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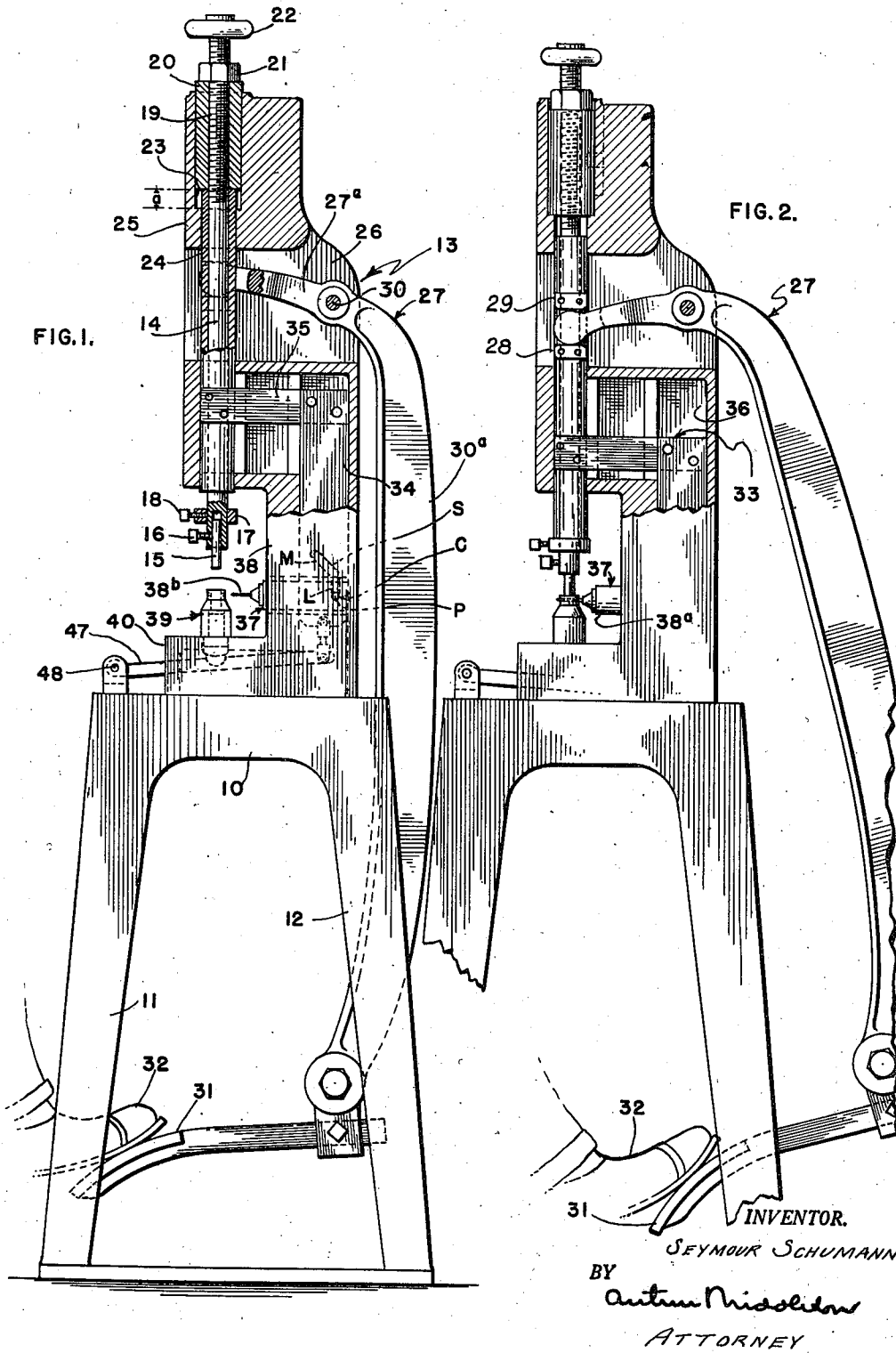
S. SCHUMANN

