United States Patent

[11] 3,565,315

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[21] Appl. No. **787,799**
[22] Filed **Dec. 30, 1968**
[45] Patented **Feb. 23, 1971**
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[54] **SPRING PIN SETTER**
7 Claims, 6 Drawing Figs.

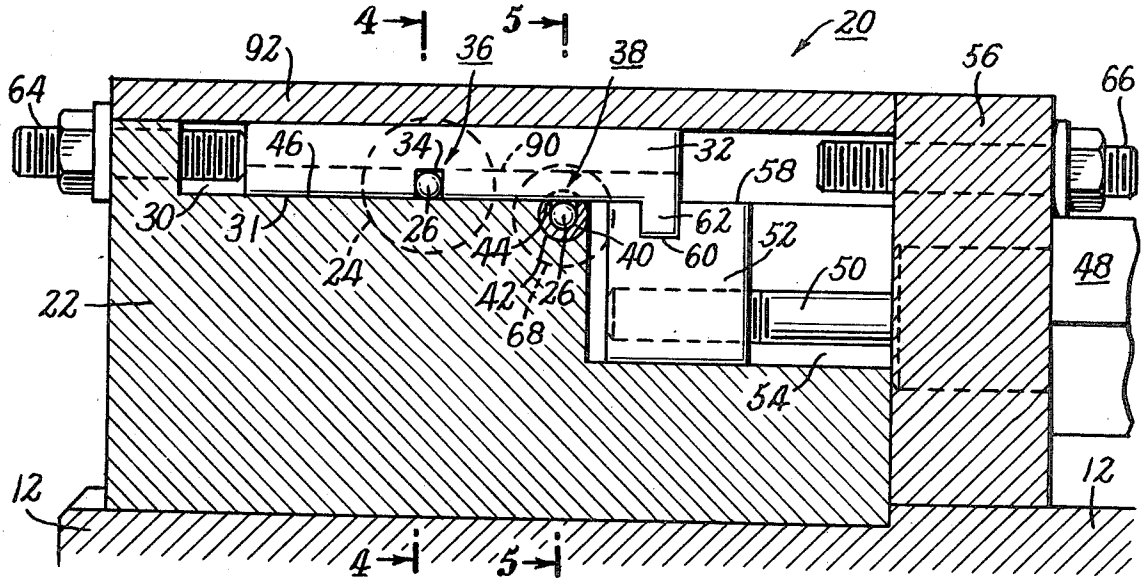
[52] **U.S. Cl.** **227/116**
[51] **Int. Cl.** **B25c 1/04**
[50] **Field of Search** 227/114, 116, 151, 152, 154

[56] **References Cited**
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ABSTRACT: An automated, high-speed spring pin setter which directs spring pins from a continuous supply of pins through a delivery tube to a reciprocating loading magazine. Pins are fed initially to the magazine at a pin load station and are carried by a slide in the reciprocating magazine to a pin feed station where a plunger drives the spring pins from the magazine into the workpiece.



