

June 20, 1939.

H. A. TOMKINS

2,163,440

RIVETING MACHINE AND THE LIKE

Original Filed Dec. 7, 1935

5 Sheets-Sheet 1

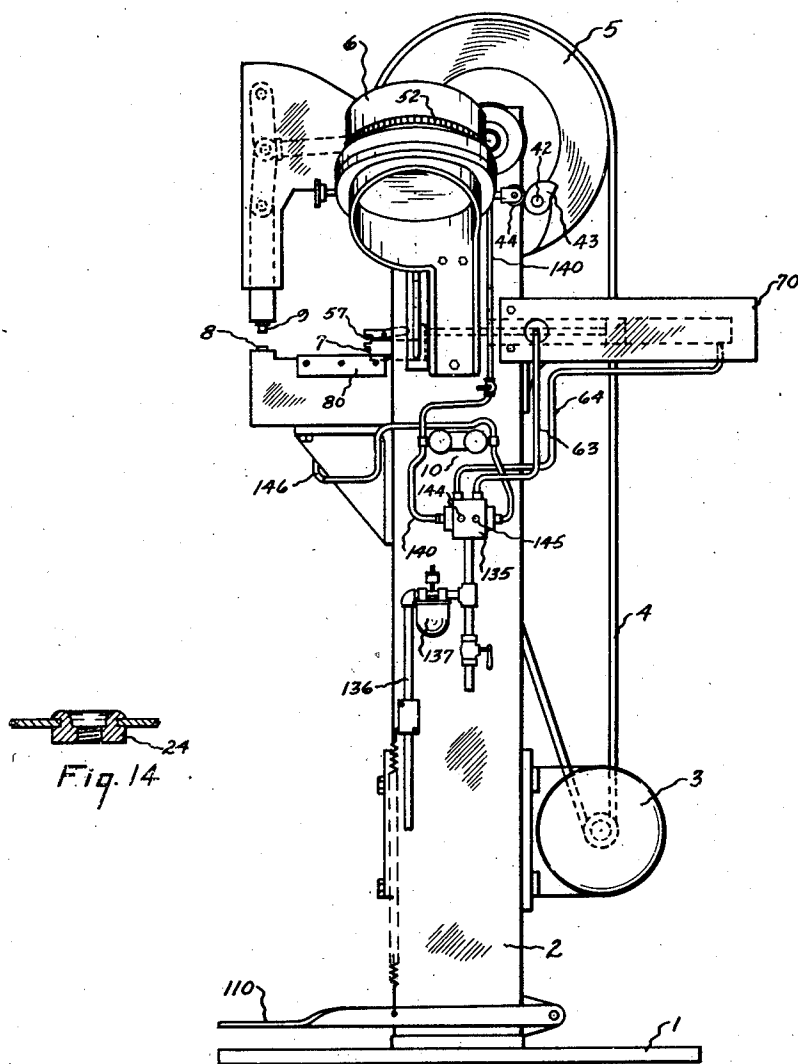


Fig. 1