2,359,798

BEAD MACHINE

Filed Jan. 8, 1943

2 Sheets-Sheet 1



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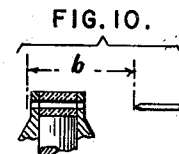
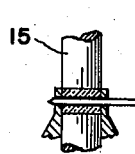
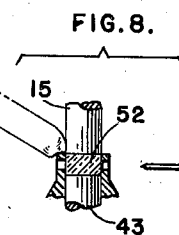
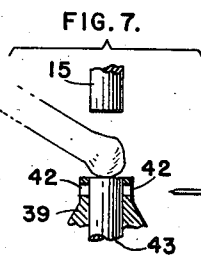
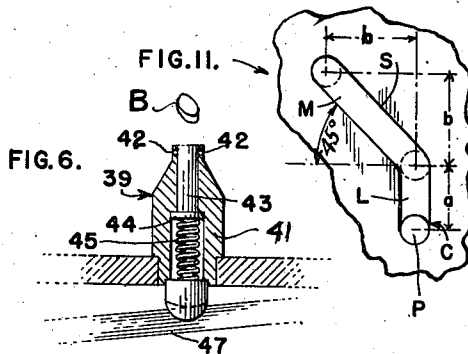
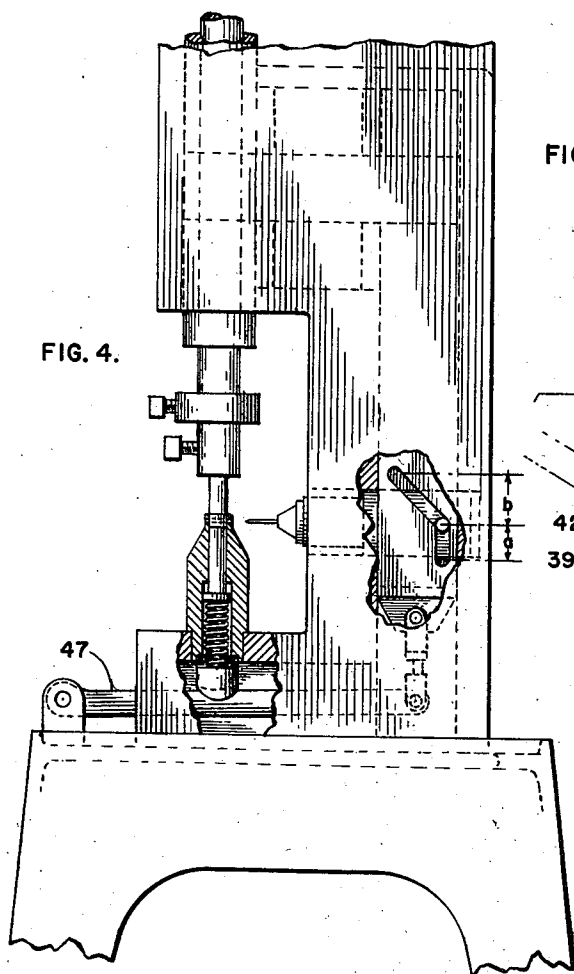
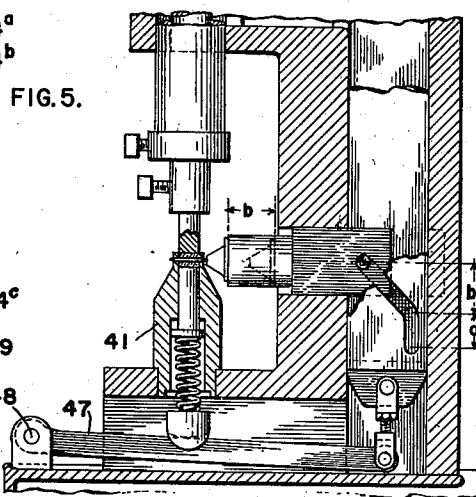
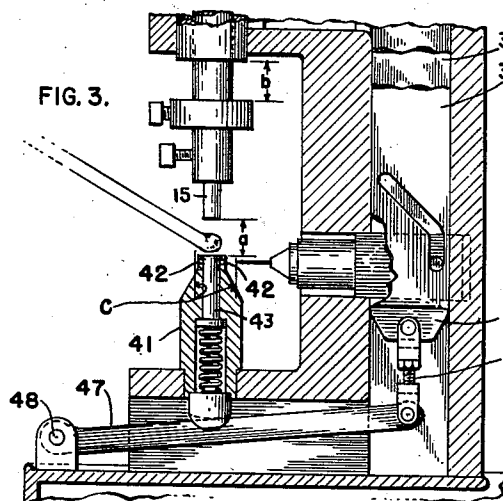


FIG. 11.

