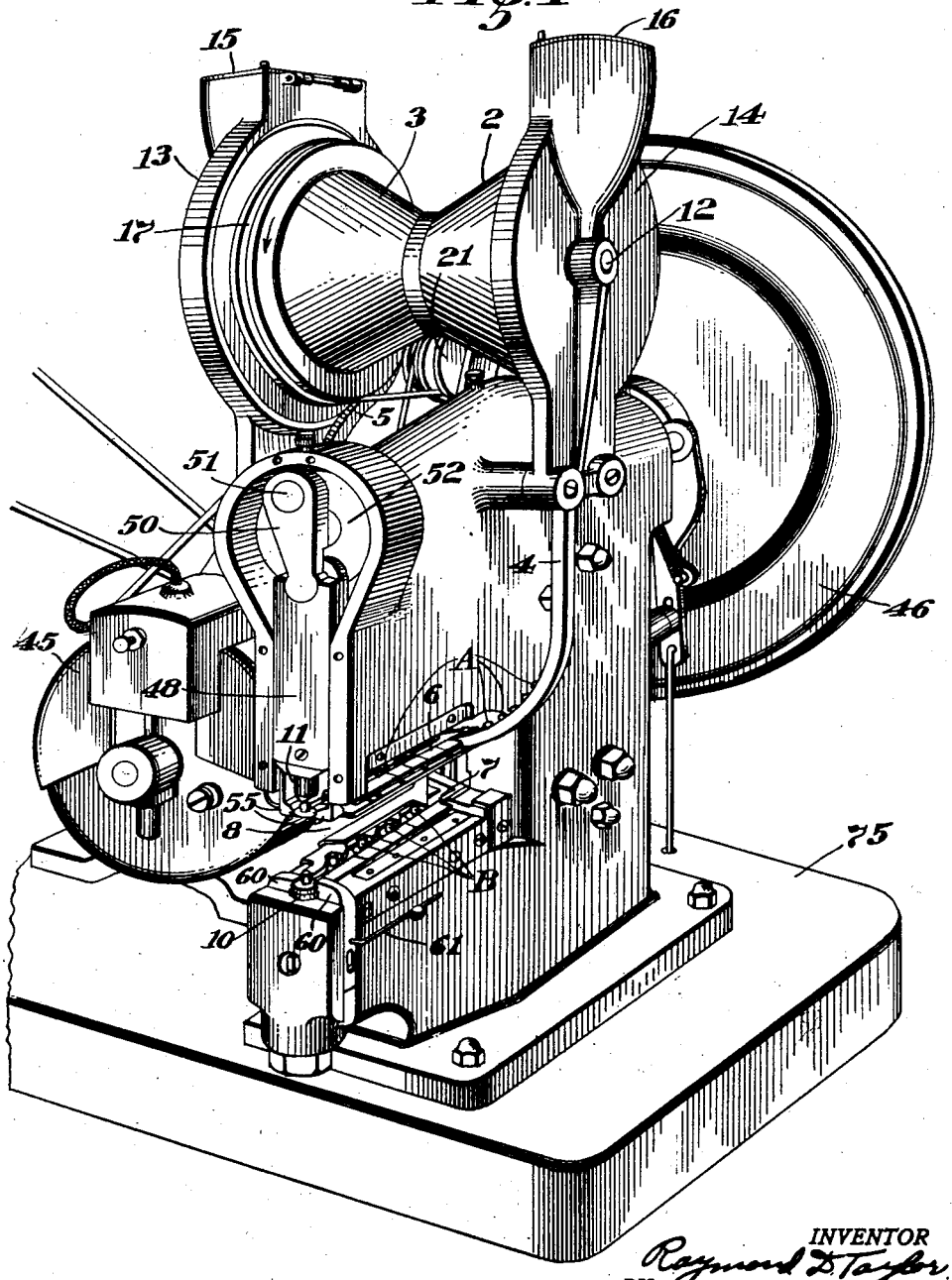
March 11, 1930. R. D. TAYLOR 1,749,856

FASTENER SETTING MACHINE

Filed Sept. 22, 1927 5 Sheets-Sheet 1

FIG. 1



