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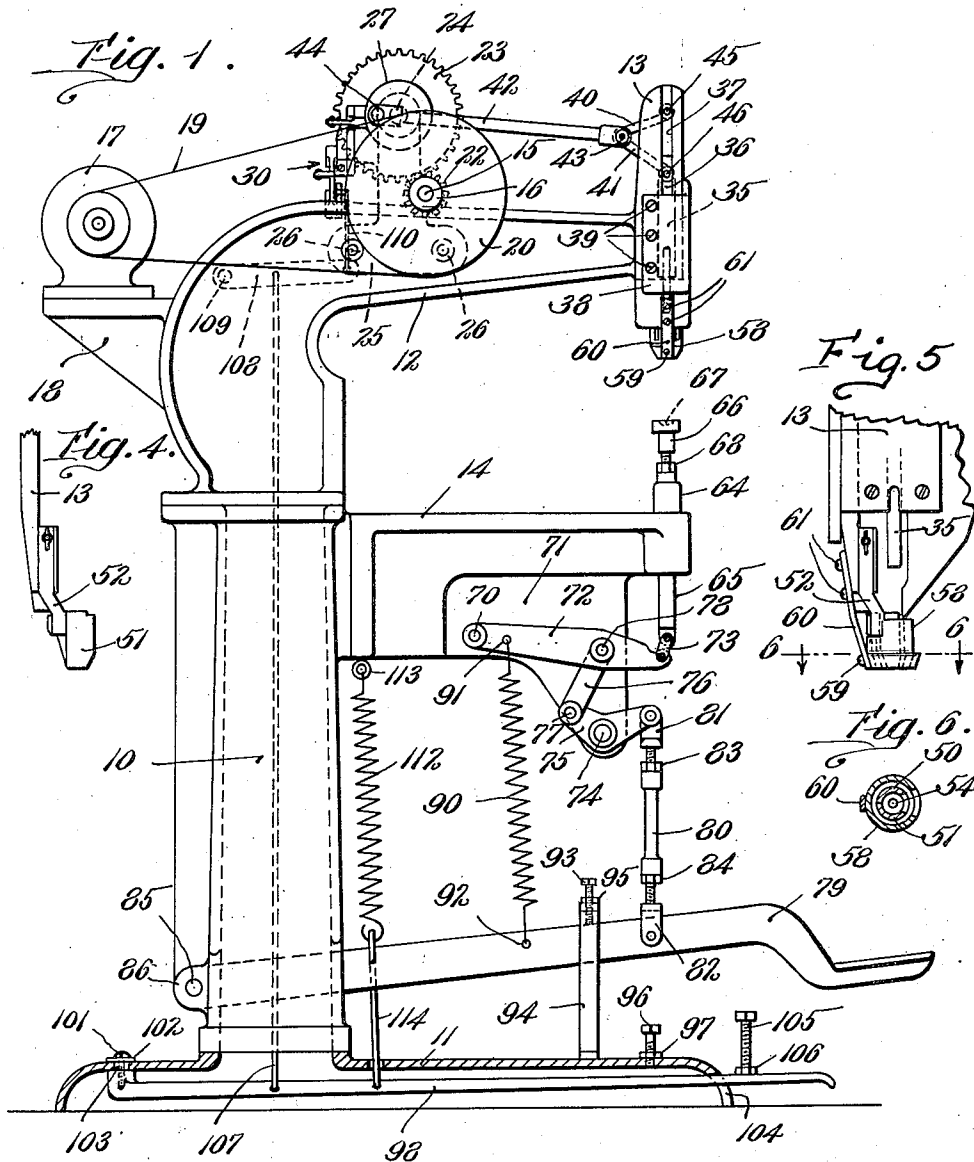
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RIVET AND CAP SETTING MACHINE