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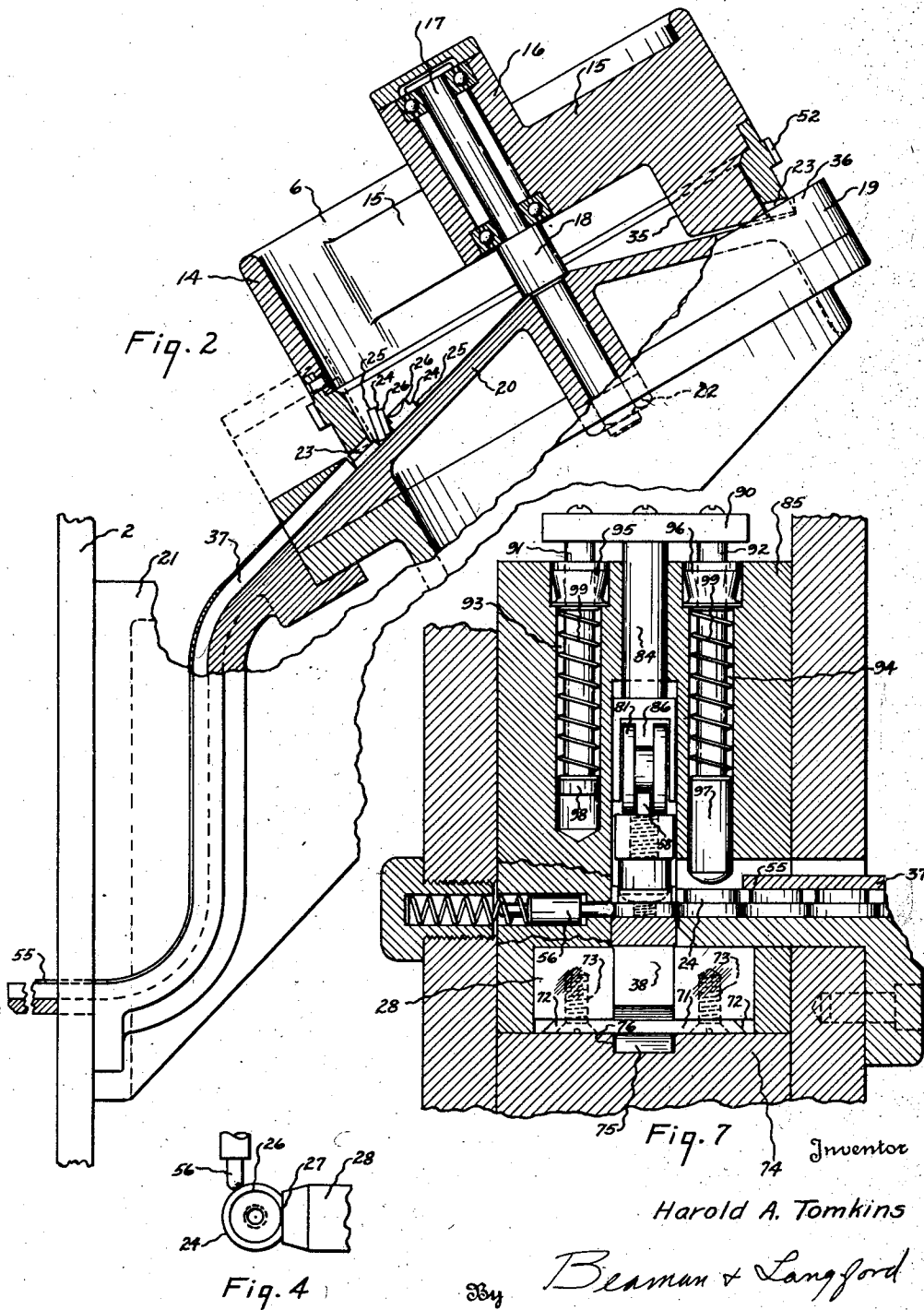
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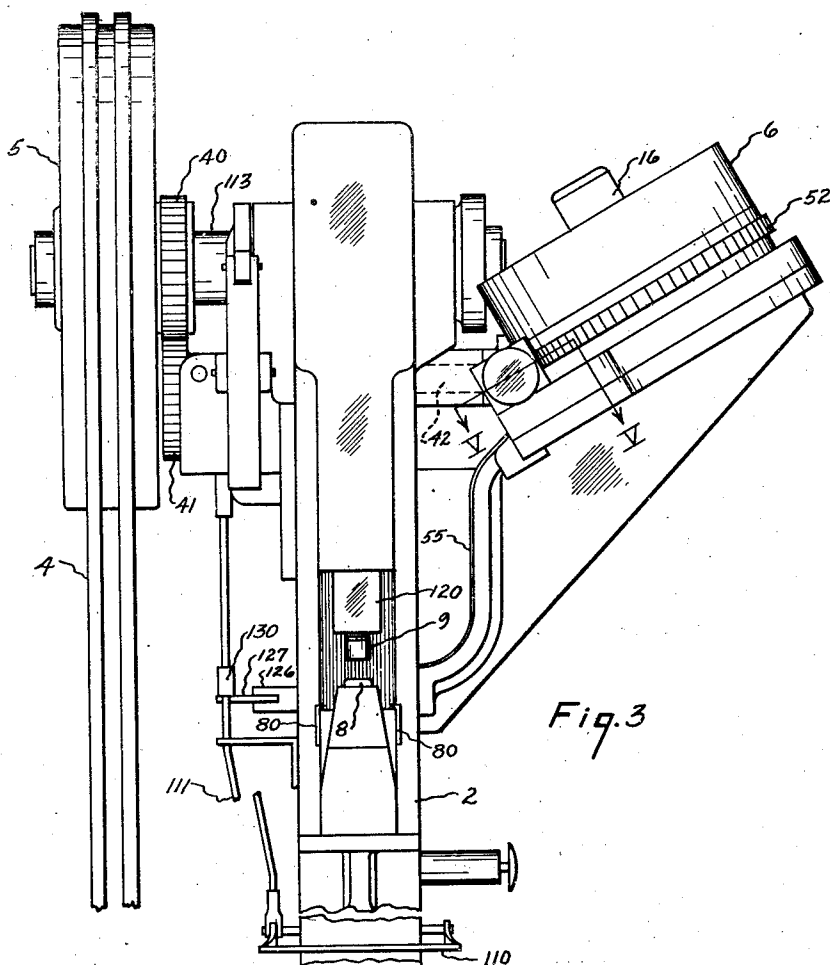