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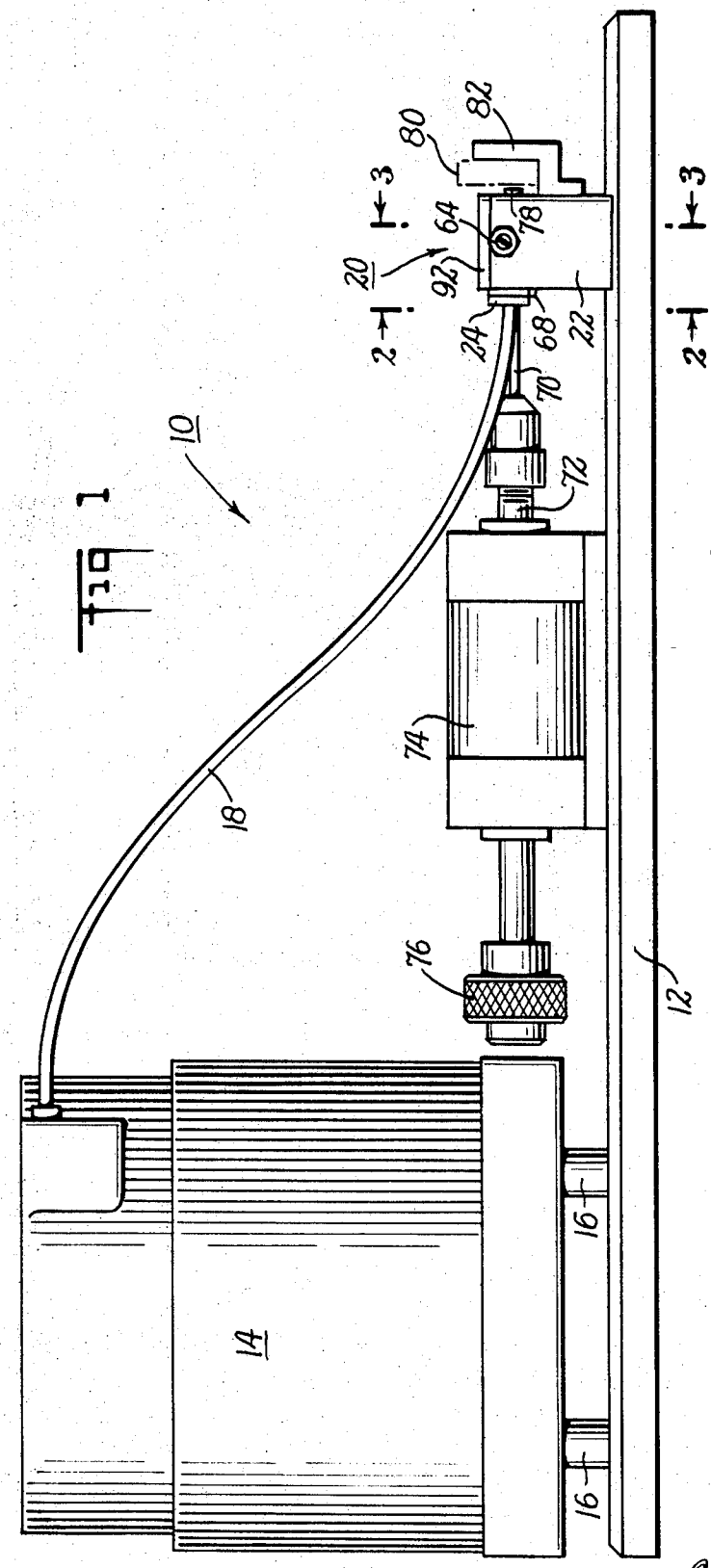


