is pivotally connected.

The object of the present invention is to provide an improved instrumentality which will materially reduce the number of operations heretofore required in forming and setting the spring members in the shells and which will perform its work satisfactorily and quickly and at a materially reduced cost.

Prior to this invention, it was customary to cut the spring member into proper form from a strip of metal, then bend it into the shape required to perform its functions in the shell, then temper the formed piece of spring metal, then place it in the shell or housing and clamp it to the shell with a tool adapted to form burrs on the interior surfaces of the shell and finally to make sure that the spring member was lined up properly within the shell to enable it to satisfactorily perform its functions. According to the present invention the spring member is made from a strip of spring hard metal and the machine is so constructed that the spring member is simultaneously cut and formed into proper shape by a progressive stamping operation and directly deposited in place in the shell or housing member, thus accomplishing by one continuous operation what was formerly accomplished in five separate operations.

The invention is illustrated in the accompanying drawings in which Fig. 1 is a side elevational view of the entire machine, the lower portion thereof being shown in central longitudinal section and the parts of the machine being shown in the positions they will have during the loading operation; Fig. 2 is a plan view of the lower portion of the machine looking along the line 2—2 of Fig. 3; Fig. 3 is a partial elevational view similar to Fig. 1 showing the relation of the parts at the end of the downward movement of the cutting and positioning members; Fig. 4 is a perspective view of the bed plate for the die members; Fig. 5 is an inner front view on an enlarged scale of the housing or shell into which the spring member is positioned by the device; Fig. 6 is a central longitudinal section of the parts shown in Fig. 5 and Fig. 7 is a plan view of a portion of the blank or strip after the spring members have been formed therefrom.

Before entering into a description of the machine, it is believed to be advisable to first consider the structure of the article for whose manufacture the machine was devised. The slider of a separable fastener structure, as is well known, includes a pair of plates spaced to receive the interlocking elements of the fastener. In the type of slider for which the machine of this invention was devised, and forms of which are shown and described in my pending application Serial No. 276,829, filed June 1, 1939, there is provided a shell or housing member on one of the slider plates, generally the top or front plate, and within which is loosely positioned a locking member having a detent at one end adapted to project into an aperture in such plate. The locking member is normally maintained in locking position by means of a spring member which is secured at one end intermediate the shell or housing member and a stud provided on the associated front plate of the slider. A typical spring member is designated generally in Figs. 5 and 6 of the drawings by the numeral 10, such spring member being provided with a root portion secured in place within the shell or housing member 11 and a finger portion which is adapted to bear against the upper surfaces of the locking member which is positioned intermediate such spring member 10 and the associated top or front plate of the slider in the assembled condition of the parts. The spring member 10 has a width of approximately $\frac{1}{32}$ of an inch and a thickness of 6 to $\frac{7}{1000}$ of an inch and has a curved configuration which enables it to be positioned up against the interior surfaces of the shell or housing member 11 in the region of its root portion and enables the finger portion thereof to extend away from the shell into engagement with the locking member so as to maintain the latter normally in locking engagement with the locking elements of the fastener structure. The locking member 10 is secured to the shell 11 by means of two opposed extensions 12 which are integral with the root portion of such member and are positioned in slots 13 provided in the interior side walls of the housing member, as is illustrated in Figs. 5 and 6 of the drawings. The housing member is provided with a pair of aligned recesses 14 on its side walls to enable the pull tab of the slider to be pivotally and slidably connected thereto and a lug 15 which engages with a recess provided in the top plate of the slider and enables the end thereof to be permanently secured to the slider plate. The other

end of the housing member is secured in any suitable fashion to the stud intermediate which and the housing, the root portion of the spring member 10 is positioned.

Turning now to the description of the machine, it will be seen from Fig. 4 that the bed of the machine which is indicated generally by the reference numeral 16, includes a body portion 17 provided at one end with longitudinally and parallelly disposed extensions 18, 18. Integral with the upper surfaces of the body portion 17 and the extensions 18, 18 are a pair of longitudinally extending side flanges 19, 19 between which the female die plate 53 and a superimposed guide plate 52 and sliding member 65 are positioned, as will hereinafter become more clear. The body portion 17 of the die plate is provided with a centrally disposed longitudinally extending slot 20 which extends throughout the entire length of such body portion. Between the extensions 18, 18 is a web 21 whose upper surface is in the same horizontal plane as the bottom wall of the slot 20. The parts 17 to 21 of the bed 16 of the machine preferably are integrally formed from a single piece of suitable metal as is illustrated in Fig. 4 of the drawings.

