Aug. 24, 1943. W. D. CHILTON 2,327,401

CLINCH NUT PRESS

Filed Dec. 22, 1941 5 Sheets-Sheet 1

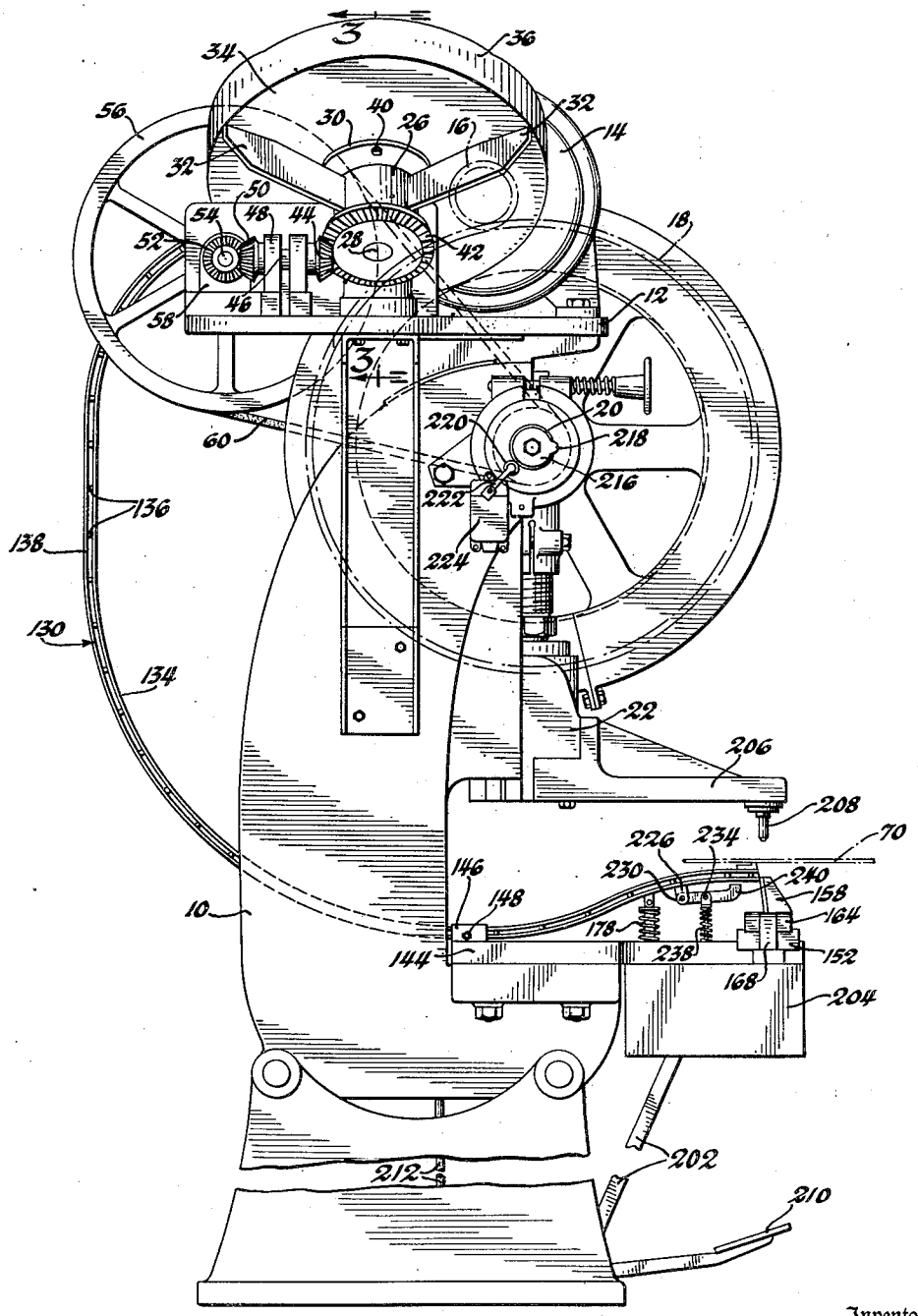

Fig. 1

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CLINCH NUT PRESS