Fig. 3

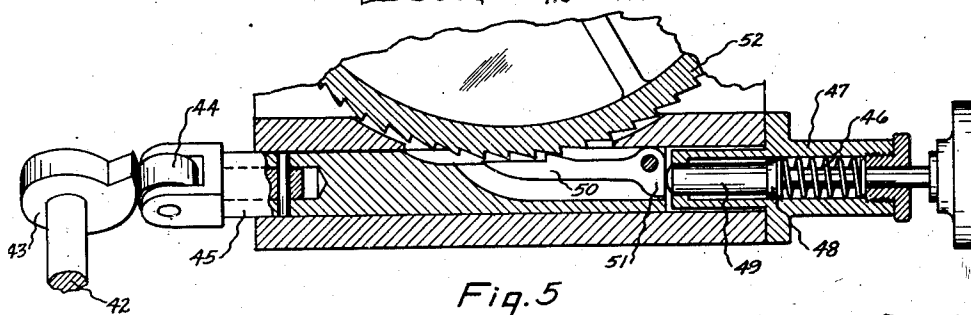


Fig. 5

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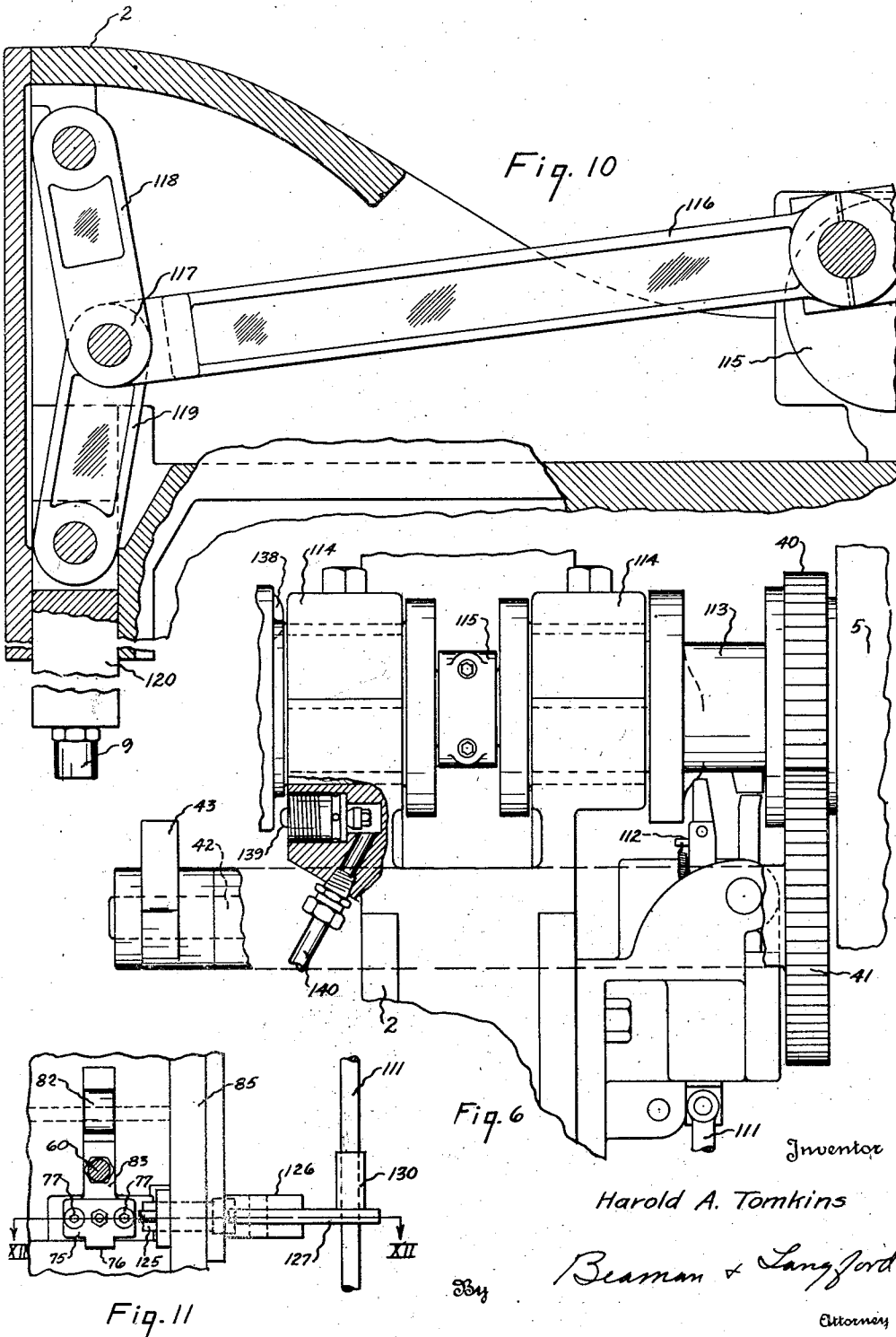
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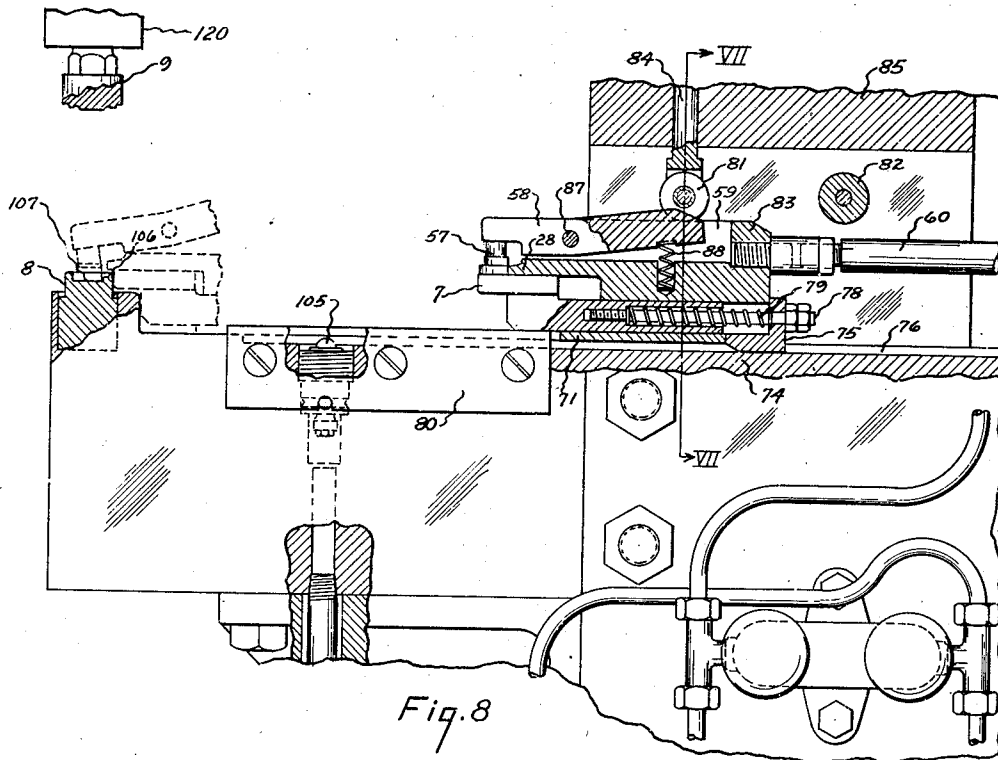