Positioned within the slot 20 is a slidable member 22 having a depth only slightly smaller than the depth of the slot 20 and a length substantially longer than the length of the body portion 17 of the die bed, as is shown in Figs. 1 to 3 of the drawings. Intermediate its ends, the member 22 is provided with a cavity or recess 23 which is of a shape conforming to that of the shell 11 so that the latter may be readily seated therein. The member 22 is provided at one end with a handle 24 by which it may be moved by the operator longitudinally in the slot to a position to load a shell member 11 in the cavity 23 or to bring the cavity together with the shell into proper position beneath the stationary female die 53, in position to receive a spring member 10 forced through the female die by the male die member 25, or to permit the operator to unload the assembled shell and spring member. The position of the member 22 and cavity 23 for the loading operation is shown in Fig. 1 of the drawings, the cavity 23 being closely adjacent to the left hand end of the flange members 19, as viewed in such figure, and between the adjacent ends of the body portion 17 so that such ends together with the cavity 23 form a pocket into which the housing shell 11 may be readily placed by the operator. In the loading position of the slidable member 22, a spring pressed ball 27 engages with an aperture 28 provided in the slidable member 22 to releasably hold such member in proper position for the loading operation. The ball 27 is positioned at the inner end of a transverse passageway 29 provided in the body portion 17 of the die bed (see Fig. 2) and is normally pressed into engagement with the adjacent side surface of the member 22 by means of a spring 30 which is contained within such passageway 29 and is seated at its outer end against a screw plug 31 threadedly engaged with the outer end of the passageway 29.

By pushing the handle 24 inwardly, the cavity 23 together with the shell 11 loaded therein is advanced to the dotted line position shown in Fig. 1 and the full line position shown in Fig. 3 so that they are disposed in proper position beneath the die opening of the female die member 53. The slidable member 22 is provided intermediate the cavity 23 and handle 24 with a transverse pin 26 which functions as a stop to limit the longitudinal movement of the member 22 in one direction and engages with the adjacent end of the body portion 17 of the bed 16 when the cavity 23 is properly positioned beneath the opening of the female die 53, as is shown in Fig. 3 of the drawings. After the male die has deposited and secured a spring member 10 within the housing or shell 11, the handle 24 is pulled by the operator to bring the slidable member 22 to a position beyond the end of the body portion 17 of the die where the assembled housing and spring member can be readily removed by the operator, as is shown by the dotted line position of the slidable member 22 of Fig. 2 of the drawings. The slidable member 22 is provided at its other end with a transverse pin 42 which engages with the ends of the body portion 17 of the die adjacent to the web 21 thereof to limit movement of such member in this direction and to maintain the parts in assembled condition against inexpert handling.

The male die 25 includes a shank portion 34 which extends through a head block 32 secured to the lower end of an actuating head 33 (see Figs. 1 and 3) and a shank portion 35 which extends up into the lower end of the actuating head 33. Intermediate the shank portions 34 and 35 of the male die is an adjusting disc 38 which is positioned in a recess formed by cutting away a portion of the lower end of the actuating head 33 and by which the position of the male die 25 may be adjusted with relation to the female die. In the adjusted position of the male die, the shank portions 34 and 35 thereof are secured to the head block 32 and the actuating head 33, respectively, by means of the set screws 36 and 37, respectively. The actuating head 33 may form part of a treadle which is actuated by the operator to raise and lower such head and consequently the male die 25 or may be connected to suitable mechanism for automatic intermittent operation of the actuating head 33 and male die 25 and in this connection the slidable member 22 may be also arranged for automatic intermittent operation as will be readily apparent to those skilled in the art. Also secured to the head block 32 is a depending positioning member 39 which is fork-shaped at its lower end and straddles the slidable member 22, the fork 40 of the positioning member 39 having a thickness less than the fork 41 thereof to enable it to straddle the strip 59 from which the spring members 10 are stamped, as is shown more clearly in Fig. 2 of the drawings. The positioning member 39 is adapted to enter between the transverse pin 42 provided on the slidable member 22 and the web 21 of the die bed when the actuating head 33 and male die member 25 are descending to stamp a spring member from the strip 59. In the event that the cavity 23 of the member 22 is not in proper position below the female die just prior to the time that the male die 25 deposits the stamped spring member in the housing 11, the beveled lower ends of the forks 40 and 41 of the positioning member 39 will engage with and force the transverse pin 42 to a position where the parts will be in proper alignment with the transverse pin 26 up against the other end of the body portion 17 of the die bed, as is shown in Fig. 3 of the drawings.