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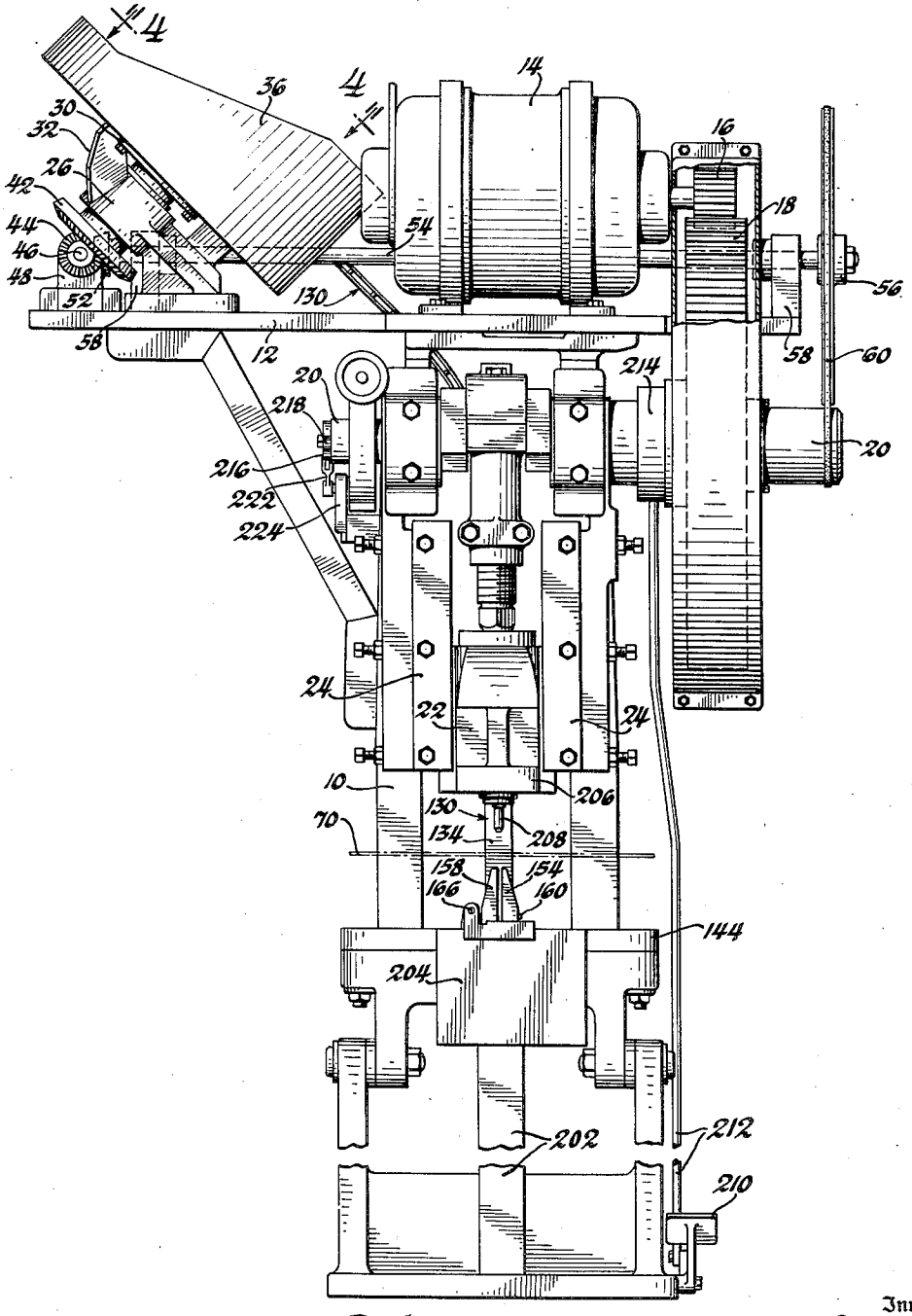

Fig. 2

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CLINCH NUT PRESS

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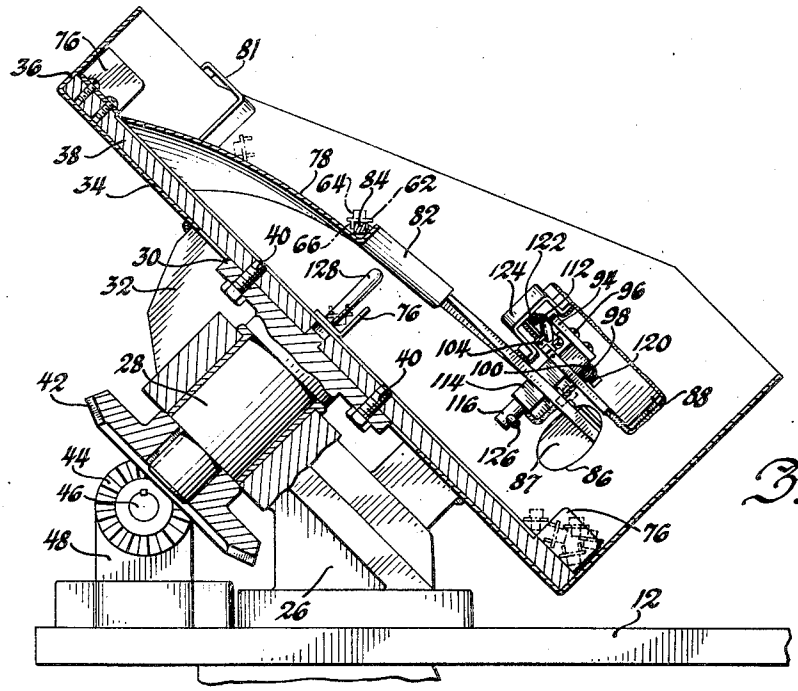