Fig. 8

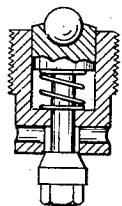


Fig. 13

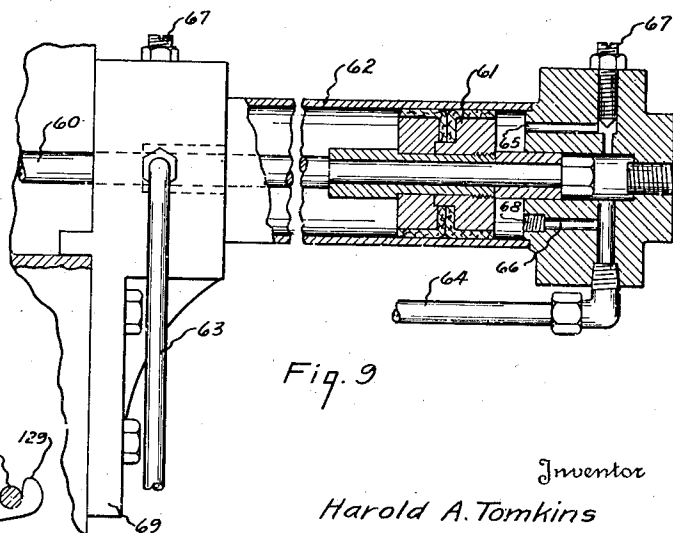


Fig. 9

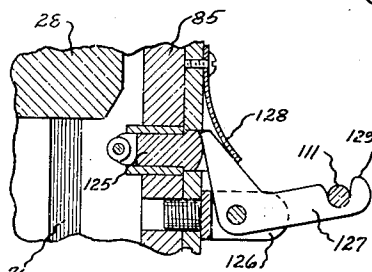


Fig. 12

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UNITED STATES PATENT OFFICE

2,163,440

RIVETING MACHINE AND THE LIKE

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Application December 7, 1935, Serial No. 53,404
Renewed September 26, 1938

15 Claims. (Cl. 218—2)

The present invention relates to riveting machines and the like and more particularly to semi-automatic machines for clinching clinch nuts in holes in sheet metal plates.

In working with sheet metal it is often desirable that holes therein be tapped for receiving bolts or screws for one purpose or another in order to provide the necessary strength. It is a common practice instead of drilling and tapping holes in the sheet metal itself to clinch internally threaded bushings known as clinch nuts in holes. The present machine although it has numerous riveting and clinching applications is particularly adaptable to clinching clinch nuts in holes in sheet metal.

An object of the present invention is to provide a machine for automatically depositing clinch nuts or the like on an anvil and during the same cycle of automatic operation upsetting or clinching the clinch nuts or the like on the work operated upon.

Another object of this invention is to provide a machine of the character described having its feeding mechanism automatically controlled by compressed air or the like.

A further object of this invention is to provide a safety lock to permit the cycle initiating mechanism to operate only at a predetermined period in the operation of the cycle.

A still further object of this invention is to provide an improved mechanical movement for effecting the operating movement of the upsetting or clinching die.

Other objects which include a novel, effective and efficient arrangement and combination of elements will be apparent from the following specification when taken with the accompanying drawings in which:

Fig. 1 is a side elevation of the complete machine comprising the present invention,

Fig. 2 is a broken away section of the hopper and clinch nut conveying chute,

Fig. 3 is a front elevation of the upper portion of the machine in a somewhat larger scale than that of Fig. 1,

Fig. 4 is a detail showing the clinch nut feeding ram and the locating stop for the clinch nut when it is fed on the feeding carriage,

Fig. 5 is a partial section on the line V—V of Fig. 3 disclosing the hopper rotating mechanism,

Fig. 6 is a broken away portion of the upper end of the right side of Fig. 1,

Fig. 7 is a section on the line VII—VII of Fig. 8 with the clinch nut transferring carriage and ram in extreme retracted position,

Fig. 8 is a broken away section of a part of the machine showing the clinch nut transferring carriage and ram together with the clinch nut receiving anvil and die cooperating therewith,

Fig. 9 is a broken away section showing the clinch nut transferring carriage and ram operating piston and cylinder together with air connections therewith,

Fig. 10 is a broken away section showing the upsetting or clinching die operating mechanism,

Fig. 11 is a side elevation of a portion of the machine showing the safety catch and is the opposite side of the machine from that shown in Fig. 3,

Fig. 12 is a section on the line XII—XII of Fig. 11,

Fig. 13 is a detail showing the vertical section on the pressure releasing valve operated by a shoe on the clinch nut transferring carriage at the end of its forward movement, and

Fig. 14 is a detail showing a vertical section of a clinch nut clinched to a piece of sheet metal.

Referring particularly to Fig. 1 of the drawings the reference character 1 indicates a base on which the frame 2 is supported. The power for driving the machine is supplied by a motor 3 which is connected by a belt 4 to the driving pulley 5. The clinch nuts to be operated on by the machine are placed in a hopper 6 from which they are fed to a carriage 7 which deposits them on an anvil 8 in position to be clinched or upset on the work by the die 9. Automatically and manually operable controlling mechanism hereinafter described control the movement of the carriage 7.

Fig. 2 discloses a broken away section of the hopper 6. The hopper comprises a rotary cylindrical shell 14 having an internal spider 15 supporting a bearing structure 16 into which is fitted a fixed spindle 17. The spindle 17 is provided with a shoulder 18 against which said bearing structure rests whereby the shell 14 is supported for rotary movement. The base 19 of the hopper comprises a conical bottom frame 20 mounted on a bracket 21 secured in any suitable manner to the main frame 2. As will be particularly apparent from Fig. 2 the spindle 18 extends from the vertex of the conical frame 20 and is clamped to the bottom frame 20 by the nut 22. At the lower edge of the shell 14 are disposed a plurality of slots 23 each one being of such a size and configuration as to receive a single clinch nut 24 in a predetermined relative position. As disclosed in Figs. 2 and 4 the clinch nuts 24 have on one side a flange 25 and on the other side a circum-

ferential tapered clinching lip 26. The clinch nuts 24 are also provided with a flat side 27 against which a ram 28, later described, acts to position the clinch nuts 24 on the anvil 8.