Means are provided for preventing the descent of the male die member 25 and positioning member 39 in the event that the transverse pin 42 is not sufficiently advanced to enable it to be engaged by the positioning member 39 to prop-

erly position the socket 23 beneath the female die. This means comprises a pair of links 43 which are pivotally mounted at their upper ends on the head block 32 and are connected at their lower ends by a transverse plate 44. Intermediate their ends the links 43 are provided with a pair of inwardly extending opposed pins 45 which in the retracted position of the male die member 25 with the plate 45 up against the ends of the die bed extensions 18, overlie the legs 48, 48 formed by a slot in a covering plate 49 in the region of the extensions 18, 18 of the body portion of the die bed, as is shown in Fig. 1 of the drawings. This is the normal position of the parts 43, 44 and 45 in the loading and unloading positions of the slidable member 22. When the member 22 is advanced by the operator to position the socket 23 below the female die, the end of such member engages with the cross plate 44 and pivots the links 43 outwardly to the dotted line position shown in Fig. 1 of the drawings, a distance sufficient to enable the opposed pins 45 to clear the ends of the legs 48 of the covering plate 49 and thereby remove any obstruction to the downward movement of the male die 25 and the positioning member 39. Should the operator, however, fail to push the member 22 in sufficiently to cause a clearance of the pins 45 and consequently to enable the positioning member 39 to properly engage with the transverse pin 42, the pins 45 will engage with the legs 48 of the covering plate 49 on the downward movement of the male die member 25 and prevent the latter from performing its dieing operation. The links 43 and the transverse plate 44 are normally maintained in the position shown in full lines in Fig. 1 of the drawings by means of a coiled spring 46 which is attached at one end to one of the links 43 and is connected at its other end to a threaded screw 47 mounted on one of the side surfaces of the body portion 17 of the die, as is shown more clearly in Figs. 2 and 3 of the drawings.

In the downward movement of the male die 25, the lower working end thereof enters a pair of aligned apertures 50 and 51 which are provided in the guide plate 52 and the female die plate 53, respectively (see Figs. 1 and 3). The apertures 50 and 51 have a shape similar to that indicated in Fig. 2 of the drawings and conform to the outlines of the working end of the male die 25 and of the spring element 10 punched from the strip 59 which is fed intermediate such plates. The female die plate 53 is a stationary plate being fixedly secured in position to the body portion 17 of the die by means of vertically disposed bolts 54, as is shown more clearly in Figs. 2 and 3 of the drawings. The guide plate 52, however, is adjustably mounted on the female die plate 53 by means of a pair of clamps 55 which are secured to the flange portions 19 of the die bed 16, as by means of bolts, and project inwardly beyond such flange portions 19 to engage the exterior surface of the guide plate 52 as is shown more clearly in Fig. 2 of the drawings. On the undersurface of the female die member 53 there is provided a longitudinally extending recess or slot 56 into which the upwardly projecting lug 15 on the housing 11 enters as the slidable member 22 is pushed by the operator to its advanced position in the die bed (see Fig. 3 of the drawings).

The strip 59 from which the spring members 10 are punched is composed of spring hard metal and is preferably twice the width of the spring elements 10 to be cut therefrom, approximately $\frac{1}{16}$ of an inch, (see Fig. 7) as that width of strip has been found to be more convenient to handle and more practical in the manufacture of such elements than a strip half that width. The strip 59 is fed from a roll or reel which is revolvably mounted on an axle member 60 provided in a casing 61, down a feed slot or guideway provided between the support 62 for the casing 61 and a longitudinally extending cover plate 63, through a guide slot 58 provided in the adjustable guide plate 52 and into a guideway 57 formed intermediate the female die plate 53 and the guide plate 52 and a U-shaped latch plate 65. The several guideways are so formed that when the strip 59 is positioned between the die holes 50 and 51 only one half of the strip will be uncovered by such holes, such half of the strip directly overlying the slidable member 22, as is shown more clearly in Fig. 2 of the drawings. The latch plate 65 is slidably mounted intermediate the female die 53 and the cover plate 49, the legs thereof overlying the longitudinally extending leg portions 64, 64 of the female die plate 53 and together with the latter are mounted between the longitudinal flanges 19, 19 of the die bed 16 and intermediate the extensions 18, 18 of such die bed and the legs 48 of the cover plate 49. The body portion of the latch plate 65 is provided with a central longitudinally extending extension 66 adapted to enter a slot 67 provided in the inner end of the guide plate 52.