Fig. 3

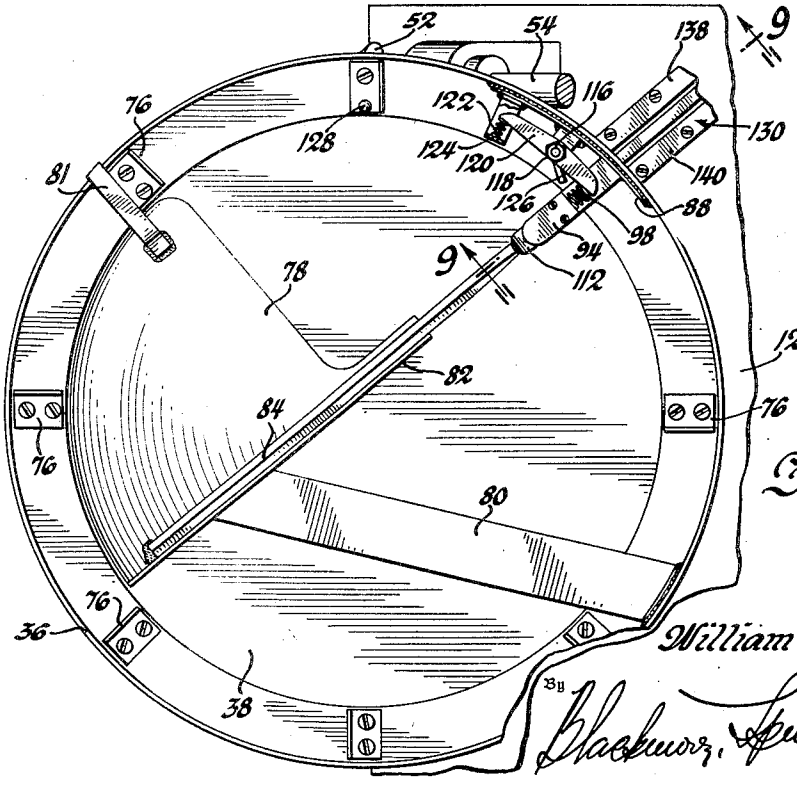

Fig. 4

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CLINCH NUT PRESS

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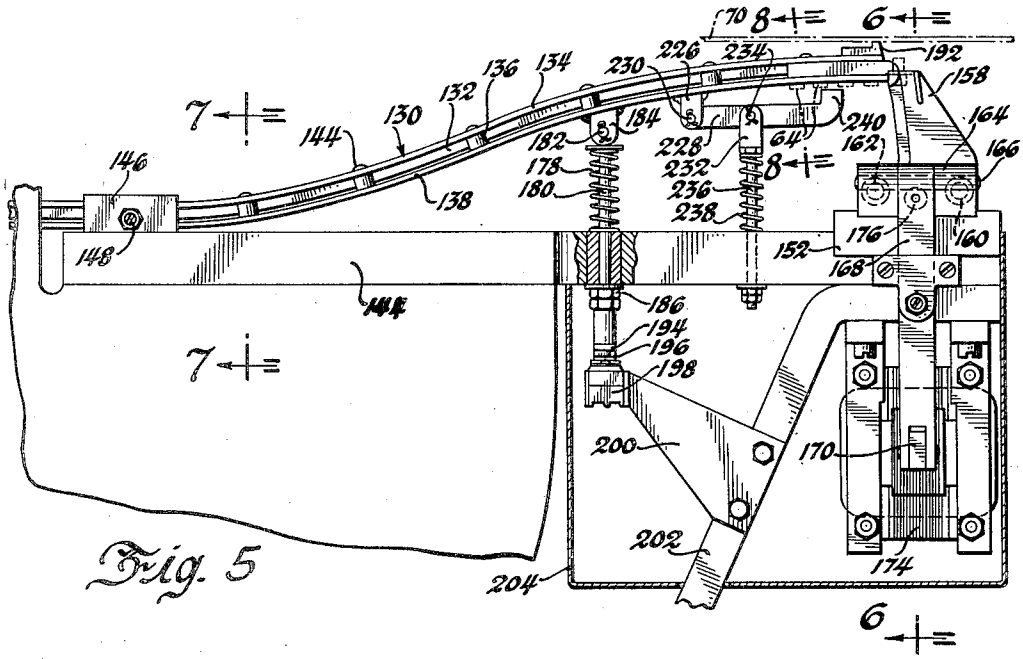

