Nov. 27, 1956 H. MEZGER 2,771,608

MULTI-POINT STAPLING MACHINE WITH PLURALITY OF STAPLING UNITS

Filed Nov. 1, 1954 3 Sheets-Sheet 1

Fig: 1

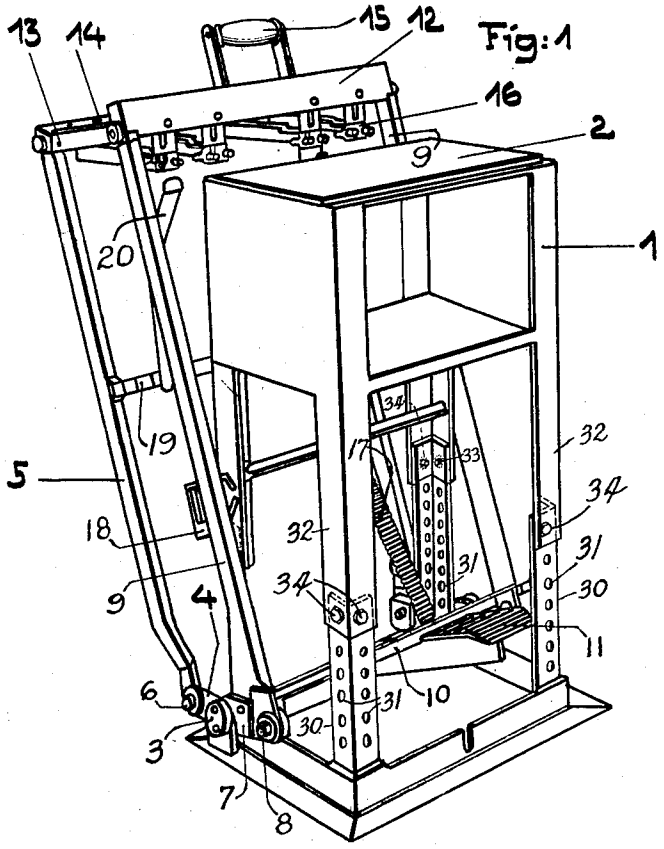
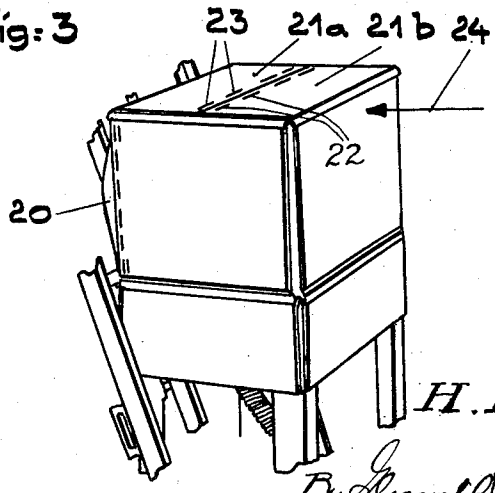


Fig: 3



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Filed Nov. 1, 1954 3 Sheets-Sheet 2