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FASTENER SETTING MACHINE

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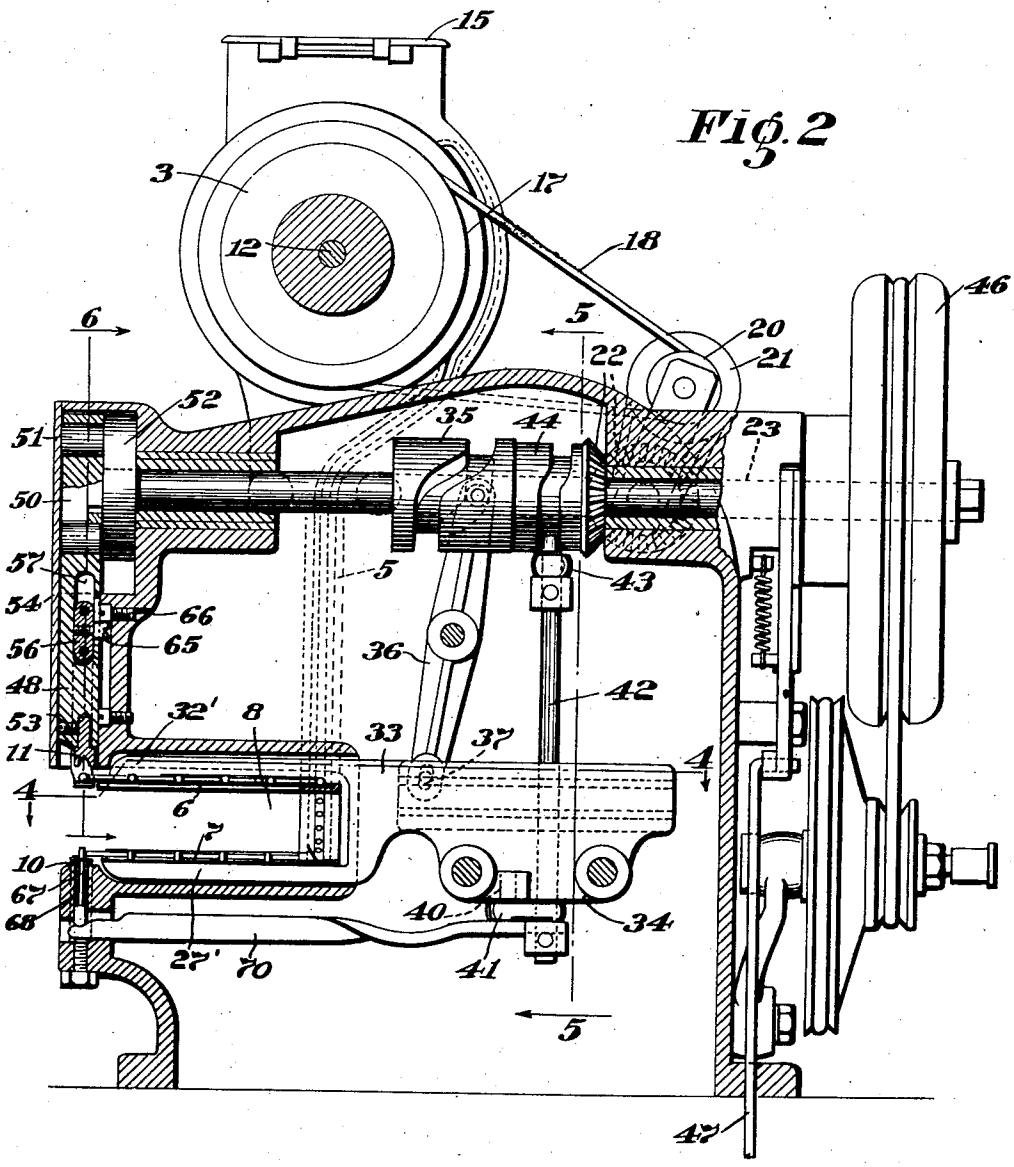
Fig. 2