Fig. 5

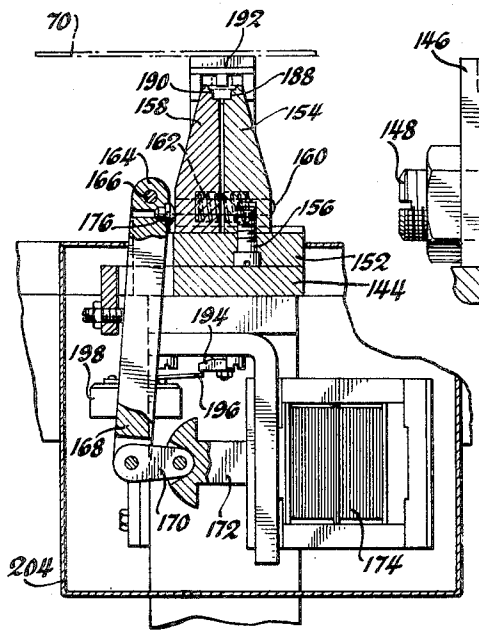

Fig. 6

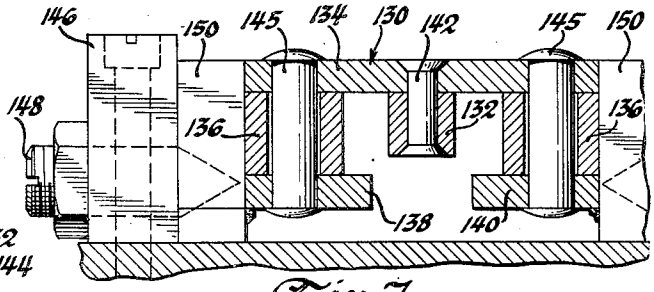

Fig. 7

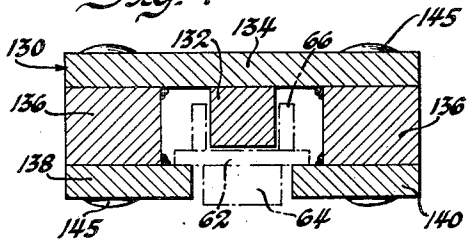

Fig. 8

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CLINCH NUT PRESS

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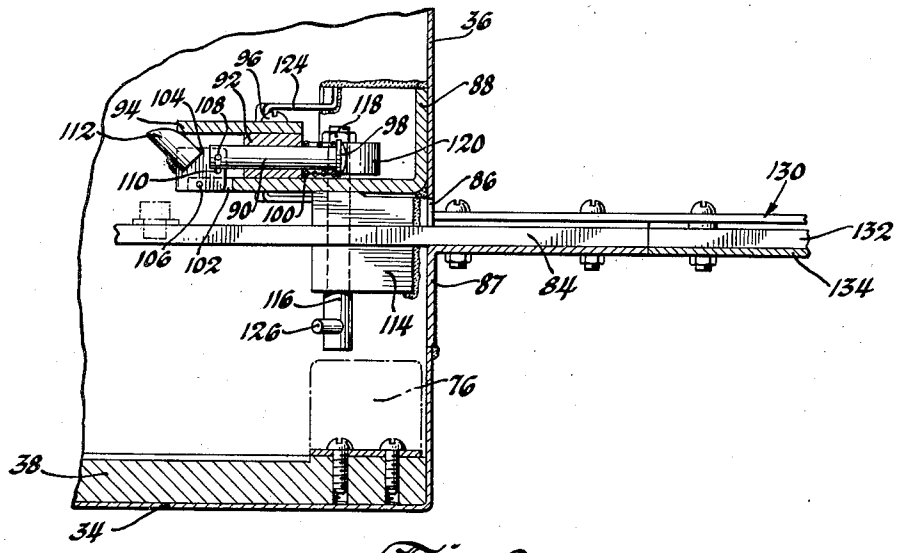

Fig. 9

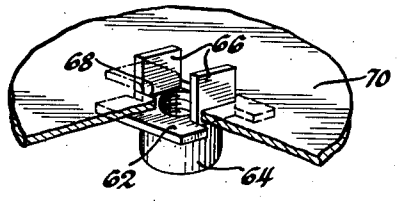

Fig. 10

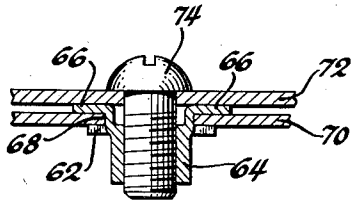

Fig. 11

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Patented Aug. 24, 1943 2,327,401

UNITED STATES PATENT OFFICE

2,327,401

CLINCH NUT PRESS

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Application December 22, 1941, Serial No. 424,093

4 Claims. (Cl. 10—169)

This invention relates to presses of the type which are employed to secure clinch nuts in apertures formed in sheet metal plates or other members, portions of the nuts being adapted to be inserted through the apertures and being bent over or deformed thereafter by the press to secure the nuts to the plate.

When the clinch nuts are manufactured, they are usually discharged from the machines on which they are made into containers in which they are transported to the point where they are to be secured to the plates or other members they are to be utilized with. They are not arranged in any particular position in the containers, but instead are mixed up in various positions so that before they may be fed into a press or other machine which is to secure them in place, they must be arranged so that they will all be in a predetermined position, in which position they will fit properly into the apertures in the plates so that they may be secured therein by the press.