Fig: 2

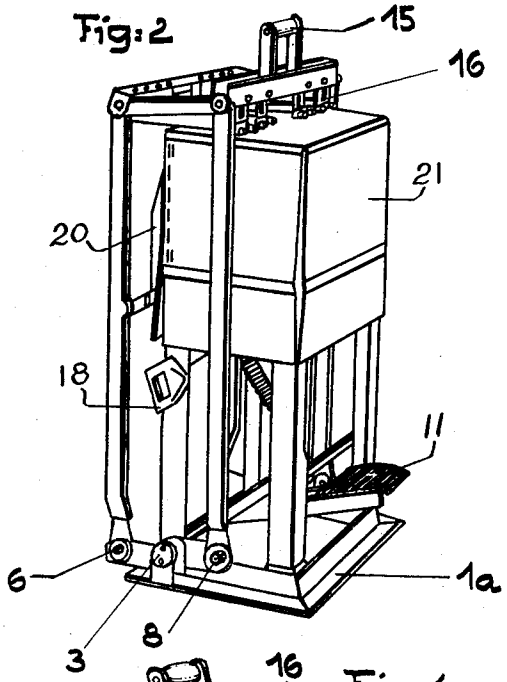
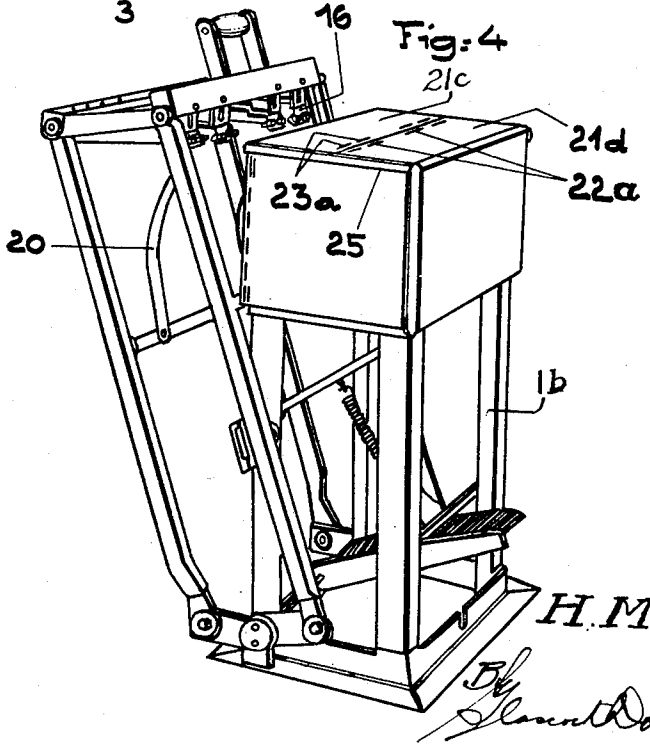


Fig: 4



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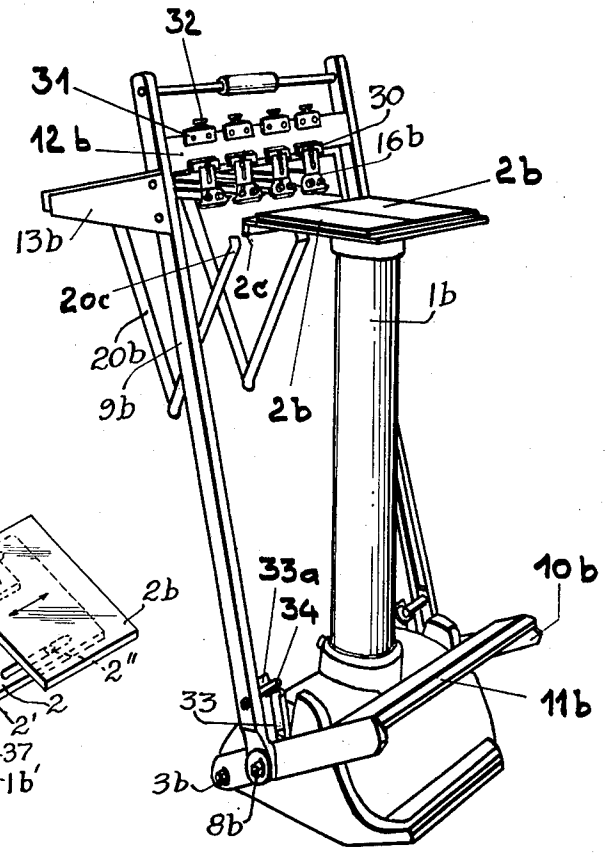
Nov. 27, 1956 H. MEZGER 2,771,608
MULTI-POINT STAPLING MACHINE WITH PLURALITY
OF STAPLING UNITS
Filed Nov. 1, 1954 3 Sheets-Sheet 3

Fig: 5



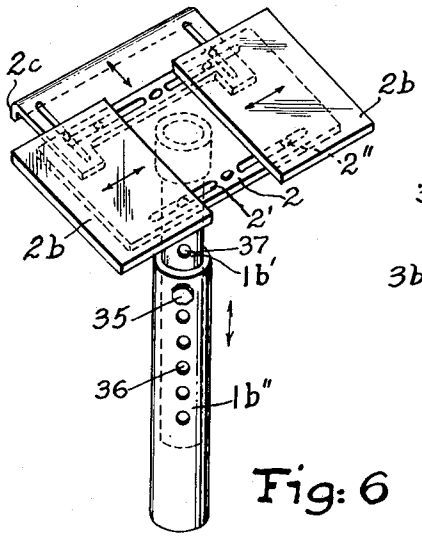


Fig: 6

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MULTI-POINT STAPLING MACHINE WITH PLURALITY OF STAPLING UNITS

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Application November 1, 1954, Serial No. 466,180

Claims priority, application Germany November 4, 1953

8 Claims. (Cl. 1—13)

The general object of the invention is to provide a machine capable of stapling at points distributed over the surface of a workpiece, in a more convenient and efficient manner than has been possible heretofore.