Carried within a recess on the outer end of the extension 66 of the latch plate 65 is a feeding pawl 69 whose free end is directed away from the male die member 25 and is adapted to engage with the straight forward end of an aperture produced in the strip 59 by punching out a spring member 10. The pawl 69 is biased for engagement with such aperture by means of a spring pressed pin 70 which extends through an aperture in the extension 66 into engagement with the pawl. The head of the pin 70 is contained within a casing or block 72 suitably mounted on the extension 66, as by screws and within which is also contained the spring 71 for resiliently pressing the pin into engagement with the pawl 69. The pawl 69 is normally maintained in a position adjacent to the guide hole 50 of the guide plate 52, by means of a pair of longitudinally extending springs 74, 74 which are attached at one end to the binder posts 73, 73 which depend downwardly from the latch plate 65 into the space between the extensions 18 of the die bed and on each side of the slidable member 22. The other ends of the springs 74, 74 are connected to binder posts 75 secured to the underside of the female die plate 53 just above the web 21 of the die bed 16. When the slidable member 22 is pushed inwardly by the operator to position the cavity 23 beneath the die holes 50 and 51, the transverse pin 42 thereof engages with the binding posts 73 to retract the latch plate 65 against the tension of springs 74, 74 and thereby cause the pawl 69 through its engagement with an aperture in the strip 59 to move the strip sufficiently to bring a new portion thereof beneath the male die 25, as is shown in Fig. 3 of the drawings. The range of movement of the member 22 is just sufficient so that when the pin 26 engages with the adjacent end of the die bed, the strip 59 will have been moved a distance approximately equal to the length of one spring member 10.

From the foregoing description it is believed to be apparent that when the slidable member 22 is in the position shown in full lines in Fig. 1 of the drawings, the cavity 23 thereof is disposed

between the adjacent ends of the walls forming the slot 20 so that a pocket is formed which is readily accessible to the operator for the placement of a shell or housing member 11 therein. In this position of the member 22, the male die 25 and positioning member 39 are in raised position and the plate 44 is engaging with the ends of the extensions 18 of the die bed 16 under the tension of spring 46 so that the stop pins 45 overlie the legs 48 of the covering plate 49. The pawl 69 is positioned closely adjacent the hole 58 of the guide plate 52 with its free end latched, under the influence of the spring pressed pin 70, with an aperture formed in the strip 59 by the male die 25 during the punching stroke which preceded the last, the aperture formed by the last punching stroke being still in alignment with the die holes 50 and 51. When the operator has placed a shell 11 in the cavity 23 he pushes the sliding member 22 inwardly until the pin 26 thereof abuts against the adjacent end of the die bed 16, at which occurrence the cavity 23 together with the shell 11 is positioned below the aligned die holes 50 and 51. During this inward movement of the sliding member 22 the pin 42 thereof engages with the depending binding posts 73 to shift the latching plate 65 towards the other end of the die and thereby cause the pawl 69 to feed the strip 59 a sufficient amount to bring an unblanked portion thereof between the die holes 50 and 51. The adjacent end of the member 22 during this movement also engages with the plate 44 and through the latter swings the links 43 outwardly a sufficient distance to enable the stop pins 45, 45 to clear the end of the die on the next downward movement of the die head 33. The die head 33 then commences its downward stroke, the working end of the male die 25 entering the guide hole 50 and coming into engagement with the portion of the strip uncovered by such hole. It will be observed from Figs. 1 and 3 of the drawings, that the lower face of the male die 25 has an inclined portion 76 and an inclined portion 77 which converge towards an advanced rounded apex portion 78. Thus when the male die 25 is advanced, the apex portion 78 of the working face thereof will initially engage the strip 59 and the latter will be progressively cut in opposite directions by the surface portions 76 and 77 thereof. By this operation the spring member 10 is bent at the same time that it is cut out of the strip to its correct form. As the male die further advances the cut spring member 10 is forced through the die hole 51 of the female die 53 and deposited by the male die in the shell 11, the extensions 12 of the member 10 being forced into the slots 13 and up against the end of the shell. As has been previously explained, the positioning member 39 during the downward movement of the male die 25 engages the transverse pin 42 in advance of the cutting operation and correctly positions and locks the member 22 in a position where the shell 11 will be correctly positioned for receiving the spring member 10. When the die 25 is withdrawn the operator pulls the member 22 with the assistance of spring 46 to the dotted line position shown in Fig. 2, where the assembled shell and spring member can be readily removed. During this outward movement of the member 22, the plate 44 and connected links 43, 43 and pins 45, 45 return to their normal positions and the latching plate 65 under the influence of springs 74, 74 returns to a position where the pawl 69 will engage with an aperture produced by the previous stroke of the male die 25. After unloading the assembled shell and spring member, the operator pushes the sliding member 22 inwardly until the spring pressed ball 27 again engages with the aperture 28 thereof, the parts being then ready for the next cycle of operations. As the strip 59 is discharged from the machine it is wound up so that when it is again placed in the casing the uncut edge portion thereof will be fed between the die holes 50 and 51. At the start of this new series of cuttings, the first cut is preferably made so that the second row of apertures will be staggered with relation to those of the first row, as is shown in Fig. 7 of the drawings.