It is therefore an object of the invention to provide a press of this type wherein a container of the clinch nuts, in the mixed condition in which they come from the point of manufacture, may be placed in a hopper located at the top of the press, and as the press is operated, rotation of the hopper carries some of the nuts up to a position wherein they may drop down on top of a member on which they become caught and on which they are free to slide downwardly through a chute which conveys them to the point in the press where they are to be inserted into the apertures in the plate they are to be secured to. All of the nuts which are admitted to the chute are in the same position, which position is the correct one to permit them to be inserted properly into the apertures in the plate. Such nuts as do not drop down in the correct position to get caught on the member after being carried up by the hopper, simply fall back into the lower portion of the hopper and are carried up to the top of the hopper again and again until they do get in the right position to permit them to become caught on the member as they drop downwardly. Means are provided adjacent the point where the nuts enter the chute to dislodge any nuts which might have become caught in an incorrect position on the member or on top of nuts which are sliding down the member into the chute, the dislodged nuts falling back into the lower portion of the hopper.

Other objects and advantages of the invention will be apparent upon reference to the following description and accompanying drawings, in which:

Fig. 1 is a side elevational view of a clinch nut press embodying my invention;

Fig. 2 is a front elevational view thereof;

Fig. 3 is a sectional view through the hopper, taken on the line 3—3 of Fig. 1;

Fig. 4 is a plan view of the hopper, taken on the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary view, on a larger scale, of the portion of the press where the clinch nuts are fed to the member they are to be mounted in and where they are secured in place therein by the press;

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 5;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 5;

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 5;

Fig. 9 is a sectional view taken on the line 9—9 of Fig. 4;

Fig. 10 is a perspective view, with portions broken away, showing how the clinch nut fits into the member it is to be secured in; and,

Fig. 11 is a sectional view through the clinch nut and the member it is secured to, also showing another member fastened thereto by a screw which is threaded into the clinch nut.

The reference numeral 10 indicates the frame of a press, at the upper end of which is located a platform 12, and 14 is an electric motor supported thereon. A pinion 16 mounted on the motor shaft drives a ring gear 18 secured to crankshaft 20, and rotation of this shaft causes the reciprocating member 22, which is located between the guides 24, to move up and down in the usual manner, to perform an operation to be later described.

Supported on the platform 12 is a bracket 26 within which a shaft 28, having a flange 30 formed at its upper end, is rotatably supported in an inclined position with respect to the platform. The bracket carries arms 32 to which an inwardly extending flange 34 on a cylindrical member 36 is welded or otherwise secured. A plate 38, which is adapted to rotate with respect to the cylindrical member, is connected to the flange 30 on the shaft by bolts 40. Keyed to the lower end of the shaft 28 is a bevel gear 42 which meshes with bevel gear 44 secured on one end of short shaft 46 which is journalled in a bracket 48 supported on the platform 12. Mounted on the other end of the shaft 46 is a bevel gear 50 which is adapted to be driven by bevel gear 52 which is secured on one end of shaft 54, the other end of this shaft carrying a pulley 56, and the shaft being rotatably supported in brackets 58 mounted on the platform 12. A V-belt 60 fitting into a groove in the pulley and one formed in the outer end of the crankshaft 20 serves to drive the shaft 54 whenever the motor 14 is being operated, and through the intermediate gear-

ing the shaft 28 is driven to cause rotation of the plate 38.

The stationary cylindrical member 36 and the rotating plate 38 together form a hopper which is adapted to receive a supply of clinch nuts of the type shown in Fig. 10, which clinch nuts are formed of sheet metal and comprise a flat body portion 62, from which a tubular shank 64 adapted to be threaded is drawn, and projections 66 which are bent upwardly from the body portion. As shown in Fig. 11, after the projections have been passed through an aperture 68 in a supporting plate 70, they are bent over into contact with the upper face of the plate, the body portion 62 bearing against the lower face thereof. This firmly secures the clinch nut in place in the aperture in the supporting plate, and as shown another plate 72 or other member may be attached to the plate 70 by means of the screw 74 which is threaded into the shank 64.

The clinch nuts come from the point of manufacture in containers holding a relatively large quantity of the nuts, which are in various positions therein, and it is the purpose of the hopper and associated structure to arrange the clinch nuts so that they will all be in the same position in order that they may be fed into the press in proper position to permit them to be secured to the supporting plate 70. Therefore a container full of the clinch nuts is emptied into the hopper and since the axis of the latter is inclined, the clinch nuts collect in the lower side thereof, as shown in Fig. 3, only a few of the nuts being shown for simplicity of illustration, it being understood that a relatively large quantity of the nuts will be placed in the hopper at a time, and it is for this reason that the lower part of the cylindrical member is made of greater depth than the upper part, as shown in Fig. 3.