FIG 1

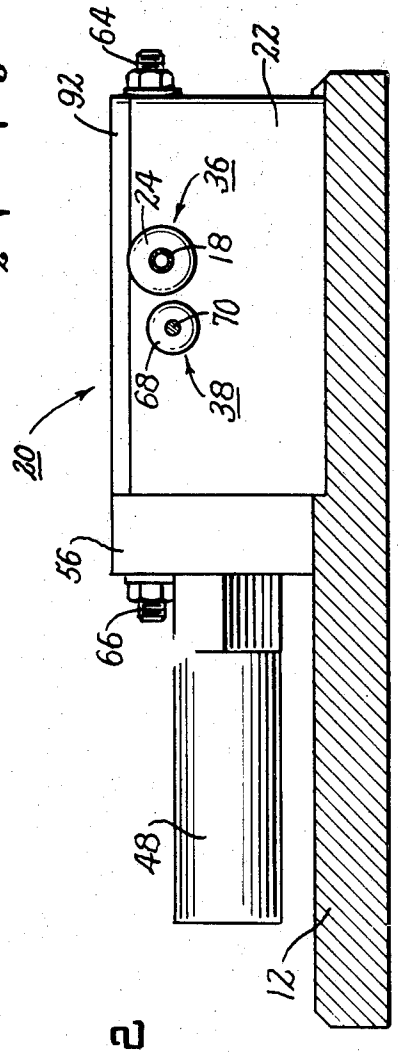


FIG 2

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Fig 3

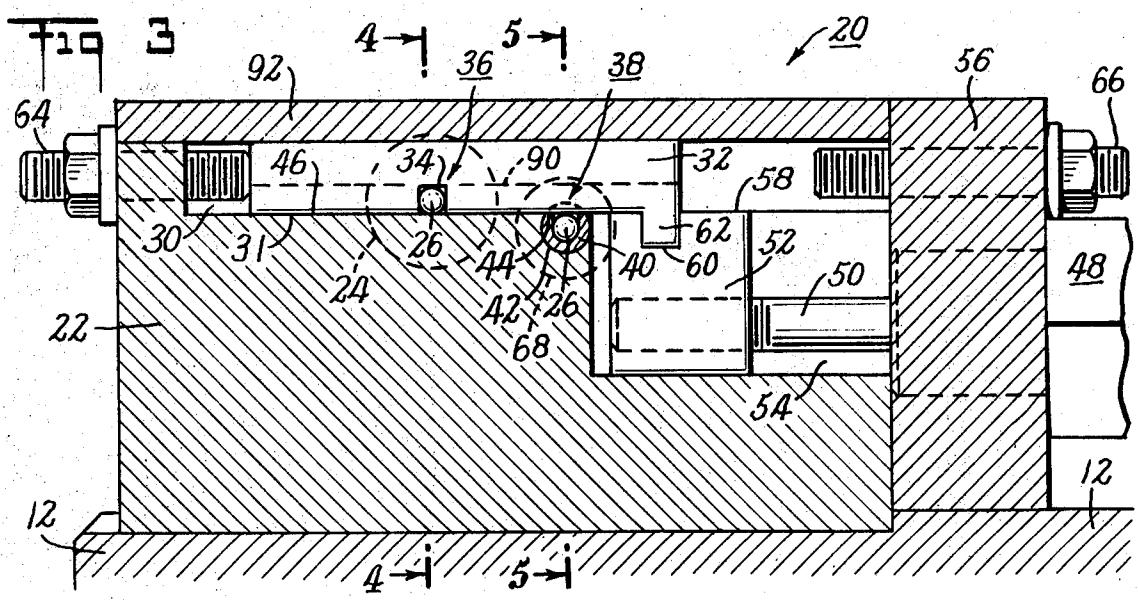


Fig 4

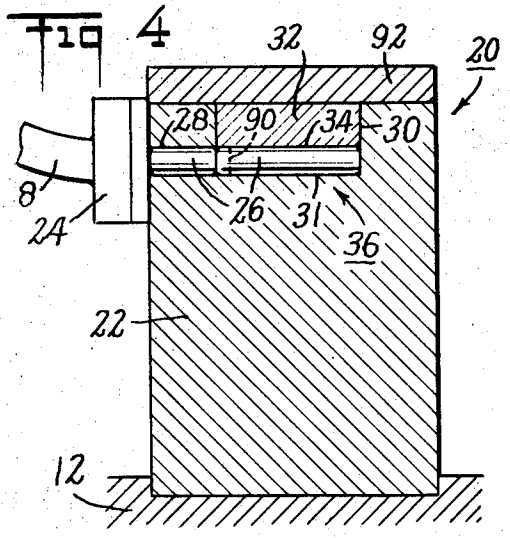


Fig 5

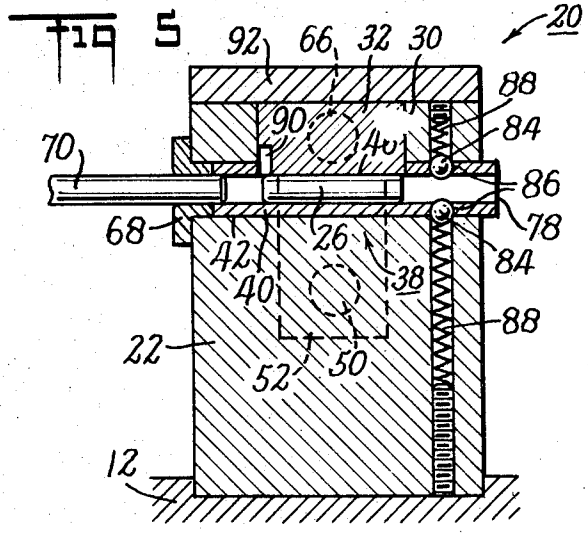
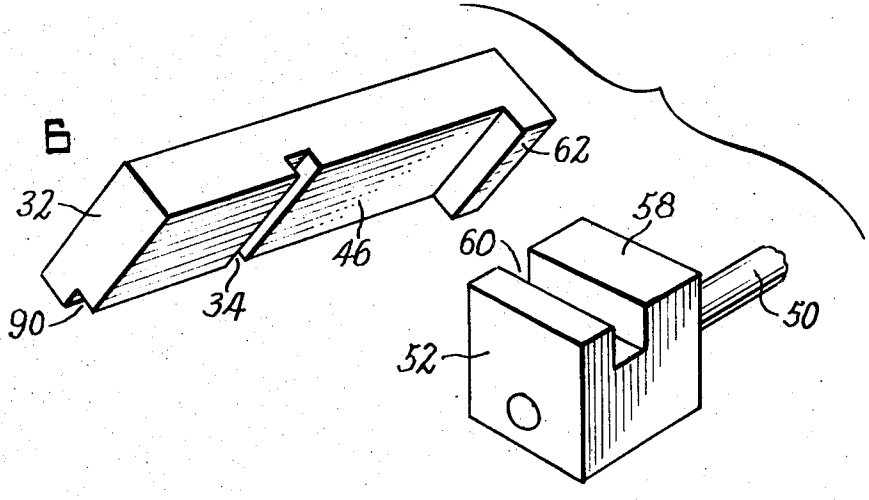