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FASTENER SETTING MACHINE

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Fig. 3

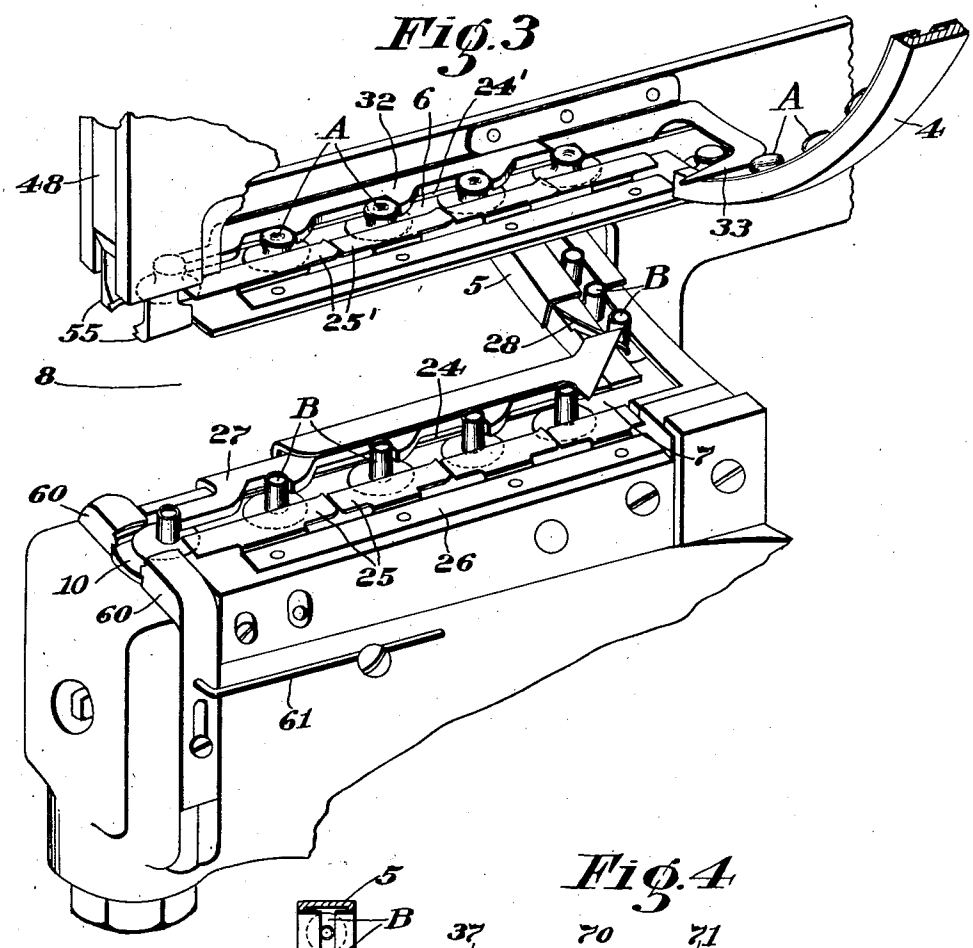
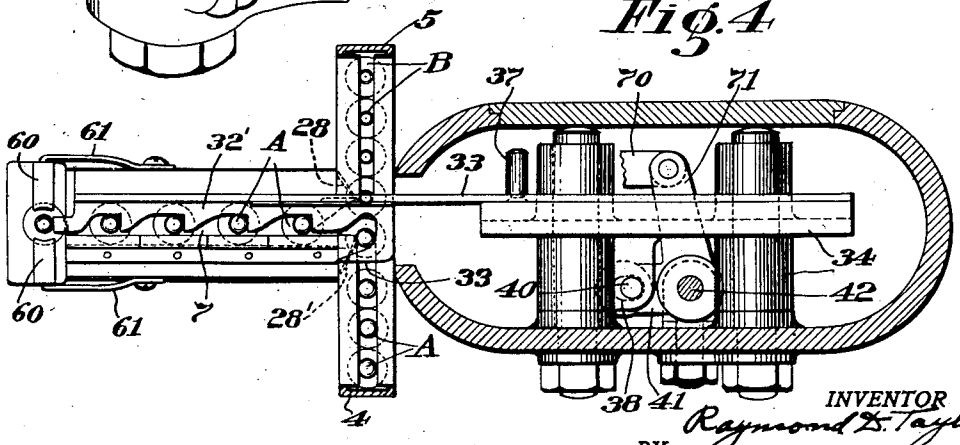