Secured to the upper face of the plate 38 adjacent the outer edge thereof are a plurality of equally spaced fins 76, each of which carries, when the plate is rotated, a few of the clinch nuts up to the top of the hopper. When each fin reaches the top, the clinch nuts it has carried up slide off it and drop downwardly onto a stationary blade 78, which is of the shape shown in Fig. 4 and which is supported in the position shown by brackets 80 and 81 connected to the cylindrical member 36. The blade 78 has an upwardly extending flange 82 formed on the edge which is adjacent the center of the hopper, and in the corner formed by the blade and the flange, a rod 84 which is square in cross-sectional shape is secured by welding or in any other suitable manner. As shown in Figs. 3 and 4, this rod is secured in such position that one corner thereof bears against the blade while another corner bears against the flange. This is so that as the clinch nuts drop away from the fins which have carried them up to the top of the hopper and slide downwardly over the upper face of the blade, a certain percentage of them will be in such position when they reach the rod 84 that the projections 66 on them will catch on and drop down over the sides of the rod, as shown in Fig. 3, in which position the clinch nuts are free to slide longitudinally on the rod since the latter is inclined downwardly. The flange 82 tends to prevent clinch nuts which are in proper position when reaching the rod from falling off of the rod until the projections 66 have slipped over the sides thereof. Of course, many of the clinch nuts falling downwardly away from the fins will not be in such position when they reach the rod as to permit them to be caught thereon, and such nuts will fall over the top of the flange 82 and will drop into the lower portion of the hopper to be carried up again by the fins to the top of the hopper. Eventually all of the clinch nuts which have been placed in the hopper will be caught on the rod, so that there is a continuous column of the clinch nuts sliding downwardly thereon. The rod 84 extends out of the hopper through an opening 86 formed in the cylindrical member, 87 being a bracket secured in the lower part of the opening, which bracket supports the outer end of the rod.

Occasionally one of the clinch nuts falling downwardly from the top of the hopper gets caught in an incorrect position on the rod or in a position on top of the column of nuts sliding downwardly on the rod, and to dislodge such nuts before they may leave the hopper, the following mechanism is provided. As best shown in Figs. 3, 4 and 9, a bracket 88 is welded or otherwise secured to the inner surface of the cylindrical member 36 adjacent the opening 86. 90 is a plunger slidably mounted in a bushing 92 which is clamped to the bracket by a plate 94 secured in position by screws 96. The plunger has a head 98 formed on it, and a compression spring 100 abutting against this head and against the bushing 92 serves to normally hold the plunger in the position shown in Fig. 9. The bracket has a slot 102 formed in it adjacent the opposite end of the plunger, and a member 104 is pivotally supported in this slot by a pin 106 which extends through the member and fits into the bracket. The member 104 is received in a slot in the plunger and is connected thereto by a pin 108 which extends through a slotted opening 110 in the member 104. At the other end of the latter, a projection 112 is welded, and normally this projection bears upwardly against the lower edge of the plate 94, as shown in Fig. 9.

114 is a support which is welded or otherwise secured to the cylindrical member beneath the bracket 88, and 116 is a rod which extends through this support and through the bracket. Secured on the upper end of the rod by a nut 118 threaded on the rod is a lever 120, one end of which bears against a compression spring 122 held in a U-shaped strap 124, and the other end of which is held against the head 98 of the plunger. At its lower end, the rod 116 has a pin 126 secured in it, and this pin projects outwardly therefrom at such an angle that it is adapted to be engaged by a stud 128 which is secured in and extends upwardly from the plate 38, such engagement taking place once for each revolution of the plate. As the stud engages the pin 126, it moves the latter outwardly, thereby rotating the rod 116 and swinging the lever 120 in a counterclockwise direction as viewed in Fig. 4. This causes the spring 122 to become compressed between the lever and the strap 124, and as soon as the stud has moved on past the pin 126, the spring 122 serves to snap the lever in a clockwise direction, and during such movement, it engages the head 98 of the plunger, striking the latter a rather sharp blow, which causes the plunger to move rapidly toward the left, as viewed in Fig. 9. This results in the member 104 being swung about its pivot 106, thereby swinging the projection 112 downwardly momentarily to a position wherein it will lie just above the upper ends of the clinch nuts which are sliding down the rod 84, and if there are any nuts which have become

lodged in the wrong position on the rod or are caught on top of other clinch nuts sliding down the rod, they will be engaged by the projection 112 and will be dislodged so that they may fall downwardly into the lower portion of the hopper. The spring 100 serves to return the plunger and the lever to normal position again, so that when the plate 38 makes another revolution, the stud 128 will again engage the pin 126 to repeat the cycle of operation just described.

After the clinch nuts leave the hopper on the rod 84, they enter a chute designated generally by the numeral 130, which chute is shown in cross-section in Figs. 7 and 8, and which is made up of a square rod 132, a plate 134, spacers 136 and strips 138 and 140. The rod 132 is of the same size and shape as the rod 84 and forms a continuation thereof, and the clinch nuts when leaving the hopper fit over it in the same manner as they fit over the rod 84. The rod 132 is secured to the plate by countersunk rivets 142, while the strips 138 and 140 are secured thereto by rivets 145 which pass through the spacers 136.