Fig 6



SPRING PIN SETTER

This invention relates to spring pin setters and more in particular to an automated, continuous-feed spring pin setter. Spring pins, which are cylindrical tube segments having a slit running the length of the segment, find wide usage as a convenient and economical pivot pin or locating pin in mass-produced commercial product lines, i.e., where mating parts designed to move relative to each other are made from materials such as plastics, phenolics or light metal stampings. Each part has a bore to receive the spring pin with the bores in mating segments being aligned to receive the spring pins. Once the pin is inserted, either as a locating pin, or to provide a pivot pin so that the two mating parts can rotate relative to each other, the operation is repeated. Heretofore, the inserting of spring pins in mating parts has been accomplished by manual operations wherein the operator picks up two mating parts, aligns them and manually inserts the spring pin. Since the use of spring pins is most commonly confined to volume operations, the manual procedure is unnecessarily slow and tedious resulting in inordinately high labor costs.

In a preferred embodiment of the present invention, spring pins are fed from a continuous feed hopper, such as a vibratory feed hopper, through a delivery tube to a loading magazine. The loading magazine includes a reciprocating slide member which in one position is adapted to receive a spring pin from the delivery tube. As the slide reciprocates to a second position, the pin is carried by the slide until it drops from the slide into a pin aligning and ejecting tube in register with an air-actuated plunger. Once a pin is in the tube, the air-actuated plunger extends to push the pin out of the magazine into a workpiece held, for example, by a jig adjacent the exit of the tube from the magazine.

While a detailed description of the present invention will be confined to spring pins, it is readily apparent that any other type of cylindrical pin member such as a dowel pin and the like may be used with equal facility in the apparatus of the present invention.

The construction of the preferred embodiment of this invention, as well as the advantages thereof, which include provision to insert spring pins in a workpiece in a rapid and efficient manner, adaptability to handle spring pins and/or dowel pins of different sizes, and uniformity of operation to insure a uniform work product, will become further apparent from the following specification when considered in conjunction with the accompanying drawings wherein:

FIG. 1 is an elevational view of the apparatus of the present invention;

FIG. 2 is an enlarged, elevational view of the loading magazine taken on line 2–2 of FIG. 1;

FIG. 3 is an enlarged, sectional view of the loading magazine taken on line 3–3 of FIG. 1;

FIG. 4 is a vertical, sectional view taken on line 4–4 of FIG. 3;

FIG. 5 is a vertical, sectional view taken on line 5–5 of FIG. 3; and

FIG. 6 is an exploded, perspective view of the reciprocating slide and slide drive block.

With reference to FIG. 1, a spring pin setter 10 includes a base support member 12 upon which a vibratory storage hopper 14 is mounted on leg members 16. The hopper 14 feeds spring pins, dowels and the like through a delivery tube 18 to a spring pin magazine assembly 20. With reference to FIG. 4 as well, it is seen that the tube 18 is fixed to a stationary block member 22 of the magazine 20, for example, by an annular collar 24, so that a spring pin 26 can be fed from tube 18 through collar 24 into a receiving bore 28 in block 22 and into a spring pin receiving channel 30 in the upper portion of block 22. The bottom surface 31 of channel 30 is at the same elevation as the bottom of bores 28 so that a spring pin 26 can move freely from bore 28 lengthwise into the channel 30. A spring pin transfer slide 32 (see also FIG. 6) is positioned to slide within channel 30 and includes a rectangular cutout portion 34 on the underside thereof of a sufficient size to accommodate a spring pin 26 when cutout 34 is in register with bore 28. Hence, a single spring pin 26 is fed into the channel 30 and is retained within cutout 34 in slide 32.