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2,359,798

BEAD MACHINE

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10 Claims. (Cl. 49—35)

This invention relates to a method and apparatus for making glass beads.

One of the objects of this invention is to produce each bead individually and complete with bore in a forming operation.

Another object is to provide a machine for forming each bead complete with bore and ejecting the bead from the machine, by a simple mechanical operation, such as the depression and release of an operating member or lever.

According to the method a quantity of vitreous substance in a hot moldable state is forced or pressed into and confined in a mold, whereby there is formed the body of the bead, and provision is made for a piercing element or needle to penetrate the form as well as the formed body of the bead material therein while the latter is still sufficiently hot and moldable to create the bore, meanwhile maintaining yieldable pressure upon the body of the bead.

The operating principle of the machine for practicing this process calls for a first operating phase whereby an axially movable stamping member forces the hot moldable material into a mold against the pressure of a yieldable bottom portion thereof; and a second immediately following phase of the operation, in which a piercing element or needle penetrates the thus formed bead in a direction at right angles to the path of the stamping member, making the bore while the material is still sufficiently hot and moldable. The movements of the stamping member and of the piercing member are mechanically coupled in a manner to insure their proper timing and coordination.

One feature of the machine is that the respective movements of the stamping member and of the piercing element are coupled by a lost motion device. While the stamping member is being advanced, lost motion is effective to allow the piercing element to remain inactive. The stoppage of the stamping member marks the beginning of the second phase of the operation during which another lost motion allows the stamping member to remain in its bead confining position, while the piercing member is being advanced to make the bore. In a final or return phase of the operation the piercing member is first retracted, then the stamping member retracts while the finished bead which by that time has sufficiently cooled off, is ejected.

According to a more specific feature, the stamping member is maintained under yieldable pressure and is allowed to advance from a raised

inoperative position to a bead confining lower position. A movable actuating member cooperatively interconnects the stamping member with the piercing element in a manner to provide lost-motion connection with the stamping member on the one hand, and with the piercing element on the other hand. The bead producing operating cycle is realized by a pre-determined movement of the interconnecting actuating member.

According to another feature, a bead ejecting device is operatively connected with the interconnecting member.

According to one embodiment the interconnecting actuating member has lost-motion connection with the stamping member through a sleeve portion surrounding the stamping member and capable of limited axial movement thereon. The piercing element is controlled by the interconnecting actuating member through slot-and-pin or equivalent camming connection whereby the piercing element is advanced while the stamping member remains in its bead-confining position. The forming and piercing of the bead is effected by the two consecutive operating phases which constitute the working stroke of an actuating lever, while the finished bead is ejected incident to the return stroke of the actuating lever.

The invention possesses other objects and features of advantage, some of which with the foregoing will be set forth in the following description. In the following description and in the claims, parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit. In the accompanying drawings there has been illustrated the best embodiment of the invention known to me, but such embodiment is to be regarded as typical only of many possible embodiments, and the invention is not to be limited thereto.

The novel features considered characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings in which:

Fig. 1 is a part-sectional side view showing the machine in inactive condition as at the beginning of the operation.

Fig. 2 is a similar part-sectional view of the machine, however, showing the working parts in

position according to the end of the working or bead-producing stroke of the actuating lever.

Fig. 3 is a somewhat enlarged longitudinal section of the machine similar to that shown in Fig. 1, showing a hot moldable daub of the bead material placed on the machine at the beginning of the operation.

Fig. 4 shows the working parts in the position which they occupy at the end of the first phase of the operation, when the bead has been formed but not yet pierced.

Fig. 5 shows the parts in the position corresponding to the end of the second operating phase when the formed bead has been pierced, the position being the same as in Fig. 2.