5 A stirring vane 35 is made a part of one of the spider arms 15 at the outer end thereof and extends to adjacent the conical base frame 20 for the purpose of stirring and tumbling the clinch nuts 24 in the hopper to dispose one of them in each of the slots 23 in a predetermined relation thereto. The base 19 is provided with an up-
10 standing ledge 36 which surrounds the lower edge of the shell 14 and prevents clinch nuts 24 in the slots 23 from escaping. At one side of the hopper, arranged to communicate successively with the slots 23 as the hopper is rotated, is provided an inclined chute 37 into which the clinch nuts 24 gravitate from the slots 23 and from which they are fed onto a carriage 7. From the carriage
15 7 the clinch nuts 24 are transferred to the anvil 8 by joint movement of the carriage 7 and the ram 28.

The hopper 6 is rotated by mechanism particularly disclosed in Figs. 5 and 6. Referring particularly to Fig. 6 the pulley 5 driven by the belt 4 from the motor 3 drives the gear 40 which in turn drives another gear 41 mounted on the end of a shaft 42 suitably journaled in the machine frame 2. A cam 43 shown in both Figs. 5 and 6
20 is mounted on the opposite end of the shaft 42 from the gear 41 and acts against a roller follower 44 mounted on a plunger 45, resiliently but indirectly urged against the cam 43 by the spring 46. The spring 46 bears against the shoulder 48
25 on the pin 49 to urge the pin 49 into engagement with a pawl 50 pivoted on the plunger 45. The pawl 50 has an offset arm 51 angularly disposed with respect to the pawl 50, against which the pin 49 bears directly, making the pawl 50, in effect, a bell crank. The action of the spring
30 46 in addition to urging the plunger 45 and consequently the roller follower 44 against the cam 43 is to urge the pawl 50 into contact with the annular ratchet 52 which encircles the hopper shell 14. It will be thus obvious that as the shaft 42 is rotated, the cam 43 will cause a reciprocation of the plunger 45 and with it the pawl 50 to impart to the hopper 6 through the annular ratchet 52 an intermittent rotary motion.

35 The lower end of the chute 37 terminates in a horizontal portion 55 as shown more particularly in Fig. 7, where when the carriage 7 is in a predetermined position, the weight of the clinch nuts 24 in the inclined chute 37 urges the clinch nuts 24 onto the outer end of the carriage 7. In order to prevent the clinch nuts 24 from being forced over the carriage 7 a resiliently urged stop 56 is provided. As shown particularly in Fig. 4 when the clinch nuts 24 are delivered to the carriage 7
40 the flat sides 27 thereof are adjacent the ram 28. After a nut has been disposed on the carriage 7 and is about to be transferred to the anvil 8 it is held against accidental displacement by the retaining pin 57 on the outer end of the lever 58 pivoted in an open ended slot 59 in the ram 28 as shown in Fig. 8.

The carriage 7 and the ram 28 are arranged to be reciprocated by the piston rod 60 shown in Figs. 8 and 9, which is in turn actuated by the
45 piston 61 shown in Fig. 9. The piston 61 is reciprocated in a cylinder 62 by compressed air or other suitable fluid alternately entering and exhausting through tubes 63 and 64 as determined by the controlling mechanism 10 shown in Fig. 1.
50 The ports 65 and 66 communicating with the

cylinder 62 may be reduced in size, respectively, to decrease the speed of operation of the piston 61 by screwing down the screw 67 and/or inserting a bushing in the threaded bore 68. The cylinder 62 and its associated structure are secured
5 to the main frame 2 by a bracket 69 and are provided with a guard 70 shown in Fig. 1.

The carriage 7 is mounted for relative movement on a plate 71 shown particularly in Figs. 7 and 8, having beveled edges 72. The plate 71 is
10 secured by screws 73 to the ram 28 and is slidably mounted on the slideway 74 comprising a part of the frame 2. Also secured to the ram 28 is a shoe 75 slidably disposed in a groove 76. The shoe 75 is secured to the ram 28 by screws 77
15 as shown particularly in Fig. 11. Slidably passing through the shoe 75 and threadably secured to the carriage 7 is a bolt 78 on which is mounted a spring 79, the action of the spring 79 being that of yieldingly urging the carriage and the ram
20 apart a predetermined distance but permitting the ram to slide relatively to the carriage adjacent the forward end of its movement, that is, to the left as shown in Fig. 8. It will be obvious that the plate 71, the carriage 7 and the shoe 75
25 are secured together and moved together as a unit. As shown in Figs. 3 and 8 plates 80, cooperating with the beveled edges 72 of the plate 71, are provided for laterally guiding the carriage 7 and ram 28 unit during the greater part of its
30 outer movement.

Disposed directly over the ram 28 are rollers 81 and 82. The roller 81 is mounted on a rod 84 slidably mounted in the frame 85 so that as the ram 28 is reciprocated by the piston rod 60, the
35 rod 84 is elevated during that portion of the movement of the ram 28 that the high portion 83 of the ram is directly beneath the roller 81, that is, the roller 81 is cammed upwardly by the high portion 83 of the ram 28. As shown particularly
40 in Fig. 7 the roller 81 is composed of two portions spaced to provide a clearance 86. As shown particularly in Figs. 7 and 8 the lever 58, pivoted about the pivot 87 in the slot 59 in the ram 28 and urged upwardly at one end by the spring 88, is
45 thus straddled by the roller 81.