A more specific object of the invention is to provide an improved stapling machine by means of which it is possible to insert a plurality of lines of staples in a workpiece supported on an anvil, without moving the workpiece relatively to the anvil.

Another more specific object of the invention is to provide a machine enabling a plurality of lines of staples to be inserted in a workpiece by a plurality of separate operations without any movement of the workpiece relatively to the fixed parts of the machine during said operations or in the intervals between them.

Further objects of the invention and further features and advantages thereof will be apparent from the following description of embodiments of the invention chosen by way of example, reference being had to the accompanying drawings in which:

Figure 1 is a perspective view of a stapling machine according to the invention;

Figure 2 shows the same stapling machine at the moment when the stapling operation is performed;

Figure 3 shows the stapled bottom of a folding carton;

Figure 4 shows the stapling machine adjusted for closing folding cartons;

Figure 5 shows a further embodiment; and

Figure 6 is a fragmentary view of a portion of the arrangement of Figure 5 illustrating a vertically adjustable table.

The stapling machine shown in Figure 1 has a table 1 mounted on a base plate 1*a* by means of four legs. On the table 1 is supported a steel plate 2 serving as an anvil for stapling operations. The plate 2 is provided with longitudinal grooves, transverse grooves or diagonal grooves, or else made smooth, depending on the nature of the stapling devices and staples used. Levers 4 are rigidly secured to journals 3 of the base plate 1*a*. Swinging levers 5 are pivotally mounted on the levers 4 by means of pivots 6. Levers 7 are mounted to pivot about the journals 3, and swinging levers 9 are pivoted to the levers 7 at 8. The swinging levers 9 are connected at the bottom by a cross-bar 10 on which a treadle 11 is mounted. At the top the swinging levers 9 are rigidly interconnected by a cross-bar 12 pivotally connected to the swinging levers 5 by links 13. The swinging levers 5 are connected together by a cross-bar 14. The cross-bar 12 is provided with a handle 15 by means of which the swinging levers 5 and 9 can be swung about the axes 6 and 8 respectively. Four stapling units 16 are attached to cross-bars 12 and 14. These stapling units all cooperate with the plate 2. A spring 17 urges the foot lever, together with the swinging levers 5 and 9, towards the position shown in the drawing. This position is determined by an abutment 18, so that the machine if not acted on by any force outside itself assumes the

position shown in Figure 1. Two leaf springs 20 are rigidly secured to an intermediate bar 19 interconnecting the two swinging levers 5; the top ends of these springs press against the top edge of the table 1, or against a workpiece placed over the table, when the swinging levers 5 are moved forward. For stapling the bottoms of folding cartons, the latter are placed bottom upwards over the table 1 so that the inside of their bottom rests against the steel plate 2 (cf. Figure 2). The operator then grasps the handle 15 and swings the levers 5 and 9 forwards so that the upper members 16 of the stapling devices are approximately in the middle of the folding carton 21. The swinging levers 9 are now drawn downwards by pressure on the foot lever 11, so that stapling is effected by the stapling units 16 co-operating with the plate 2. It is obvious that stapling does not have to take place only along a certain fixed line. Stapling takes place further forward or further backward, depending on how far forward the handle 15 is pulled. Consequently, surface stapling operations can be effected, i. e. for instance two rows of stapling points 22 and 23 (Figure 3) can be produced one after the other in quick succession, by means of one and the same apparatus, without displacing the anvil and also without displacing the carton. When the handle 15 is pushed forward the top ends of the springs 20 force the folding carton forwards so that its position on the steel plate 2 is fixed. The springs 20 also form an abutment for a pressure which the operator exerts on the folding carton substantially in the direction of the arrow 24. Thus in a simple manner the two flaps 21*a* and 21*b* of the folding carton can be pressed together until they abut against one another. This position can be seen in Figure 3. A stapling machine as shown in Figures 1 and 2 can also be used for closing the filled cartons; for this purpose the table 1 is replaced by a table 1*b* which is lower than the table 1 by the height of the carton, as shown in Figure 4. The carton is then placed with its closed bottom resting on the table 1*b*. Its longitudinal flaps 21*c* and 21*d* can then also be closed by means of the stapling units 16 in a manner known per se. When the folding carton is being closed as shown in Figure 4, also, the springs 20 are used for pushing together the two upper strips 21*c* and 21*d*.