Fig. 4



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FASTENER SETTING MACHINE

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Fig. 5

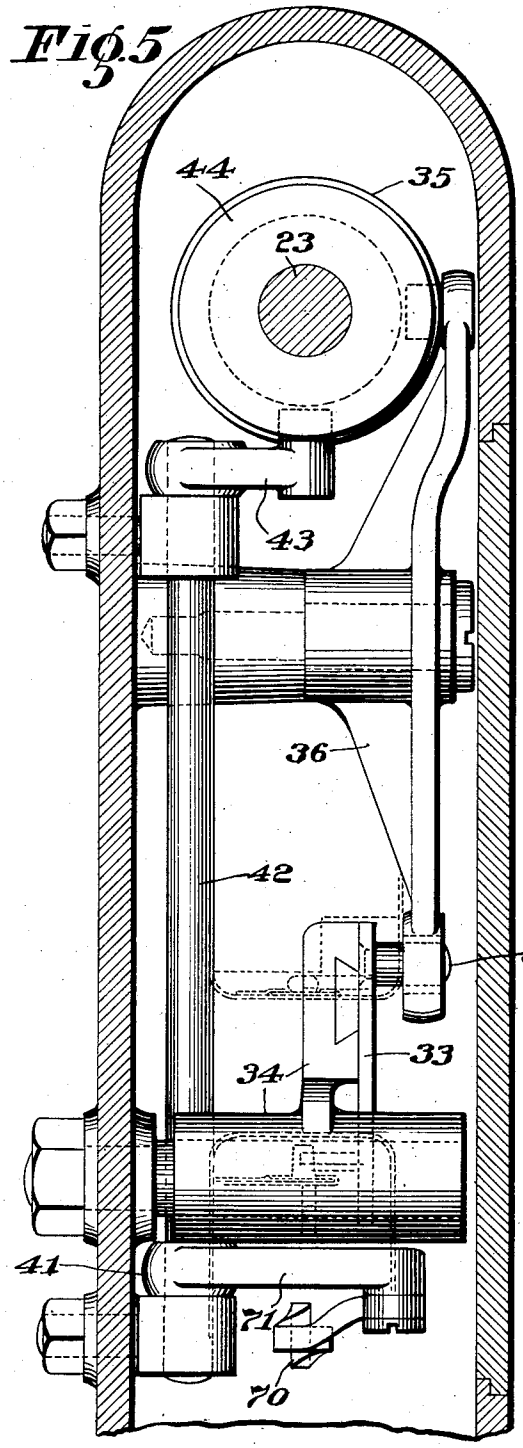
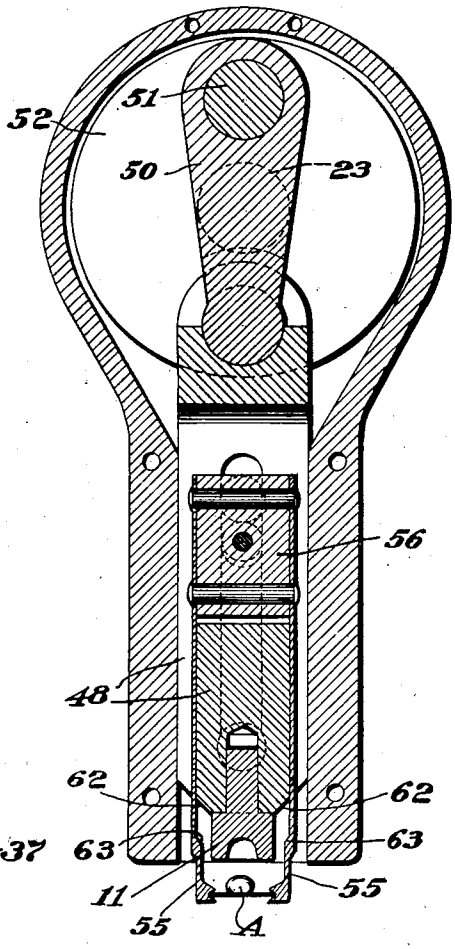
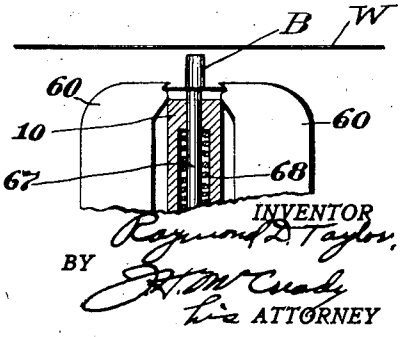