The rod 84 has mounted on the upper end thereof a yoke 90 to the ends of which there are secured depending rods 91 and 92 extending into
50 bores 93 and 94, respectively. The top end of each bore is enlarged and has press fitted therein bushings 95 and 96. The lower end of the rod 92 has connected thereto a pin 97 and the lower end of the rod 91 has a stop 98. Disposed on the rods 91 and 92 between the bushings 95 and 96
55 and the stop 98 and pin 97, respectively, are springs 99. The springs 99 have the function of urging the rod 84, its yoke 90 and associated movable structure, including the pin 97, downwardly. The purpose of the pin 97 is to, under certain conditions, engage with the last clinch nut 24 in the horizontal portion 55 of the chute 37 to prevent it from being moved. The rod 91, its stop 98 and its spring 99 are for the purpose of balancing the yoke 90 structure.
60

Consider the carriage 7 and ram 28 as returning from the anvil 8. As the high portion 83 of the ram 28 moves against the roller 81, the rod 84 and consequently the yoke 90 and pin 97 are lifted to free the last clinch nut 24 in the horizontal portion 55 of the chute 37. Further movement of the last clinch nut 24 toward the carriage at this portion of the cycle of operation is prevented by its direct engagement with the side of the ram 28. As the carriage 7 and ram 28 con-
65 75

tinue to move to the right as shown in Fig. 8 the lever 58 contacts with the roller 82 is rotated about its pivot 87. The purpose of this operation is to lift the retaining pin 57 away from proximity to the carriage 7 to permit the weight of the clinch nuts 24 in the inclined chute 37 to push the last clinch nut 24 on the carriage 7 against the resilient stop 56 and beneath the retaining pin 57. At this point in the operation the carriage 7 and the ram 28 has reached the rightmost limit of their stroke. On the movement of the carriage 7 and ram 28 toward the anvil 8 the lever 58 moves from beneath the roller 82 permitting the pin 57 to drop into the recess in the top of the clinch nut 24 now on the carriage 7. On continued movement, the ram 28 moves from beneath the roller 81 permitting the rod 84, the yoke 90 and the pin 97 to lower, the pin 97 fitting into the recess at the top of the last clinch nut 24 in the horizontal portion 55 of the inclined chute 37, just before the ram 28 moves from retaining contact with the last clinch nut 24.

The movement of the carriage 7 continues until it butts against the anvil 8. Then the ram 28, against the action of the spring 79, is moved forward to push the clinch nut 24 from the carriage 7 over the cutaway side 106 of the anvil 8 and into the recess 107 therein. At approximately the same time the shoe 75 riding in the groove 76 and connected to the carriage 7 strikes the exhausting valve 105, which results, in a manner to be explained, in a reversal in the direction of movement of the piston 61 in the cylinder 62 and consequently the piston rod 60, carriage 7 and the ram 28. On the return movement of the carriage 7 the pin 57 slides out of the recess in the top of the clinch nut 24 leaving the clinch nut 24 within the recess 107 in the anvil 8 in position to be clinched or upset by the die 9.

The operation of the machine is initiated by an operative applying pressure to the treadle 110 which action results in transmitting through the clutch rod 111 connected to the treadle 110 a cycle-initiating impulse to the clutch operating mechanism 112. The clutch operating mechanism 112 may be of any standard type where in a single initiating impulse results in the movement of the associated mechanism through an entire cycle, although it is preferred that it be like that disclosed in the copending application of Robert Hofstetter, Serial No. 36,061, filed August 14, 1935, now Patent Number 2,091,362, granted August 31, 1937. The main shaft 113 driven from the pulley 5 is journaled in bearings 114 mounted in the main frame 2. To the shaft 113 at the portion thereof adjacent the main portion of the frame 2 is secured a crank 115 about which is journaled one end of a connecting rod 116. The connecting rod 116 is pivoted to the center of a toggle 117, the toggle comprising links 118 and 119. One end of the toggle is pivoted to the main frame 2 while the other end is pivoted to a cross head 120. The clinching die 9 is secured to the cross head 120 so that as the shaft 113 is rotated by the pulley 5 the connecting rod 116 is reciprocated by the crank 115 to operate the toggle 117, which in turn reciprocates the cross head 120 and the clinching die 9. The connecting rod 116 is connected to the crank 115 and the toggle 117 in such a manner that as the toggle is straightened out the crank 115 is on dead center toward the toggle 117 thus resulting in both the toggle and the crank delivering a maximum force at the same time.

A safety device not essential to the operation

of the machine but highly desirable is disclosed particularly in Figs. 11 and 12. Fig. 11 is that portion of the machine which is a continuation of the lower part of Fig. 6 the opposite side of which is included in Fig. 3.

Referring particularly to Fig. 12 the end of the ram 28 nearest the anvil 8 is shown. Extending into the path of the ram 28 through the frame 85 is a slidably mounted plunger 125. Pivoted in a bracket 126 secured to the frame 85 is a bell crank lever 127 which has cooperating therewith a spring 128 for urging, through the bell crank lever 127, the plunger 125 into the path of the carriage 7 and also urging the hooked outer end 129 of the bell crank lever 127 into engagement with the clutch rod 111. A collar 130 is secured to the clutch rod 111 in such a position that it can not be moved downwardly when the hooked end 129 of the bell crank lever 127 is in engagement with the clutch rod 111. Thus, it is only when the carriage 7 is in its rearward position where it has received the clinch nut 24 that the plunger 125 is cammed outwardly to release the hooked end 129 of the bell crank lever 127 from the clutch rod 111, that the clutch rod 111 can be lowered to initiate a cycle of operation of the machine.