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2 Sheets-Sheet 1



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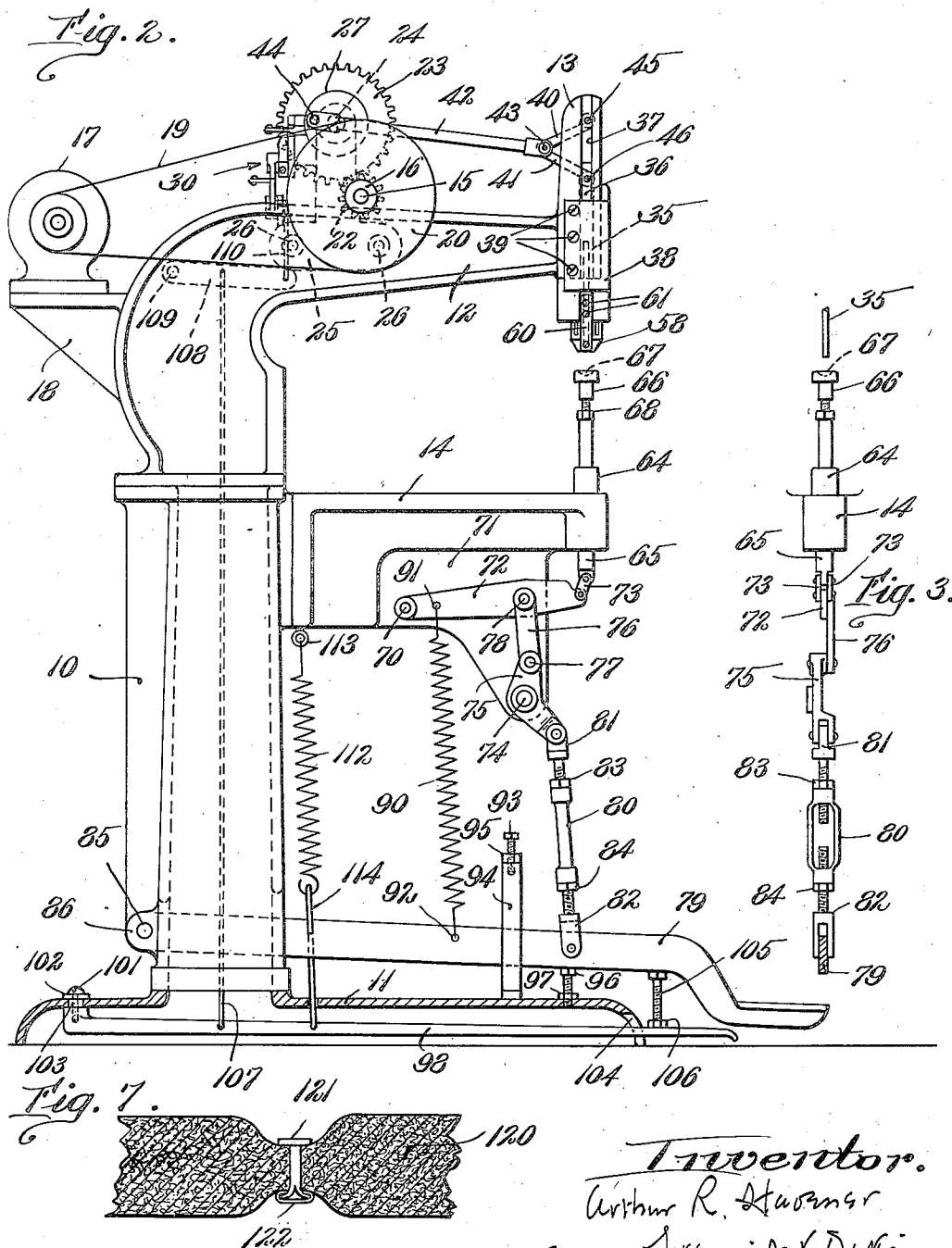
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UNITED STATES PATENT OFFICE

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RIVET AND CAP SETTING MACHINE

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5 Claims. (Cl. 218-2)

This invention relates to riveting machines and more particularly to a machine of that character designed for clenching rivets in caps in very thick work such as mattresses, cushions and similar articles.