Fig. 6





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FASTENER SETTING MACHINE

Filed Sept. 22, 1927 5 Sheets-Sheet 5

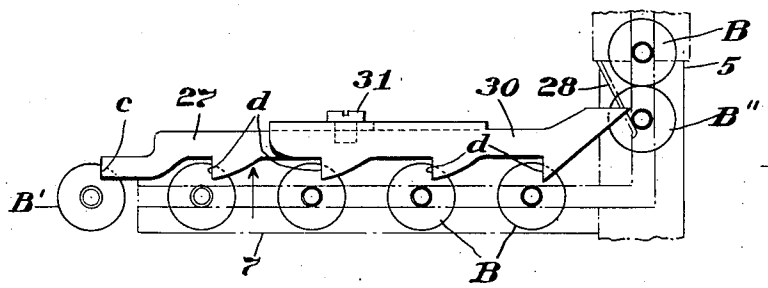

Fig. 7

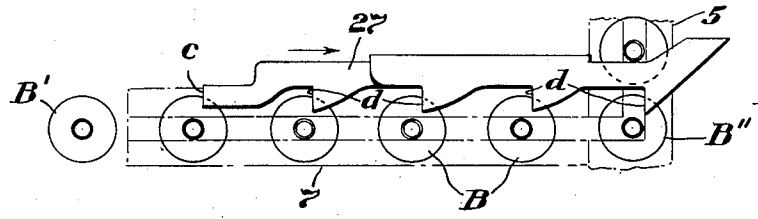

Fig. 8

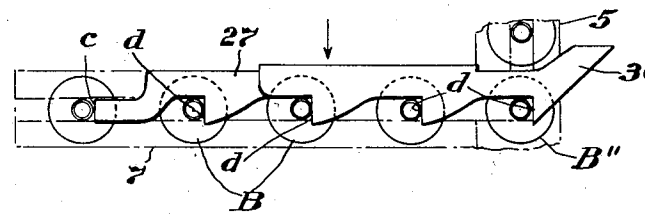

Fig. 9

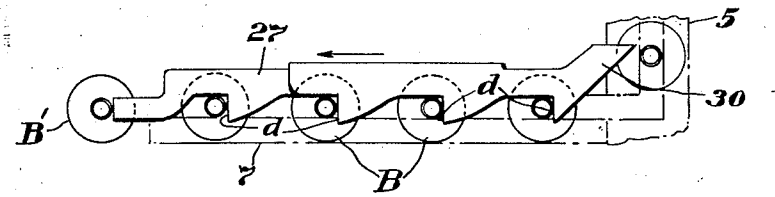

Fig. 10

Fig. 11

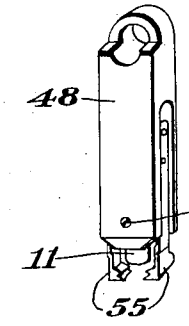

Fig. 12

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UNITED STATES PATENT OFFICE

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FASTENER-SETTING MACHINE

Application filed September 22, 1927. Serial No. 221,224.

This invention relates to machines for setting fasteners in various articles of work, and is especially concerned with the handling of fasteners of the so-called "snap type."

It is the general object of the invention to devise a machine of this type which will handle ar uncommonly wide range of work while at the same time being reliable in operation and simple in construction.

The invention will be herein disclosed as embodied in a machine designed to set snap fasteners in sheet material, such as automobile curtains, rugs, and the like, and an important object of the invention is to devise a machine of this character which will permit the setting of the fasteners a considerable distance back from the edge of the work. Such a machine requires a deep throat to permit the introduction of the work, and consequently involves unusual problems in the delivery of the fasteners to the setting mechanism. The invention provides a machine in which these problems are satisfactorily solved.

The various features of the invention will be readily understood from the following description when read in connection with the accompanying drawings and will be more particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a perspective view of a machine constructed in accordance with this invention;

Fig. 2 is a vertical cross-sectional view of the machine shown in Fig. 1;

Fig. 3 is a perspective view showing more particularly the mechanism for delivering fasteners to the setting mechanism;

Fig 4 is a horizontal cross-sectional view partly in elevation, the plane of cross-section being indicated by the line 4—4, Fig. 2;

Figs. 5 and 6 are cross-sectional views substantially on the lines 5—5 and 6—6, respectively, Fig. 2;

Figs. 7, 8, 9 and 10 are diagrammatic plan views showing successive steps in the feeding of fastener members to the setting mechanism; and

Figs. 11 and 12 are perspective views of elements of the setting mechanism.