The operation of my machine together with the description of the mechanism for controlling the compressed air for actuating the piston 61 is as follows: Referring particularly to Fig. 1 the compressed air controlling valve 135 of the type disclosed in the copending application of Oscar G. Tweddell, Serial No. 733,617, filed July 3, 1934, is secured to the main frame 2 of the machine. Briefly, the compressed air controlling valve 135 comprises a movable member for distributing compressed air alternately from an inlet to each end of the piston 61, the distributing member also controlling the exhaust. The movement of the distributing member is controlled by releasing pressure from the end of the cylinder, in which the distributing member is movable, toward which it is desired that the distributing member move. Compressed air is supplied to the distributing valve 135 through the inlet pipe 136 having in line therewith an oiling device 137.

At the completion of the previous cycle of operation a clinch nut has been disposed in the recess 107 in the anvil 8 and the carriage 7 and ram 28 have been retracted to their rearmost position, that is, to the right, as shown in Fig. 8. The first operation is to place the sheet metal on the anvil in such a manner that the tapered edge 26 of the clinch nut extends through the hole in the sheet metal in which the clinch nut 24 is to be secured. The operative then depresses the treadle 110 which operation draws down the clutch rod 111 and initiates a cycle of operation of the machine through the clutch controlling mechanism 112. Upon the beginning of the cycle of operation of the machine the crank 115 rotates to move the connecting rod 116 to straighten out the toggle 117 and force down the die 9 to upset or clinch the tapered ends 26 of the clinch nuts 24 over the edges of the hole in the sheet metal as shown particularly in Fig. 14. Continued rotation of the crank 115 withdraws the die 9 permitting the operative to remove the sheet metal with the secured clinch nut from the anvil 8. By this time the protuberance 138 rotated with the shaft 113 and the crank 115 and shown in Fig. 6 engages with the pressure releasing valve 139 to exhaust pressure from the left side of the compressed air controlling valve 135 shown in Fig. 1, through the

tube 140. The result of this exhausting is to provide a direct passage for compressed air from the inlet 136 through the controlling valve 135 to the right side of the cylinder 62 behind the piston 61, through the tube 64. The piston 61 is then driven to the left as viewed in Fig. 1 moving the clinch nut transferring carriage 7 which by this time has received the clinch nut from the horizontal portion 55 of the inclined chute 37 as illustrated in Fig. 7, and the ram 28 until the carriage 7 and ram 28 reach the dotted line position shown in Fig. 8 which is at the end of the extreme forward movement. During this movement the air in the opposite or left side of the cylinder 62 is exhausted through the tube 63 and the port 145, the latter being in the body of the controlling valve 135. In this position the shoe 75 contacts with the pressure releasing valve 105 to release the pressure in the right side of the compressed air controlling valve 135 through the tube 146. The result is that compressed air from the inlet 136 is conducted through the controlling valve 135 to the left side of the cylinder 62 through the tube 63. The piston 61 is then driven to the right, returning by means of the piston rod 60, the carriage 7 and the ram 28 to the extreme retracted position and leaving the clinch nut 24 in the recess 107 of the anvil 8. At the same time air from the right side of the cylinder 62 is exhausted through the tube 64 and the port 147 in the body of the controlling valve 135. A complete cycle of operation is thus completed and the operation of the machine stops until started again by depressing the treadle 110.

While the application of this machine has been described as securing clinch nuts to sheet metal it is not intended that it be so limited for it may be equally applicable to other riveting and upsetting operations. Furthermore, it is contemplated that if desirable other mechanism be employed to reciprocate the carriage 7 and the ram 28 although compressed air is desirable because in the event that the operative is unable to remove the work from the anvil 8 before the carriage moves to deposit another clinch nut on the anvil 8 or the machine is tripped with a clinch nut in the anvil 8, the impulsive action of the compressed air prevents the spoiling of the work or the damaging of the carriage.

Having thus described my invention what I desire to secure by Letters Patent and claim is:

1. A machine of the character described comprising a fixed anvil, a reciprocable carriage, means to dispose an upsettable member on said carriage and means to transfer the upsettable member from said carriage to said anvil.

2. A machine of the character described comprising an anvil, a source of supply of upsettable members, means to transfer said upsettable members from said source, one at a time, to said anvil, said means comprising a carriage and a ram for moving said upsettable member from said carriage to said anvil, and means to upset said members while on said anvil.

3. A machine of the character described comprising an anvil, a source for upsettable members, a carriage to convey said upsettable members, one at a time, to said anvil, means for conveying said upsettable members from said source to said carriage, means to upset said members while on said anvil, driving mechanism for said machine to operate said upsetting means, and means controlled by said driving mechanism to move said carriage toward said anvil and con-

trolled by said carriage to move said carriage away from said anvil.

4. A machine of the character described comprising an anvil, a source for upsettable members, a carriage to convey said upsettable members, one at a time, to said anvil, means for conveying said upsettable members from said source to said carriage, means to upset said members while on said anvil, driving mechanism for said machine to operate said upsetting means, controlling mechanism included in said driving mechanism for limiting said driving mechanism for operation during a single cycle of the machine only, means for imparting an actuating impulse to said controlling mechanism, and locking means controlled by said carriage to prevent operation of said impulse actuating means during predetermined positions of said carriage.

5. A machine of the character described comprising an anvil, a source of supply of upsettable members, means to transfer said upsettable members from said source, one at a time, to said anvil, said means comprising a carriage, a ram for moving said upsettable members from said carriage onto said anvil, and yieldable means for maintaining said carriage and ram in a predetermined relation but permitting said ram to be moved relatively to said carriage, and means to upset said members while on said anvil.