In work of this character, it has been customary to set the rivets at regular spaced intervals and to compress the work at these points by the rivets in order to prevent the filling from shifting or bunching in the cover when subjected to use. Heretofore, the rivet has been driven through the work and clenched in a cap on the bottom side of the work, the head of the rivet being used for compressing the work. In this operation, the head of the rivet pulls the fabric cover on the top face of the work downwardly in compressing the filling which imposes a strain on the cover so that it is sometimes torn around the head of the rivet during the clenching operation. Furthermore, the general result of this method is to weaken the fabric cover around the heads of the rivets and sometimes around the caps and to develop after short use a tendency in the mattress or cushion for the cover to break away from the rivets or caps. This tendency is especially noticeable where the cover is not of the best material.

It has heretofore been customary to use foot power machines for this class of work but the heavy pressure required to be exerted on the foot treadle by the operator has made the work extremely arduous and has in consequence reduced the speed of operation.

The main object of my invention is the provision of a simple, compact and efficient riveting machine for operating on this class of work which will eliminate the disadvantages above pointed out.

A more specific object of the invention is the provision of means in a riveting machine for first compressing the work and then driving the rivet through the work while it is held compressed and clenching it in a cap on the bottom face of the work.

A further object is the provision of a machine in which the work is compressed by a preliminary depression of a foot treadle and the rivet is then set by power, the machine being started by a further depression of the treadle.

Another object is the provision of more efficient means for compressing the work so that a comparatively light pressure only is required on the foot treadle and the strain on the operator is eliminated.

Other objects will be in part obvious and in part described hereinafter.

My invention contemplates a machine in which the work is first compressed by the operation of a foot treadle and the rivet is, preferably driven by a power mechanism set in action by a further depression of the treadle, which carries it through the compressed work and clenches it in a cap on the bottom face of the work.

One of the important features of the invention resides in providing means for compressing the work before the rivet is driven which require a minimum of exertion on the part of the operator thereby eliminating fatigue. The preferred form of this means includes a vertically movable anvil adapted to hold a cap and upon which the work is placed, a fixed member such as a presser ring, against which the work is compressed, a foot treadle and lever connections between the treadle and the anvil for raising the latter and locking it in final position when the former is depressed. These connections are so arranged that the force exerted on the treadle is multiplied in the compressing force exerted by the anvil.

Another feature of the invention consists in providing means whereby after the work has been compressed by the preliminary depression of the treadle, a further depression operates a clutch to start the machine in operation for driving the rivet through the work and clenching it in the cap. Since the work support is locked in its raised compressing position, all of the downward strain imposed upon it by the driving of the rivet is sustained by certain portions of the lever connections so that it is not transmitted to the treadle.

In the accompanying drawings, Figure 1 is a side elevation of a riveting machine constructed and adapted to be operated in accordance with my invention, the parts of the machine being shown in normal position with the work support lowered for receiving the work and the treadle raised; Fig. 2 is a similar view of the machine showing the work support raised and locked in compressing position and the treadle depressed to start the machine in operation for driving the rivet; Fig. 3 is a front elevation of the work support, treadle and lever connections looking from right to left in Fig. 2; Fig. 4 is a side elevation of the rivet holder; Fig. 5 is a front elevation on an enlarged scale looking from right to left in Fig. 1 of the rivet driving mechanism and the fixed presser foot ring; Fig. 6 is a cross-sectional view on line 6-6 in Fig. 5 looking downwardly showing the relation between the rivet holder and the fixed presser foot ring; and Fig. 7 is a vertical

sectional view of a portion of the work showing a rivet and cap clenched therein.