With reference now to FIGS. 3 and 5, it is seen that the slide 32 is adapted to slide from a spring pin receiving station 36, where cutout 34 in slide 32 is in register with the spring pin receiving bore 28, to a pin ejection station 38, where a single spring pin 26, which has been carried by the slide 32, is allowed to fall from cutout 34 into a pin aligning and ejection tube 40. Tube 40 is positioned in a bore 42 in block 22 and has its upper half cut away, as at 44, within the channel portion 30 of block 22. Tube 40 is positioned below the bottom surface 31 of the channel 30 so that there is a clearance between the top of pin 26 and the underside 46 of the slide after the pin drops into the tube 40 when the cutout 34 in slide 32 is moved into register with the open top 44 of tube 40.

The reciprocating movement of the slide 32 may be initiated in any convenient manner, i.e., pneumatically, electrically or mechanically but preferably is initiated by an air cylinder 48 (see FIG. 2) having a piston extension 50 anchored in a sliding drive block 52 which is positioned for sliding movement in a cutout 54 in block 22. The air cylinder 48 is mounted on, and piston 50 passes through a support block 56 secured to base member 12 adjacent the rear of block 22. Drive block 52 includes, on its upper side 58, a cutout 60 to receive a lip extension 62 on sliding block 32. Hence, as piston 50 extends and retracts, block 52 is moved within cutout 54 and imparts a reciprocating movement to the sliding block 32. Adjustable limit screws 64 and 66 mounted in blocks 22 and 56, respectively, extend into the channel 30 and cutout 54, respectively, to limit the stroke of the sliding block 32.

Once the block 32 carrying a single spring pin 26 in the cutout 34 has traversed from the pin-loading station 36 to the pin-feeding station 38 and the pin 26 has dropped into the tube 40, the spring pin is ejected from the block 22 by a reciprocating plunger 70. Plunger 70 may be actuated electrically or mechanically if desired but preferably is pneumatically actuated. Plunger 70 is positioned to pass through a bushing 68 into the ejection tube 40 and is an extension of piston 72 of an air cylinder 74 mounted on base member 12 traversely of the block 22. The length of the stroke of piston 72 is adjusted by means of a micrometer adjustment 76 and is correlated to the length of the spring pins being used. The plunger 70 is mounted for reciprocal movement within the tube 40 and the length of its stroke is adjustable so as to force a pin 26 out of the end 78 of tube 40 and into a workpiece 80 which is held in a suitable retaining jig 82 mounted on block 22.

As seen in FIG. 5, a pair of ball detents 84 are mounted in block 22 and extend into tube 40 through bores 86 in the upper and lower portion thereof. Balls 84 are urged to extend into tube 40 by springs 88 so that the normal at rest position of each ball 84 is such that the balls are in the path of a spring pin as it is being ejected by plunger 70. As a spring pin 26 is ejected by plunger 70, the balls are forced outward under spring tension 88 and maintain rolling contact with the spring pin as it passes therethrough and, thus, the balls 84 maintain positive frictional engagement with the spring pins to prevent misalignment or cocking of the pins as they are ejected into the workpiece.

Since the length of the spring pins 26 varies within a given tolerance range for a particular nominal size, there is the possibility of processing a given lot of pins which includes some that are shorter than the nominal length. Hence, in order to avoid jamming of the spring pins when the slide 32 is actuated the slide undercut as at 90 on its underside 46 so that, when the slide is actuated, only the spring pin within the channel portion 30 will be carried by the slide and the next spring pin in line is not caught by the movement of the slide.

A removable cover plate 92 is positioned over block 22 to enclose the slide 32 within the channel 30.