A very common type of snap fastener includes a stud having a more or less rounded head, and a socket provided with spring members to grip the head. The stud usually is secured to the work by an inner or base member having a tubular extension which is forced into the hollow stud, the fabric or other article to which the stud is attached being gripped between the disk-like bases or flanges of the inner and outer members. The machine shown in the drawings is designed particularly to handle fasteners of this type, the outer member of the stud being shown at A (see particularly Figs. 3 and 6), while the inner member of the stud is shown at B.

Referring to Fig. 1 it will be seen that this machine comprises two rotary hoppers 2 and 3, respectively, the hopper 2 being designed to hold a supply of the members A, while the hopper 3 handles a supply of the members B. These hoppers sort the fastener members and deliver them, respectively, to raceways 4 and 5 which guide their respective fasteners to upper and lower horizontal tracks 6 and 7. These tracks are mounted, respectively, above and below a deep throat 8 designed to permit the introduction of the work, and mechanism is provided for feeding the fasteners step by step along the tracks and delivering them to the setting mechanism. This setting mechanism comprises a stationary anvil 10 and a plunger or driver having a tip 11 to engage the fasteners, this plunger being mounted directly over the anvil and arranged to reciprocate toward and from it. The detailed description of the various mechanisms of the machine will be taken up in substantially the order in which they have just been mentioned.

It will be seen from an inspection of Fig. 1 that the hoppers 2 and 3 are both mounted horizontally on a shaft 12. These hoppers consist of hollow tapered sections with their smaller ends abutting, and their larger ends opening into stationary casing members 13 and 14 fitted with covers 15 and 16, respectively, at their upper ends through which supplies of the fasteners may be introduced. This mechanism for receiving the fasteners, sorting them, and delivering them to the race-

ways may be of any suitable character, a number of satisfactory hopper mechanisms being well known in this art, any one of which can readily be adapted to, or redesigned for, use in this machine. The hopper 3 has a pulley section 17 formed thereon to receive a driving belt 18, Fig. 2, which runs over a driving pulley 20. This pulley rotates with another pulley 21 which is driven through bevel gears 22, Fig. 2, from the main driving shaft 23 of the machine.

The two raceways 4 and 5 join their respective tracks 6 and 7 at approximately right angles to them, and it is necessary to feed the fastener members along their respective tracks to the setting mechanism. In order to avoid the use of a long stroke feeding mechanism, means is provided for feeding a series of these fasteners in unison, the entire series being advanced one step at a time so that the distance travelled by any individual fastener member in a given cycle of operations of the machine is very short and a higher speed of operation thus is permitted.

Referring to Fig. 3 it will be seen that the lower track 7 comprises a flat surface on which the members B ride, this track being provided with a stationary marginal guide 24 under which the edges of the bases of the members B run and by means of which they are guided. The opposite margins of the bases of the parts B slide under flat leaf spring sections 25 projecting from a bar 26, these sections 25 serving to press the bases of the fastener members against the flat surface of the track and to apply a certain friction to them so that they will be held in any position to which they are moved by the feeder.

The feeder which cooperates with the lower track 7 consists of a bar 27 (see Figs. 3 and 7 to 10, inclusive) which is provided with an end *c* and four shoulders *d*, each adapted to engage the upright or tubular portions of the fasteners B and to feed them forward. Mechanism is provided to give this feeder a four-way motion; that is, a backward and forward reciprocating motion longitudinally of the track and another reciprocating motion directed laterally or transversely of the track. Assuming that the feeder 27 has just moved forward, as indicated by the arrow in Fig. 10, and has advanced the fastener B′, Fig. 10, into setting position on the anvil 10, the next movement will be outwardly, in the direction indicated by the arrow in Fig. 7, entirely clear of the fastener; then backward, as shown by the arrow in Fig. 8, to the rearward limit of its stroke; and then inward again, as shown in Fig. 9 where each feed shoulder *d* will engage the fastener member in the rear of that which it operated upon during its previous forward stroke. When this feeder is again moved forward, in the direction indicated by the arrow in Fig. 10, it will advance all the fasteners one step, moving another fastener into setting position on the anvil 10. This same movement is utilized to control the transfer of the fastener members from the raceway 5 to the track 7.

Referring again to Figs. 3 and 7 to 10, it will be seen that the lowermost fastener B in the raceway 5 is stopped by a spring 28. Also, that a separator finger 30 is adjustably secured to the feeder 27 by a screw 31. The outward movement of the feeder into the position shown in Fig. 7 carries the end or point of the separator finger 30 past the tubular part of the lowermost fastening member B″ in the raceway 5, so that when the feeder next moves backwardly, as shown in Fig. 8, the inclined surface of the separator 30 forces the member B″ out of the raceway and into the track 7, as shown in Fig. 8. When this feed member again moves inwardly, as shown in Fig. 9, the outermost shoulder *d* on the feeder is moved behind the fastener B″ in readiness to feed it forward toward the setting mechanism.