Referring to the drawings, the frame of the machine comprises a column 10 mounted on a base 11 and having affixed to its top an overhanging or upper arm 12 carrying on its end a vertical head 13. Extending outwardly from the head of the column and in alignment with the upper arm is a lower, horizontal arm 14. The former arm carries the rivet feeding and driving mechanisms and the latter arm, the work support and the treadle connections for imparting thereto vertical movement.

A main shaft 15 is journaled in suitable bearings 16 on the upper arm 12 and is adapted to be rotated from a motor 17 mounted on a bracket 18 on the arm through the medium of a belt 19 and pulley 20 fixed to said shaft. A pinion 22 fastened to the main shaft meshes with an idler gear 23 on a shaft 24 journaled in a bracket support 25 secured to the upper arm by bolts 26. The idler gear 23 forms one member of a clutch, the other member 27 of which is fixed to the shaft 24. The two members 23 and 27 are clutched together as one piece by suitable mechanism adapted to be operated by a treadle in a manner to be hereinafter explained. This mechanism is indicated generally at 30 in Figures 1 and 2 but is fully shown and described in a prior application for United States Letters Patent for Riveting machines, filed by me November 20, 1934, Serial No. 753,853 to which reference may be made for a more particular description.

For driving the rivets during the setting operation, a driver 35 is fastened to the lower end of a slide 36 guided in ways 37 in the head 13 of the frame and held therein by a face plate 38 secured to one side of the head by screws 39. A vertical reciprocatory motion is imparted to the slide by a pair of toggle links 40 and 41 which are both connected to one end of a rod 42 by a pivot pin 43, the other end of the rod being pivotally connected to a crank pin 44 in the clutch member 27. One link 40 is pivotally connected to a pin 45 fixed in the head 13 and the other link 41 is pivotally connected to a pin 46 in the slide 36. When the clutch member 27 is rotated, the slide 36 and driver 35 are given a vertical reciprocatory movement.

The rivets are fed from a hopper down a raceway in the usual manner to a rivet carrier comprising a pair of jaws 50 and 51 (Fig. 6) supported respectively on springs (only one, 52, of which is shown) fastened to the head 13 of the frame (Fig. 5). The jaws are recessed to form a pocket 54 adapted to receive and hold a headed rivet in position to be engaged by the driver 35 on its downward movement and the springs permit the jaws to separate to allow the rivet to be driven out of the carrier into the work. The hopper and raceway are not shown in the drawings since these members are both of a construction and mode of operation well known to those skilled in the art.

Surrounding the rivet carrier is a presser foot 58 in the form of a collar or ring which is fastened in fixed position by a screw 59 to the lower end of a bar 60 which in turn is fastened to the head 13 of the frame by screws 61. The presser foot 58 serves as a fixed member against which the work may be compressed and its interior diameter is sufficient to prevent interference with the separation of the jaws of the rivet carrier when the rivet is passing out of the carrier and into the work under the impetus of the driver. The

presser foot 58, as shown, has a downwardly tapering or conical shaped lower portion conforming generally to the depressed cover and enabling the same to ride thereon to a greater or less extent.

For compressing the work before the rivet is set, I provide a work support vertically reciprocable in alignment with the driver 35 and adapted to be raised by treadle operated means from a normally lowered position in order to compress the work against the fixed presser foot. One form of means for accomplishing this end comprises the following. Slidably mounted in a vertical sleeve 64 fixed in the end of the lower arm 14 is a work support preferably made in two parts, a round bar 65 having threaded into its upper end a stud 66, the expanded top of which is provided with a shallow recess 67 adapted for holding a cap and for serving as an anvil. The stud 66 may be held in adjusted position in the bar by a set nut 68.