Fig. 6 is a detail section of the mold, illustrating the ejection of the finished bead.

Figs. 7, 8, 9, 10 and 11, are diagrammatic detail sections indicating various operating positions of the working parts relative to each other in various stages of the bead forming and piercing operation.

The machine according to this embodiment comprises a base frame 10 having leg portions shown as at 11 and 12, and the machine frame 13 proper mounted upon and supported by the base frame. Vertically slidable in the machine frame is a stamping member or rod 14 in the lower end of which is held fixed a stamping die 15 as by set-screw 16. An adjustable stop collar 17 is provided upon the lower end portion of the stamping member 14, and it is adjustable by way of the set-screw 18. The upper end portion of the stamping member is provided with a length of thread 19 upon which engages a cylindrical body 20 serving as a weighting body, and it may be adjusted by screwing up or down upon the stamping member 14, and locked in adjusted position as by a lock nut 21. Fixed to the extreme upper end of the stamping member is a hand knob 22 or the like. The weighting body is vertically slidable with respect to the machine frame as in the corresponding depression 23 in the top portion of the frame.

Axially slidable upon the stamping member 14 is a sleeve 24, and its relative sliding movement is confined between limits represented by the weighting body 20 above, and by the collar 17 below, and it is herein termed the lost motion sleeve. The sleeve 24 is slidable in an overhanging head portion 25 of the machine frame, which has a transverse opening or passage 26 through which an actuating lever 27 may impart up and down motion to the sleeve. That is to say, the actuating lever 27 has a bifurcated upper end portion straddling the sleeve, the short arm 27a of the lever having camming engagement with the sleeve by way of guide blocks 28 and 29 provided on the sleeve. The actuating lever 27 is fulcrumed on the machine frame as at 30 and has a downwardly extending long portion 30a which is provided at the lower end with a treadle 31 for the operator's foot shown at 32.

The sleeve 24 constitutes part of an actuating member designated as a whole by the numeral 33 which comprises as further component parts a vertical portion or member 34 rigidly interconnected with the sleeve by a horizontally extending portion or member 35. The vertical portion 34 and the horizontal portion 35 of the actuating member 33 move and are guided in a corresponding hollow portion 36 of the machine frame. The vertical portion 34 in fact is composed of a pair of identical flat component members 34a and 34b (see Fig. 3), which are inter-

connected at their top ends by the horizontal member 35, and at their lower ends by a lug portion 34c or the like.

A piercing member 37 is horizontally movable in an intermediate portion 38 of the machine frame, and comprises a body portion 38a slidably guided in the frame, carrying a bead piercing needle 38b. The horizontal movement of the piercing member 37 is transverse to the direction of movement of the stamping member 14, and its movement is controlled and timed through the vertical movement of the vertical portion 34 of the actuating member 33 with which it is operatively connected by a pin-and-slot connection C. This movement controlling connection is herein shown to comprise a pin P provided at each side of the piercing member 37 and lodging in a corresponding slot S provided in each of the component members 34a and 34b of the vertical member 34.

The slot S comprises a vertical or loss motion portion L and an inclined movement producing or active portion M.

Thus it will be seen that the actuating member 33 operatively interconnects the stamping member 14 with the piercing member 37, and it is therefore herein termed the interconnecting actuating member; and it will further be seen that this member 33 has a lost-motion-connection at one end with the stamping member 14 by way of the sleeve 24, and with the piercing member 37 at the other end by way of the pin-and-slot connection C. Below there will be explained how these connections are functionally correlated so that the component phases of the operating cycle, that is bead stamping, bead-piercing, and bead ejecting are realized in the proper sequence during but one reciprocation of the interconnecting actuating member 33.