The legs of table 1 are made so that the height can be adjusted. In this connection, the legs are formed in two parts including leg members 30 secured to the base and having a plurality of vertically spaced apertures 31 therein and complementary leg members 32 also provided with apertures 33 in which are engaged bolts 34. The legs 33 overlap legs 30 and by manipulation of the bolts with respect to the apertures 34 and 31 the height of the table can be adjusted. The table top can be made smaller than in the drawing, so that the plate 2 projects beyond the outer contour of the table. It is then possible to replace the plate 2 by smaller plates, so that smaller cartons can also be stapled with the same machine.

Instead of a single plate 2, it is possible to use a plurality of plates each associated for instance with a respective stapling unit 16. In that case the respective plates are displaced on the table 1, just as the stapling units 16 can be displaced on the bars 12 and 14.

It is also possible so to construct the machine that the table 1 together with the folding carton, and not the stapling units 16, are displaced backwards and forwards. In that case, stapling can be effected by movement of the stapling units, just as in the example described above. But it is also possible to effect stapling by upward movement of the table 1, so that in that case the stapling units are swung into the working position and the table 1 performs the stapling movement proper.

Lastly, this arrangement can also be reversed, i. e. the table 1 can be swung into the working position while the stapling units, as in the example illustrated, perform the stapling movement proper. The only essential thing is that the stapling units are displaceable together relatively to the workpiece and that then one of the two parts, either the stapling unis or the anvil, performs the stapling movement. The extent of the relative swinging movement between the two parts is so great that not only stapling along a line, but also stapling distributed over a surface, can be effected.

The relative movement between stapling units and anvil, which in the example described above is carried out with the aid of the swinging levers 5 and 9, can also be effected by any other parallel displacement of the two parts, in which case suitable stationary frame parts must then be provided in the region of the steel plates 2, for guiding the stapling units.

In the embodiment shown in Figure 5, a U-shaped frame consisting of two levers 10*b* rigidly interconnected by a treadle bar 11*b* is adapted to swing about pivots 3*b*. Said frame is resiliently urged towards the upper position shown in the drawing. Swinging levers 9*b* are adapted to swing about pivots 8*b* on the levers 10*b* and are connected at the top by a bar 12*b* on which stapling units 16*b* are mounted. Said units are provided with claws 30 and 31 embracing the bar 12*b* and can be laterally displaced on the bars and clamped in position by setting screws 32. A frame 13*b* protects the rear portion of the stapling devices and carries two leaf springs 20*b* in which hairpin bends are made and of which the ends 20*c* serve to force the carton, which is to be staple, against the table 1*b*. On the table two stapling plates 2*b* are arranged, which can be slid away from one another for the purpose of treating longer cartons. Also, a bar 2*c* can be pulled out from the table to provide a support for wider cartons.

Each of the swinging levers 9*b* carries a rigid pin 34 which in the position shown in the drawing rests in a recess of a support lug 33, so that when the lever 9*b* is in the position shown the treadle bar 11*b* cannot be depressed. If the lever 9*b* is pulled forward by hand, the pins 34 are brought clear of the support lugs so that the treadle bar 11*b* can then be depressed to actuate the stapling devices 16*b*. A rear projection 33*a* of the lug 33 limits the movement of the swinging levers to the rear and prevents the levers 9*b* from falling backwards.

Figure 6 is a fragmentary view which illustrates vertical adjustment of the table, and further illustrates the adjustability of the plates 2*b*. As shown in this figure, the table and its support include an outer column 1*b* having a positioning bolt 35 engaged in one of a plurality of apertures 36 provided in vertically spaced relation in the column. Within the column is slidably positioned an inner column 1*b'*. This column has apertures 37 therein with which bolts 36 cooperate to lock the two columns into vertically adjusted position. The table is secured to and carried on the top of column 1*b'* and as shown includes the plates 2 having slots 2' therein within which are engaged bolt means 2'' removably secured to the under surface of the plate units 2*b*. With this arrangement, by backing off the bolts 2'', the plates 2*b* can be moved toward or away from one another and then secured in adjusted positions. The bar 2*c* is shown extended and is similarly adjusted relative to the plates 2*b* by a slot and clamping bolt arrangement.