The fastener members A are fed along the upper track 6 in the same manner as the members B, this track being equipped with parts 24′ and 25′ corresponding to the parts 24 and 25 above described. The feeding operation is performed by a feeder 32, essentially like the feeder 27, and this feeder also is equipped with a separator finger 33 which effects the transfer of the fastener members A from the raceway 4 to the track 7. The raceway also has a spring 28′, Fig. 4, which yieldingly arrests the movement of the line of fasteners conducted thereby. Both the feeders 32 and 27 are operated in unison, and they are both formed integral with or are rigidly secured to the arms 32′ and 27′, Fig. 2, of a feed bar 33. This feed bar is slidably supported in a carriage 34, Figs. 2, 4 and 5, for movement longitudinally of the tracks 6 and 7, and this longitudinal movement is produced by a cam 35, Figs. 2 and 5, operating through a lever 36, and a pin 37 which projects from the bar 33. In order to reciprocate the carriage 34 and thus move the feed bar 33 and the feeders 27 and 32 carried thereby back and forth transversely of the tracks 6 and 7, the carriage 34 is provided with a lug which is slotted, as shown at 38, Fig. 4, to receive a pin 40 projecting upwardly from one arm 41 of a bell crank lever. This lever is secured fast on the lower end of an upright rock shaft 42, and an arm 43 at its upper end carries a stud or roll which runs in the path of a cam 44 Figs. 2 and 5, which rotates with the main shaft 23. The cams 35 and 44 are so timed that they produce the four-way motion of the feeders 27 and 32, as above described.

For the purpose of driving the shaft 23, an electric motor 45, Fig. 1, is provided and the shaft of this motor is belted to a pulley 46 which runs freely on the shaft 23. The pulley

may be connected, however, with the shaft to drive it, by means of a single revolution clutch of any suitable type connected through the rod 47, Fig. 2, to a treadle, the arrangement being such that when the treadle is depressed the shaft 23 will make a single revolution and then be stopped automatically. Clutches of this type are well known in this art so that any detailed description of the clutch is unnecessary.

The setting mechanism may be of any suitable construction and necessarily will depend upon the nature of the fastenings handled. The arrangement shown comprises a driver bar 48 mounted to slide in a vertical guideway formed in the front part of the machine frame. This bar is reciprocated by a crank 50 operated by an eccentric pin 51 projecting from a disk 52 which is secured fast on the forward end of the shaft 23. In the lower end of this bar a socket is provided to receive the driver tip 11 previously referred to, this tip having a socket in its lower end to receive the head of the stud A. The tip 11 is removably secured in the bar by a screw 53, Fig. 2. A cover plate 54, Fig. 2, is secured in front of and protects this part of the setting mechanism.

Each fastener A which is brought into setting position is gripped between the grooved lower ends of two spring fingers 55—55, Fig. 6, which are secured to opposite sides of a slide 56 mounted in a slot 57, Fig. 2, of the driver bar 48. Each inner fastener member B, when moved into setting position, is similarly gripped between the grooved ends of bars or fingers 60—60, Figs. 1, 3, 4 and 6, which are mounted in upright guideways formed in the machine frame at opposite sides of the anvil 10. Springs 61—61 press these bars inwardly and serve also to hold them normally in their uppermost positions as shown, for example, in Fig. 3. As the driver bar 48 is moved downwardly by the crank 50, the fingers 55 will move with it due to their frictional engagement with the bar, and they will thus carry the fastener member A down into contact with the work W, Fig. 6. This downward movement will continue until the work is pressed against the upper surfaces of the fingers 60—60 and the movement of the fingers 55—55 is arrested by their contact with the work. Thereafter the bar 48 will continue to descend, the head of the fastener member A will be entered in the socket in the tip 11, and the inclined surfaces 62, Fig. 6, on the lower part of the driver bar will engage correspondingly inclined surfaces 63—63 on the fingers 55—55 and force these fingers apart, thus causing them to release the member A which they carry. A further descent of the driver will bring enough pressure to bear on the fingers 60—60 to force them downwardly and cause them to spread apart and release the member B, this spreading action being produced by the engagement of inclined surfaces above the grooves in the fingers 60—60 with the upper surfaces of the anvil 10, as clearly shown in Fig. 6. The final movement of the driver will press the bases of the two members A and B firmly against the work causing them to grip it securely, and at the same time distorting the upper end of the tubular part of the fastener B inside the head A and locking the two parts securely together and to the work.