The stamping member 14 and the piercing member 37 sequentially converge upon a mold 39 fixed upon a lower or front portion 40 of the machine frame. The mold comprises a hollow body portion 41 provided with holes 42 to present horizontal passage for the bead piercing needle 38b. The mold is functionally connected with a bead ejecting device which comprises a yieldably mounted bottom portion in the form of a plunger 43 having a stop shoulder 44 to limit its upward or bead ejecting motion in the mold body portion 41. The plunger 43 is under the pressure of a compression spring 45 confined between the bottom face of the plunger 43 and the upper face of a lug 46 provided upon and intermediate the ends of an arm 47. The arm 47 is pivotally mounted as at 48 upon the top of the base frame 10, and the opposite end is connected by means of a link 49 with the lug portion 34c of the interconnecting actuating member 33.

The operation of the machine is as follows:

At the beginning of the operating cycle the machine is in inoperative condition as in Fig. 1, where the die 15 as well as the piercing member 37 are shown in their retracted position. In that condition the weight of the then released long arm 30a of the actuating lever 27 due to its weight holds the actuating member 33 as well as the stamping member 14 in raised position, since the short arm 27a engages the sleeve portion 24 which in turn engages and supports the weighting body 20, thereby holding the stamping member 14 in its raised position. This upper limit position of the actuating member 33 is due to the pin P of the piercing member 37 engaging the

lower end of the slot S in vertical portion 34 of the actuating member 33.

According to Figs. 3 and 7 a hot moldable daub 50 of glass at the end of a glass rod 51 is then placed on the top face of the plunger 43 in preparation to its being pressed into the mold 39. At this time the position of the operating elements is still the same, that is inactive. Next, by depressing the treadle 31 the operator's foot initiates the downward movement of the sleeve 24, that is of the entire actuating member 33. The complete downward stroke of the member 33 comprises a first phase or portion (see Figs. 4 and 8), which permits the stamping member 14 to drop a distance a as determined by the weighting body 20 engaging the bottom of the depression 23 in the top of machine frame. The distance a is so adjusted that the die 15 in its lower limit position will have forced a suitable and substantially predetermined portion of the glass daub 52 into the mold 39 against the pressure of the yielding plunger 43, and the die stopped substantially even with the top face of the mold. This first phase corresponds to about half the downward stroke of the actuating member 33. In this way the body 53 of a flat cylindrical or pill-shaped bead will have been formed and be held thus confined for the remainder or second phase or half of the downward operating stroke, during which the piercing of the bead body takes place while the formed material is still sufficiently hot and moldable.

It should be noted that, when the stamping member 14, together with the actuating member 33 will thus have moved part way downward together, the slot S will have moved to the Fig. 4 position which brings the pin P of the piercing member to the upper end of the vertical or lost-motion portion L of the slot, so that up to this point the piercing member 37 will have remained inactive or retracted as at the beginning.

Further continued depression of the treadle 31 will move the actuating member 33 through the second phase or half of its downward stroke. During this second phase the stamping member 14 will remain stationary, as the sleeve 24 moves further down and relative to the stamping member, but it will forcibly advance the piercing needle into and through the holes 42 of the mold 39 and thus pierce the formed bead body 52 until the pin P will have reached the upper end of the inclined portion M of the slot S (see Fig. 5), which represents the downward limit of the movement of the actuating member 33. If the portion M of the slot be inclined under a 45° angle, then it will be seen that at the end of this second phase the actuating member will have moved an additional distance b the same as the piercing member 37 has advanced from its Fig. 4 to its Figs. 5 and 9 position. This position incidentally is the same as the one shown in the more complete view of Fig. 2 of the machine.

Fig. 10 shows the condition of the bead immediately preceding its ejection, that is just before the finished bead has given off enough heat to the surrounding mold, whereby it shrinks sufficiently for the upward resilient pressure of the plunger to overcome friction between the bead and the mold, whereupon the bead is ejected.

It will be noted that during the first and second phase of the operation just described, that is during the descent of the actuating member 33 from its Fig. 1 to its Fig. 2 position, the arm 47 of the bead ejecting device is also depressed, thereby partially de-compressing the spring 45,

which permits of adequate yield of the plunger 43. Now when the treadle 31 is released by the operator, its weight will cause the long arm 30a of the actuating lever 27 to return from its Fig. 2 to its Fig. 1 position, and thereby move the actuating member 33 back up to its initial position, which return movement causes first the sideward withdrawal of the piercing member 37 from the mold 39, and then upward withdrawal of the stamping member 14. The arm 47 swings upward concurrently with the upward return movement of the actuating member 33, thereby compressing the spring 45, thus placing increased pressure upon the plunger 43, eventually causing the ejection of the finished bead B (see Fig. 6).