At its upper end where it is connected to the hopper, the chute is in such position that the plate 134 is on the bottom with the rod 132 secured to its upper face, so that the base portion 62 of the clinch nuts rests on top of the rod with the projections 66 extending downwardly over the sides of the rod. Since it is desired to have the clinch nuts be in the opposite position, i. e., with the flanges extending upwardly, when the nuts are fed into the clinching portions of the machine, the chute is twisted downwardly in such manner that it will be turned upside down, so that when it approaches a horizontal position adjacent the table 144 of the press, the plate 134 will be at the top of the chute with the rod 132 hanging downwardly therefrom. At this point, the clinch nuts are supported by the strips 138 and 140, the base portion 62 of the nuts resting on top of the strips, and the projections 66 extending upwardly straddling the rod 132 to guide the nuts in their passage through the chute, as shown in Fig. 8.

Referring to Figs. 5 and 7, a pair of brackets 146 are secured to the table 144, and these brackets have pointed set screws 148 extending through them, the points projecting into depressions formed on lugs 150 welded to opposite sides of the chute. This provides a pivotal support for the chute at this point, so that the portion which extends to the right as shown in Fig. 5 may move upwardly or downwardly a limited amount about this pivot point, for a purpose to be presently described.

Mounted on the table 144 is a guide 152 to which a stationary anvil 154 is secured by screws 156. Slidably supported in the guide is a movable anvil 158, there being pins 160 secured in the anvil 154, which pins extend through openings formed in the anvil 158. A compression spring 162 surrounds each of the pins 160, lying in a counterbore formed in each of the anvils, the purpose of the springs being to normally urge the anvil 158 away from the anvil 154 so that it will be spaced a slight distance away therefrom, as shown in Fig. 6.

Located between spaced lugs 164 on the guide 152 and pivotally connected thereto by a pin 166 is a lever 168 which extends downwardly beneath the table 144 and which has its lower end connected by a link 170 to the armature 172 of a solenoid 174. A hardened pin 176 secured in the lever just below the pivot pin 166 bears against the anvil 158, and it will be seen that as the solenoid is energized, the lower end of the lever will be pulled to the right, as viewed in Fig. 6, and since the hardened pin 176 bears against the anvil 158, the latter will be moved toward the stationary anvil 154.

As stated above, the lower end of the chute is free to pivot about the point 148. It is normally supported in the position shown in Fig. 5 by a compression spring 178 which surrounds a rod 180 extending downwardly through an opening in the table 144 to a point below the latter. The upper end of the rod 180 is connected by a pin 182 to a lug 184 welded to the underside of the chute, and the lower end of the spring 178 bears against the table 144 while the upper end bears against the lug 184 to urge the chute upwardly, the upward movement being limited by the engagement of a nut 186, threaded on the rod, with the under side of the table.

The chute is of course full of clinch nuts, and when it is in the position shown in Fig. 5, the clinch nut held at the end of the chute is in line with the tops of the anvils, and is forced by the weight of the column of nuts behind it out into recesses 188 and 190 formed in the upper portions of the anvils 154 and 158 respectively, these recesses being shaped to conform to the shape of the clinch nut, as shown in Fig. 6.

Referring now to Fig. 5, secured to the upper surface of the chute adjacent the end thereof is a member 192, and when the plate 70 that the clinch nuts are to be secured in is rested on top of the member 192, the weight of the plate causes the chute to pivot about the point 148 and to be forced downwardly against the compression of the spring 178. This movement causes the rod 180 to be moved downwardly and results in a projection 194, secured to the lower end of the rod, engaging an arm 196 of a switch 198 which is supported on a bracket 200 mounted on a brace 202. This closes an electric circuit which energizes the solenoid 174, with the result that through the lever 168 the anvil 158 is moved toward the anvil 154, so that the clinch nut located in the openings 188 and 190 in the upper ends of the anvils is clamped between the two, and is therefore held firmly in position while the plate 70 is moved down over it so that the projections 66 on the clinch nut may enter the aperture 68 in the plate. The solenoid 174, lever 168, rod 180, switch 198 and associated parts are all enclosed in a housing 204 which is suspended from the lower surface of the table 144.

It will be noted that the clamping and holding action of the anvils takes place as soon as the end of the chute starts to move downwardly, so that before the plate can come into contact with the clinch nut, the latter will be firmly held. This is necessary because the plates that the clinch nuts are to be assembled to are usually relatively large and heavy and consequently are rather difficult to handle, while the clinch nuts are small and light and therefore might be easily displaced in the anvils so that they would not fit correctly into the apertures in the plate.

The reciprocating member 22 has an extension 206 secured to it, and mounted in this extension is a tool 208 which is adapted to engage the upstanding projections 66 on the clinch nuts after they have been inserted into the openings

in the plate 70 and to clinch them over into the position shown in Fig. 11. To perform this operation, the foot pedal 210 is depressed and through the rod 212 the clutch 214 is engaged to cause rotation of the crankshaft 20, resulting in downward movement of the member 22. This of course causes the tool 208 to be forced downwardly bending over the projections 66 on the clinch nut, the latter being firmly held before and during this operation as previously described.