As the driver bar 48 is moved upwardly the fingers 55—55 will move with it until the head of a screw 65, Fig. 2, which projects rearwardly from the slide 56 strikes the head of another screw 66 and stops further upward movement of the fingers, their movement being arrested while their grooved lower ends are in position to receive another fastener member A when it is advanced along the track 6 by the feeder 32. As soon as the driver bar moves out of contact with the fingers 60—60 they will be returned again to their normal positions, as shown in Fig. 3, due to the action of the springs 61—61.

Any possibility of accidentally displacing the fastener member B with reference to the upper member A during the setting operation is prevented by a centering pin 67, Figs. 2 and 6, which is mounted to project centrally through the anvil 10 and is normally held in a depressed or inoperative position by a coiled spring 68. The lower end of this pin is enlarged and rests on the end of a slide 70 which is pivoted to the arm 71 of the bell crank lever 41, previously referred to, (see Figs. 2, 4 and 5). The timing of the parts is such that this pin is projected upwardly through the anvil and through the fastener member B supported thereon during the time that the plunger 48 is making the lower portion of its stroke. This pin thus holds the fastener members in alinement while the setting operation is being completed.

The invention thus provides a machine of relatively simple design, which will handle a great variety of work, and in which the parts are sturdy and substantial in construction so that the machine is not liable to get out of order. The fact that the machine has a very deep throat between the two tracks 6 and 7 is an important practical advantage in permitting the setting of fasteners a considerable distance back from the edge of a curtain, rug, or other article of work, as is often desirable. While this involves a relatively long feeding movement of the fastener members from the ends of the raceways to the setting mechanism, the fact that this movement is broken up into short steps, one step being performed in each cycle of operations of the machine, avoids the use of long strokes with a consequent reduction in speed

obtainable, and the complications introduced by momentum.

While I have herein shown and described a preferred embodiment of my invention, it will be evident that the invention may be embodied in other forms without departing from the spirit or scope thereof. The machine shown in the drawings has been described and illustrated as adapted to handle a fastener of a particular construction, but it will be understood that this machine can be readily modified to handle other fasteners. For this purpose it may be necessary to replace the fingers 55 and 60 and the driver tip 11, and possibly other parts, with members designed to meet the requirements of the particular fastener to be set, but by making these, and in some cases other minor changes, the machine may be adapted to handle a great variety of fasteners.

The machine shown in the drawings is designed to handle the stud part of a snap fastener. In order to handle the socket part of the fastener it is usual to provide another machine of the same organization as the machine shown in Fig. 1 and mounted on the base 75 at the left of the motor 45, Fig. 1, this second machine preferably also being driven from the motor 45.

Having thus described my invention, what I desire to claim as new is:

1. In a machine for setting fasteners, the combination of a setting mechanism, a track adapted to receive and guide a series of fastener members toward said mechanism, a raceway for conducting said fastener members to said track, said raceway meeting said track laterally at an abrupt angle, a reciprocating feeder for advancing a series of said members along said track step by step, operating mechanism for said feeder, and means arranged to be actuated by said operating mechanism for controlling the transfer of the fastener members from said raceway to said track.

2. In a machine for setting fasteners, the combination of a setting mechanism, a track adapted to receive and guide a series of fastener members toward said mechanism, a raceway for conducting said fastener members to said track, said raceway meeting said track laterally at an abrupt angle, a reciprocating feeder for advancing a series of said members along said track step by step, and a separator finger movable with said feeder and arranged to control the transfer of the fastener members from said raceway to said track.

3. In a machine for setting fasteners, the combination of a setting mechanism, a horizontal track adapted to receive and guide a series of fastener members toward said mechanism, a reciprocating feeder for advancing a series of said members along said track step by step, and resiliently mounted fingers at the end of the track between which said feeder delivers a fastener in each cycle of operation of the machine, said fingers gripping said fastener and supporting it for the operation of the setting mechanism and adapted to release it to permit it to be drawn upwardly through the fingers.

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