I claim:

1. A machine for making glass beads comprising a frame, an upstanding mold provided on a lower portion of said frame, said mold having a resiliently yieldable bottom portion, a stamping member mounted for up-and-down sliding movement relative to an upper portion of said frame and adapted to stamp hot moldable bead material into said mold against the pressure of said yieldable bottom portion, and thereby effective to form the bead, a piercing element mounted for horizontal movement on an intermediate portion of said frame and adapted to pierce the formed body and to be withdrawn therefrom while the bead material is still sufficiently moldable and while being held confined by said stamping member, and actuating means operatively interconnecting said stamping member and said piercing member for effecting the proper sequential operation thereof, which actuating means comprise an actuating member vertically slidable upon said frame for a predetermined length of stroke, and having at its upper end portion a first lost motion actuating connection with said stamping member, effective during a first portion of the downward stroke of the actuating member to permit downward bead forming movement of the stamping member to a lower limit bead confining position, and effective during the remainder of said downward stroke to permit said stamping member to remain in said bead confining position, said actuating member having at its lower end portion a second lost motion actuating connection with said piercing member, effective during said first portion of said downward stroke of the actuating member to retain said piercing member in withdrawn position, and effective during said remainder of said downward stroke to advance said piercing member horizontally into the bead, said first and second lost motion connections also being effective during the upward return stroke of said actuating member first to withdraw said piercing member from the bead while the stamping member holds the bead confined, and then to lift the stamping member to permit ejection of the bead from the mold, and means for reciprocating said actuating member.

2. A machine according to claim 1, in which said means for reciprocating the actuating member comprises a foot operated lever fulcrumed on said frame, and having a short and a long arm, a camming operating connection between said short arm and the actuating member, said long arm having means for the actuation of the lever by foot.

3. A machine according to claim 1, in which said first lost motion actuating connection comprises a sleeve portion constituting a fixed part of said actuating member, and surrounding and

vertically slidable upon said up-and-down movable stamping member, whereby said sleeve portion is slidably guided in said frame, and said stamping member slidably guided in said sleeve portion.

4. A machine according to claim 1, in which the second lost motion actuating connection comprises a slot-and-pin connection between the actuating member and the piercing element, the slot having a lower vertical portion whereby the pin and thus the piercing member is allowed to remain stationary in withdrawn position during said first portion of the downward stroke of the actuating member, said slot further having an upper inclined portion whereby said pin and thus said piercing member is advanced horizontally during said remainder of the downward stroke of the actuating member.

5. A machine according to claim 1, in which said yieldable bottom portion of the mold constitutes a part of a bead ejecting device comprising a substantially horizontally extending arm one end of which is pivotally mounted on said frame, and the other end of which is movably connected with the lower end portion of said actuating member, so as to swing in harmony with the up and down movement of the actuating member, and a compression spring interposed between an intermediate portion of said arm and said bottom portion of the mold.

6. A machine according to claim 1, with the

addition that the stamping member is weighted.

7. A machine according to claim 1, with the addition that the upper end portion of said stamping member is provided with a thread, and that a correspondingly tapped cylindrical weight member is concentric with said stamping member and vertically adjustable along said thread.

8. A machine according to claim 1, with the addition of an adjustable stop member mounted upon the upper end portion of said stamping member, and engageable by the upper end portion of said actuating member.

9. A machine according to claim 1, with the addition of a stop member vertically adjustable upon the lower end portion of the stamping member and disposed below said first lost motion actuating connection.

10. A machine according to claim 1, in which said actuating member comprises an upper tubular sleeve-like portion surrounding and vertically slidable upon said stamping member along a portion between the ends thereof, and constituting a part of said first lost motion connection, a lower vertical portion extending parallel to and horizontally spaced from said tubular portion, and constituting a part of said second lost motion connection, and a horizontal portion fixedly interconnecting said upper tubular portion with said lower vertical portion.

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