As soon as the projections on the clinch nut have been bent over, it is desired to release the clinch nut from the anvils in order that the plate 70, to which the clinch nut is now attached, may be moved on to the next position. To accomplish this, a cam 216 is secured to one end of the crankshaft, and lobe 218 on this cam is adapted to engage a roller 220 held in an arm 222 of a switch 224 immediately after the tool 208 has reached its lowermost position. This opens the electric circuit leading to the solenoid 174, with the result that the clamping action of the anvils is released, and thereupon the clinch nut which was held therein but which has now been attached to the plate, may be lifted out of the anvils. After the lobe 218 has passed beyond the roller 220, the arm 222 returns to its normal position closing the circuit so that the solenoid may be energized again as soon as the chute has been depressed slightly by the weight of the plate 70, in order that the next clinch nut, which by this time has been pushed out of the chute into the recesses in the anvils, may be held between them in the same manner.

Since there are a great many of the clinch nuts sliding downwardly in the chute, the combined weight of them is considerable, and in order to hold them back while the clinching operation is being performed, the following mechanism is provided. As shown in Fig. 5, a bracket 226 is secured to the underside of the chute, and a lever 228 is connected to this bracket by a pin 230. A yoke 232 is attached to the intermediate portion of the lever by pin 234, and a rod 236 threaded into the yoke extends downwardly through a hole in the table 144, there being a compression spring 238 surrounding the rod between the table and the yoke. As soon as the chute is depressed the slightest amount by the weight of the plate 70, the end of the lever 228 which is connected to the bracket 226 will be forced downwardly, and since downward movement of the yoke 232 is yieldingly resisted by the spring 238, the lever will fulcrum about the pin 234 as a pivot point, this causing the end 240 of the lever to swing upwardly until it engages the lower ends of the tubular shank 64 of the clinch nuts immediately above it in the chute. This holds the engaged clinch nuts in position in the chute and prevents them from being pushed along in the chute by the weight of the column of clinch nuts behind and above them in the chute, which movement if permitted might interfere with the feeding of a single clinch nut at a time into proper position in the anvils.

While I have disclosed a particular form of device embodying the invention, it will be understood that various changes may be made in the details of construction or operation of the device without departing from the spirit or scope of the appended claims.

I claim:

1. In a machine of the type described, the combination of a hopper adapted to receive a quantity of articles in a mixed condition, a chute leading from the hopper into the machine, a member projecting from the chute into the hopper, a portion of said hopper being rotatable to arrange the articles in such position that they become caught upon the member and may slide on the latter into the chute to be fed into the machine, reciprocatory means located adjacent the point where the articles enter the chute to remove any articles which may have become caught in an incorrect position upon the member, and a stud extending upwardly from the rotating portion of the hopper and adapted to engage said means to reciprocate it intermittently.

2. In a machine of the type described, the combination of a hopper adapted to receive a quantity of articles in a mixed condition, a chute leading from the hopper into the machine, a member extending from the chute into the hopper, a portion of the hopper being rotatable to arrange the articles in such position that they become caught upon the member and may slide on the latter into the chute to be fed into the machine, and means located adjacent the point where the articles enter the chute to remove any articles which may have become caught in an incorrect position upon the member, said means being actuated intermittently by the rotating portion of the hopper.

3. In a clinch nut press, the combination of a hopper adapted to receive a quantity of clinch nuts in a mixed condition, said hopper being mounted in an inclined position so that the clinch nuts accumulate in the lower portion thereof, a chute leading from the hopper into the press, a rod forming part of the chute and extending into the hopper, a rotatable plate forming the bottom wall of the hopper, said plate when rotated serving to carry the clinch nuts from the lower to the upper portion of the hopper from which they fall downwardly, some of the nuts in so falling becoming caught upon the rod and sliding along the latter into the chute to be fed into the press, and a reciprocating member located adjacent the point where the nuts enter the chute adapted to dislodge from the rod any nuts which may have become caught in an incorrect position thereon, said member being intermittently actuated by the rotatable plate.

4. In a clinch nut press, the combination of a hopper adapted to receive a quantity of clinch nuts in a mixed condition, said hopper being mounted in an inclined position so that the clinch nuts collect in the lower portion thereof, a chute leading from the hopper into the press, a rod forming part of the chute and extending into the hopper, a rotatable plate forming the bottom wall of the hopper, a plurality of fins secured to the plate, said fins when the plate is rotated serving to carry some of the clinch nuts from the lower to the upper portion of the hopper where they fall downwardly away from the fins onto a blade which guides them over the top of the rod, some of the clinch nuts becoming caught upon the rod and sliding along the latter into the chute to be fed into the press, and an upstanding flange formed on said blade adjacent to said rod, said flange serving to assist in causing the clinch nuts to become caught upon the rod.

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