Pivotally mounted at one end on a pin 70 set in a depending web portion 71 of the lower arm 14 is a lever 72 which is pivotally connected at its other end to the lower end of the work support bar 65 by a pair of parallel links 73. Below the lever and pivotally mounted on a pin 74 in the web 71 is a bell-crank lever 75, one arm of which is pivotally connected to the said lever 72 by a link 76 and pins 77 and 78 and the other arm of which is pivotally connected to a foot treadle 79 by a link 80. The latter link is of the turnbuckle type comprising a central member designated as 80 and two end members 81 and 82 having oppositely threaded shanks engaging threaded holes in the two ends of the member 80 so that when that member is turned the link is either shortened or lengthened according to the direction in which it is turned. Set nuts 83 and 84 hold it in adjusted position.

The foot treadle 79 is pivotally mounted at its rear end on a pin 85 between ears 86 formed on the rear face of the column 10 which is provided with a suitable opening for receiving the rear end of the treadle. A spring 90 under tension, having its two ends hooked into holes 91 and 92 in the lever 72 and foot treadle 79 draws these two members together and holds the latter normally in a raised position against a stop 93 and the former, together with the work support, normally in a lowered position. The stop 93 is in the form of a screw threaded through the laterally turned top of an upright guide bar 94 and is held in adjusted position by a set nut 95. By adjusting the stop, the raised position of the foot treadle may be varied within certain limits and thereby the lowered position of the work is similarly varied. A stop 96 threaded into the base 11 and held in adjusted position by a set nut 97 limits the downward movement of the foot treadle.

For starting the machine in operation to set a rivet after the work has been compressed, a starting lever 98 is mounted below the foot treadle and in position to be operated by it at the end of its downward movement. The starting lever is preferably arranged in the base 11, its rear up-turned butt end being mounted on the shank of a headed screw 101 which is supported loosely by a washer 102 in a hole 103 in the base. The front end of the starting lever projects outwardly through a vertical slot 104 in the base and is provided with an upright bolt or screw 105 adapted to be engaged by the foot treadle when depressed. The bolt 105 is threaded into the starting lever

so that it may be adjusted therein for regulating the time of its operation, and a set nut 106 secures it in adjusted position.

The starting lever is connected by a rod 107 to a lever 108 pivotally mounted at one end on a pin 109 set in the frame and at its other end connected by a link 110 to the clutch operating mechanism 30 hereinbefore referred to in such manner that when the starting lever is depressed, the clutch mechanism is operated to start the machine. A spring 112 under tension at all times is fastened at its upper end to an eye 113 in the lower arm 14 and at its lower end by a link 114 to the starting lever to hold it in a normally raised inoperative position.

In the operation of the machine, the various parts being normally in the positions shown in Figure 1, the work, a sample of which in the form of a mattress 120 is shown in Fig. 7, is positioned upon the work support at the point at which the rivet and cap are to be set. The operator then depresses the foot treadle which turns the bell-crank lever on its pivot and turns the lever 72 upwardly raising the work support and forcing the mattress against the fixed presser foot 58 to compress it between these two latter members. This compression is rapid during the first downward movement of the treadle and diminishes toward the end of that movement, as the pin 77 is moving over center in relation to the pivotal point of the bell-crank lever. At the end of its downward movement the treadle engages the bolt 105 and depresses the starting lever to operate the clutch which starts the machine for driving the rivet 121 through the compressed portion of the work and for clenching its split ends in the cap 122 on the anvil.

It will be observed that the work is compressed on an area larger than the head of the rivet so that the cover is not strained around the head of the rivet which entirely eliminates the breaking away of the cover when the mattress or cushion is subjected to use.

While the rivet is being driven through the work, the work support, its treadle operated means and the starting lever are in the positions shown in Figure 2, so that any downward thrust on the work support is transmitted from the lever 72 in an approximately straight line to the fixed pivot pin 74 upon which the bell-crank lever is mounted. Since the pin 77 is turned slightly over centers, the bell-crank lever is locked in that position to withstand all downward pressure due to the driving of the rivet. It will also be noted that the connections between the work support and treadle are so fulcrumed as to increase the leverage from the latter to the former so that a relatively light pressure on the treadle is sufficient for all purposes.