While with the foregoing description I have described a preferred embodiment of the invention, it will be evident to those skilled in the art, that modifications and changes may be made without departing from the spirit and scope of the invention as is set forth in the appended claims.

I claim:

1. The combination of a female die, a slidable member having a recess adapted to receive a shell and movable relative to said female die in a direction transversely of the male-die-receiving aperture of the female die to position the recess thereof beneath such aperture, a male die adapted to coact with said female die to punch a blank from a strip of material and to deposit it at the end of its punching stroke into a shell carried by said slidable member, a positioning member carried by said slidable member and means movable with said male die and adapted to coact with said positioning member during the punching stroke of said male die to correctly position the recess of said slidable member with relation to said female die prior to the delivery of the cut blank into the shell carried by the recess of said slidable member.

2. The combination such as defined in claim 1, in which said positioning member consists of a pin mounted on said slidable member and extending transversely thereto, and said coacting means comprises a depending fork-shaped member, the forks of which straddle said slidable member and have inclined camming surfaces at their lower ends adapted to interengage with said transverse pin to move said slidable member into proper position for the assembling operation.

3. The combination of a female die, a slidable member having a recess adapted to receive a shell and adapted to be moved relative to said female die in a direction transversely of the male-die-receiving aperture of the female die to position the recess thereof beneath such aperture, a male die adapted to coact with said female die to punch a blank from a strip of material and to deposit it at the end of its punching stroke in a shell carried by said slidable member, and means mounted on said female die adapted to feed the strip in the same direction as the direction of movement of said slidable member in bringing the recess thereof beneath the aperture of said female die, said means being connected to and controlled by said slidable member.

4. The combination of a female die, means for feeding a strip of metallic material to said die, means for delivering a shell beneath the male-die-receiving aperture of the female die, and a male die adapted to coact with said female die to punch a blank from the strip of material and to deposit it at the end of its punching stroke into the shell positioned beneath the aperture of the female die, the working end of said male die

having an intermediate advanced working portion located in the central region of said working end and tapering away from either side of such portion to cause said die to progressively cut the blank from the strip and at the same time and during such cutting action to bend the metallic material of said blank to a predetermined shape prior to its insertion into the shell.

5. The combination of a female die, a slidable member underlying said female die and having a recess in its upper surface adapted to receive a shell, said member being movable longitudinally forward and backward in directions transversely of the male-die-receiving aperture of the female die and adapted to be advanced from a place for loading a shell into the recess thereof to a position where the recess thereof is positioned beneath such aperture, stop means for limiting the forward movement of said slidable member at a point where the recess thereof will be positioned directly beneath the aperture of said female die, and a male die adapted to coact with said female die when the recess of said slidable member is positioned beneath the aperture of said female die, to punch a blank from a strip of material and to deposit it at the end of its punching stroke into a shell carried by said slidable member, the working end of said male die having an advanced working portion and tapering away from either side of such portion to cause the die to progressively cut the blank from the strip and at the same time bend it to a predetermined shape.

6. The combination of a female die, a slidable member having a recess adapted to receive a shell and movable relative to said female die in a direction transversely of the male-die-receiving aperture of the female die to position the recess thereof beneath such aperture, a male die adapted to coact with said female die to punch a blank from a strip of material and to deposit it at the end of its punching stroke into a shell carried by said slidable member, fixed means provided on said female die to stop the movement of a movable member, a movable member connected to said male die and adapted normally to coact with said stop means to prevent the operation of said male die, and means connected to said movable member and operable by said slidable member to cause said movable member to be moved to a position where it will not coact with said stop means.

7. The combination of a female die, a slidable member having a recess adapted to receive a shell and movable relative to said female die in a direction transversely of the male-die-receiving aperture of the female die to position the recess thereof beneath such aperture, a male die adapted to coact with said female die to punch a blank from a strip of material and to deposit it at the end of its punching stroke into a shell carried by said slidable member, fixed means provided on said female die to stop the movement of a stop member, a pivotally mounted member connected with said male die, a stop member carried by said pivotally mounted member and adapted to coact with said stop means to prevent the operation of said male die, a portion of said pivotally mounted member being adapted to be positioned in the path of movement of said slidable member in the retracted position of the male die and operable by said member to prevent the interengagement of said stop member with said fixed stop means when the male die is operated.

MAX H. LANGE.