In operation, spring pins are fed by action by the vibratory hopper **14** to the delivery tube **18** where they are fed by gravity and the pushing action of the following pins to the loading station **36** in the magazine assembly **20**. Hence, the pins are generally aligned one after the other in tube **18** from the loading station **36** back to hopper **14**. The slide **32** is initially positioned so that only one spring pin enters through bore **28** into the channel portion **30**. Piston **50** is actuated and retracts the slide carrying the entrapped spring pin **26** to the ejection and aligning tube **40**. There the pin drops by gravity to a level below the underside **46** of slide **32**. At this point plunger **70** is actuated and extends into the tube **40** and ejects the single spring pin out of the magazine assembly **20** into a workpiece **80** held in the jig at the side of the block **22**. Contemporaneously with the actuation of plunger **70**, piston **50** is again actuated causing the slide **32** to move back to the pin-receiving station **36** where another pin is fed to the slide **32** when the cutout **34** comes into register with the pin-feeding bore **28**.

It is thus seen that the device of the present invention provides an accurate automated manner of feeding spring pins, dowels or the like, to a workpiece, with the speed of delivery being limited only by the operator's speed in placing workpieces **80** in the jig **82**. Pins of varying lengths can be accommodated by varying the length of the plunger stroke through a micrometer adjustment and also by providing interchangeable slides **32** and ejection tubes **40** to accommodate pins of varying diameters and varying lengths.

I claim:

1. In an automatic spring pin setter, means to provide a continuous supply of spring pins to a spring pin receiving and ejection assembly, said assembly comprising:

a stationary block member having a channel portion therein:

a slide member positioned in said channel portion and of a length less than the length of said channel portion thereby to permit said slide member to reciprocate within said channel, means operatively associated with said slide member to selectively move said slide member back and forth within said channel portion between a spring pin receiving station and a spring pin ejecting station spaced therefrom;

said receiving station being located on the bottom wall of said channel portion and said ejecting station being located in the bottom wall of said channel portion;

said slide member including a cutout portion on the side adjacent the bottom wall of said channel portion;

said cutout portion being positioned in register with said means to supply spring pins when said slide member is at said receiving station thereby to receive and retain a single spring pin within said cutout portion whereby when said slide member is moved to said ejecting station, said single spring pin is transferred from said receiving station to said ejecting station and will drop free of said slide member into said ejecting station; and

means operatively associated with said assembly to eject said single spring pin from said ejecting station into a workpiece positioned adjacent said ejecting station.

2. A spring pin setter as defined in claim **1** wherein said ejecting station includes guide means to maintain the alignment of the spring pin being ejected while the spring pin is being ejected.

3. A spring pin setter as defined in claim **2** wherein said guide means comprises spring urged balls projecting into said ejecting station.

4. A spring pin setter as defined in claim **1** wherein said slide member includes an undercut portion on the side adjacent said means to supply spring pins.

5. A spring pin setter as defined in claim **4** wherein said undercut portion extends transverse to said cutout portion of said slide member.

6. A spring pin setter as defined in claim **1** wherein said means to provide a continuous supply of spring pins include a receiving bore in said block member in communication with said receiving station and wherein said ejecting station includes a recess formed in the bottom surface of said channel portion.

7. In an automatic spring pin setter, means to provide a continuous supply of spring pins to a spring pin receiving and ejection assembly, said assembly comprising:

a stationary block member having a channel portion therein,

a slide member positioned in said channel portion and of a length less than the length of said channel portion thereby to permit said slide member to reciprocate within said channel, means operatively associated with said slide member to selectively move said slide member back and forth within said channel portion between a spring pin receiving station and a spring pin ejecting station spaced therefrom;

said receiving station being located on the bottom wall of said channel portion and said ejecting station being located in the bottom wall of said channel portion;

said slide member including a cutout portion on the side adjacent the bottom wall of said channel portion;

said cutout portion being positioned in register with said means to supply spring pins when said slide member is at said receiving station thereby to receive and retain a single spring pin within said cutout portion whereby when said slide member is moved to said ejecting station, said single spring pin is transferred from said receiving station to said ejecting station and will drop free of said slide member into said ejecting station;

means operatively associated with said assembly to eject said single spring pin from said ejecting station into a workpiece positioned adjacent said ejecting station;

said means to provide a continuous supply of spring pins including a receiving bore in said block member in communication with said receiving station and wherein said ejecting station includes a recess formed in the bottom surface of said channel portion;

a plurality of balls projecting into said recess to maintain the alignment of said spring pin being ejected while the spring pin is being ejected; and

an undercut portion on the side of said slider member adjacent said receiving bore.