It is to be understood that my invention is not to be limited to the precise form herein shown and described since it may be embodied in various other forms of construction within the scope of the following claims.

What I claim is:

1. In a machine of the character described, the combination of a fixed ring member having a downwardly tapering lower portion, a vertically movable work support in vertical alignment with said fixed ring member and normally in a lowered position, a lever pivotally mounted at one end on a fixed support and connected at its other end to said work support, treadle operated means including a bell-crank lever for moving said lever to raise said work support for compressing a

cushion mounted thereon between it and said fixed ring member and means for driving a rivet through said ring and the cushion after it has been compressed and for clenching said rivet in a cap on the bottom face of the said cushion, said ring member serving to hold the top cover of said cushion in position for receiving the rivet without subjecting said cover to strain.

2. In a machine of the character described, the combination of a fixed presser ring, a vertically movable work support in vertical alignment with said fixed ring and normally in a lowered position, a lever pivotally mounted at one end on a fixed support and connected at its other end to said work support, treadle operated means for moving said lever to raise said work support for compressing a cushion mounted thereon between it and said ring and means operated by the further depression of said treadle for driving a rivet through said ring and said cushion after it has been compressed and for clenching said rivet in a cap on the bottom face of the cushion, said ring serving to eliminate the strain on the cover of said cushion around the head of the rivet and said treadle operated means including a bell-crank lever adapted when said work support is in compressing position to lock the same against a downward thrust.

3. In a machine of the character described, the combination of a fixed presser ring, a vertically movable work support in vertical alignment with said fixed ring and normally in a lowered position, a lever pivotally mounted at one end on a fixed support and connected at its other end to said work support, treadle operated means for moving said lever to raise said work support for compressing a cushion mounted thereon between it and said fixed ring, said means including a bell-crank lever adapted to lock said work support when in raised position against any downward thrust, and means for driving a rivet through said ring and said cushion after it has been compressed and for clenching said rivet in a cap on the bottom face of said cushion, said ring serving to eliminate all undue strain on the cover of said cushion around the head of the rivet.

4. In a machine of the character described adapted for tufting cushions, the combination with a fixed rivet carrier comprising a pair of spring jaws for holding a rivet and means for driving a headed rivet from said carrier and through a cushion, of a fixed presser ring surrounding said carrier, means for compressing a cushion against said ring, said ring serving to hold the cover of said cushion in position for receiving the rivet without subjecting said cover to undue strain around the head of the rivet, said compressing means comprising a vertically movable work support for carrying said cushion, said work support being in alignment with said ring and normally in a lowered position, a lever pivotally mounted at one end on a fixed support and operatively connected at its other end to said work support, a foot treadle and a bell-crank lever intermediate said lever and said treadle and operatively connected to both whereby when said treadle is depressed said work support is raised to compress the work against said ring, said bell-crank lever being adapted to lock said work support when in a raised position against all downward thrust.

5. In a machine of the character described adapted for tufting cushions, the combination with a fixed rivet carrier comprising a pair of

spring jaws for holding a rivet and means for driving a headed rivet from said carrier, of a fixed presser ring surrounding said carrier, means for compressing a cushion against said ring, said ring serving to hold the cover of said cushion in position for receiving the rivet without subjecting said cover to undue strain around the head of the rivet, said compressing means comprising a vertically movable anvil for carrying said cushion, said anvil being in alignment with said ring and normally in a lowered position, a lever pivotally mounted at one end on a fixed support and operatively connected at its

other end to said work support, a foot treadle and a bell-crank lever intermediate said lever and said treadle and operatively connected to both whereby when said treadle is depressed said work support is raised to compress the cushion against said ring, said bell-crank lever being adapted to lock said work support when in a raised position against all downward thrust, and a lever for starting said rivet driving means in operation, said lever being operated by a further depression of said treadle after the cushion has been compressed.

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