I claim:

1. A stapling machine including a substantially vertical anvil carrier, a displaceable frame mounted for movement in a direction substantially at right angles to the stapling direction, stapling means secured to the frame, an anvil secured to said carrier and comprising a plate means having a top surface adapted to support a carton placed thereon, said plate means having a surface extent such as to be cooperable with the stapling means at a plurality of points and a handle connected to the frame for displacing it and the stapling means relative to the plate means and any carton thereon.

2. A stapling machine as claimed in claim 1 in which said plate means comprises a plurality of parts adapted to be adjusted to different positions relatively to one another.

3. A stapling machine as claimed in claim 1 and further including a base, said anvil carrier extending upwardly from said base, said frame including aligned, mutually spaced journal means each disposed adjacent one of the opposite sides of the base, a short lever secured to each journal means and extending in each direction away from said carrier, another support lever mounted to pivot about each journal means, each second-mentioned lever extending in a direction away from the respective first-mentioned levers, an elongated lever pivoted to each short lever to provide two pairs of elongated levers, an upper cross-bar rigid with each pair of elongated levers, link means pivoted at opposite ends to the adjacent ends of the two upper cross-bars so as to interconnect the same, said handle being connected to one of said upper cross-bars, a lower cross-bar rigid with the said pair of elongated levers pivotly connected to said second-mentioned short levers, and a pedal rigid with said lower cross-bar for displacing the said pair of elongated levers longitudinally of their axes to effect stapling.

4. A stapling machine as claimed in claim 1 in which an inverted carton is adapted to be placed on said anvil and a resilient contact pressure device carried by the frame and adapted to press the wall of such an inverted carton against the edge of the anvil when relative movement occurs between the frame and the anvil.

5. A stapling machine as claimed in claim 1 and including a base, said anvil carrier extending upwardly from said base, said displaceable frame including a pair of rigid lever means, an upwardly based U-shaped lever including a base portion in front of said carrier and spaced arms on opposite sides of said carrier pivotally connected to the base, means respectively pivotally connecting the lever means of said pair to the arms of said U-shaped lever between the base portion and the pivotal connections of the arms to the base, a pin on each of said first-mentioned lever means, said pins extending towards one another and being in alignment, a support lug on the base including a projection in the path of movement of each pin to limit movement of the pair of lever means in a direction away from said anvil carrier, and each lug further having a recess therein adapted to accommodate said pins to prevent depression of said U-shaped lever and upon swinging of said frame towards said carrier said pins clear said recesses and the stapling means are positioned above the anvil whereby depression of said U-shaped lever moves said frame and stapling means toward the surface of said anvil to effect stapling of a work piece supported thereon.

6. A stapling machine including a base plate, an anvil rigid with the base plate, a cross-bar mounted for relative movement over the base plate and anvil in two directions at right angles to one another and to the length of the cross-bar, and a plurality of stapling units secured to said cross-bar whereby plurality of lines of staples can be inserted in a work piece supported on the anvil without the necessity of moving the work piece relative to the anvil during stapling.

7. A stapling machine comprising a vertically extending support means, an anvil means carried by said support means and adapted to receive and support an inverted carton the bottom of which is to be stapled, a frame including a portion above said anvil means, stapling means carried by said portion of the frame, means mounting the frame for swinging movement about a pivot axis extending transversely to the longitudinal axis of the stapling direction and means displaceably supporting the mounting means for movement in a plane transverse

to said pivot axis whereby said frame can be displaced to selective positions overlying said anvil means and rocked to actuate the stapling means.

8. A stapling machine including staple driving means and a work supporting anvil means, said anvil means comprising a horizontal flat plate means having a surface extent adapted to cooperate with said staple driving means at a plurality of points in one direction transverse to the plate means, and said staple driving means being mounted for at least selective horizontal movement over said plate means in said one direction whereby stapling can be effected in any position of adjustment of said staple driving means in said one direction.

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