6. A machine of the character described comprising an anvil, a source of supply of upsettable members, means to transfer said upsettable members from said source, one at a time, to said anvil, said means comprising a carriage, a ram for moving said upsettable members from said carriage onto said anvil, means to upset said members while on said anvil, driving mechanism to operate said upsetting means, compressed air mechanism for reciprocating said carriage and ram, a source of compressed air and means for controlling the flow of compressed air to said compressed air mechanism, said means comprising a valve controlled by said driving mechanism and by said carriage.

7. A machine of the character described comprising an anvil, a reciprocable member arranged to receive an upsettable member to transfer the same to said anvil, a pivoted lever resiliently urged toward said reciprocable member and against said upsettable member to hold said upsettable member against displacement, and means to upset said member while on said anvil.

8. A machine of the character described comprising an anvil, a source of supply of upsettable members, means to transfer said upsettable members from said source, one at a time, to said anvil, said means comprising a carriage, a ram for moving said upsettable members from said carriage onto said anvil, and yieldable means for maintaining said carriage and ram in a predetermined relation but permitting said ram to be removed relatively to said carriage, a member pivoted on said ram yieldingly urged against the upsettable members on said carriage as they are transferred to prevent displacement, and means to upset said upsettable members while on said anvil.

9. A machine of the character described comprising an anvil, a source of supply of upsettable members, means to transfer said upsettable members from said source, one at a time, to said anvil, said means comprising a carriage, a ram for moving said upsettable members from said carriage onto said anvil, yieldable means

for maintaining said carriage and ram in a predetermined relation but permitting said ram to be moved relatively to said carriage, a lever pivoted to said ram resiliently urged toward said carriage and into engagement with the upsettable member on said carriage to prevent its displacement, a cam fixed with respect to said rim and carriage for camming said lever away from said carriage on a predetermined movement of said carriage and ram to permit an additional upsettable member to be disposed on said carriage, and means for upsetting said members while on said anvil.

10. A machine of the character described comprising an anvil, a source for upsettable members, means to transfer upsettable members from said source to said anvil, said means comprising a carriage, a ram for moving said upsettable members from said carriage onto said anvil, yieldable means for maintaining said carriage and ram in a predetermined relation but permitting said ram to be moved relatively to said carriage, and means for conveying under the action of gravity upsettable members from said source to said carriage, means resiliently urged against the last upsettable member in said gravity conveying means to prevent the feeding of the same, means cammed by said transferring means for removing said resiliently urged means to permit the last upsettable member in said gravity conveying means to move onto said carriage, said camming by said transferring means being timed with respect to the movement of said transferring means, and means to upset said members while on said anvil.

11. A machine of the character described comprising an anvil, a source for upsettable members, means to transfer upsettable members from said source to said anvil, said means comprising a carriage, a ram for moving said upsettable members from said carriage onto said anvil, yieldable means for maintaining said carriage and ram in a predetermined relation but permitting said ram to be moved relatively to said carriage, and means for conveying under the action of gravity upsettable members from said source to said carriage, a lever pivoted in said ram and yieldably urged toward said carriage against an upsettable member thereon for preventing displacement thereof, means fixed relatively to said transferring means to cam said lever away from said carriage at a predetermined movement of said carriage to permit another upsettable member to be disposed on said carriage upon movement of said transferring means adjacent thereto, means resiliently urged against the last upsettable member in said gravity conveying means to prevent the feeding of the same, means cammed by said transferring means for removing said resiliently urged means to permit the last upsettable member in said gravity conveying means to move onto said carriage, said camming by said transferring means being timed with respect to the movement of said transferring means, and means to upset said members while on said anvil.

12. A machine of the character described comprising an anvil, a source for upsettable members, means to transfer said upsettable members from said source to said anvil, said means comprising a carriage, a ram for moving said upsettable members from said carriage onto said

anvil, yieldable means for maintaining said carriage and ram in a predetermined relation but permitting said ram to be moved relatively to said carriage, and means for conveying under the action of gravity upsettable members from said hopper to said carriage, a lever pivoted in said ram and yieldably urged toward said carriage against an upsettable member thereon for preventing displacement thereof, means fixed relatively to said transferring means to cam said lever away from said carriage to permit another upsettable member to be disposed on said carriage upon movement of said transferring means adjacent thereto, means resiliently urged against the last upsettable member in said gravity conveying means to prevent the feeding of the same, means cammed by said transferring means for removing said resiliently urged means to permit the last upsettable member in said gravity conveying means to move onto said carriage, said camming by said transferring means being timed with respect to the movement of said transferring means, means to upset said members while on said anvil, driving mechanism for said machine to operate said upsetting means, and means controlled by said driving mechanism to move said carriage toward said anvil and controlled by said carriage to move said carriage away from said anvil.

13. A machine of the character described comprising an anvil, a source for upsettable members, reciprocable means for conveying upsettable members, one at a time, to said anvil, means for conveying said upsettable members from said source to said reciprocable means, means to upset said members while on said anvil, driving mechanism for said machine to operate said upsetting means, and means controlled by the driving mechanism to move said reciprocable means toward said anvil and controlled by said reciprocable means to move said reciprocable means away from said anvil.

14. A machine of the character described comprising an anvil, a source for upsettable members, reciprocable means to convey said upsettable members, one at a time, to said anvil, means for conveying said upsettable members from said source to said reciprocable means, means to upset said members while on said anvil, driving mechanism for said machine to operate said upsetting means, controlling mechanism included in said driving mechanism for limiting said driving mechanism for operation during a single cycle only of the machine, means for imparting an actuating impulse to said controlling mechanism, and locking means controlled by said reciprocable means to prevent the operation of said impulse actuating means during predetermined positions of said reciprocable means.

15. A machine of the character described, comprising an upsetting station including an anvil elevated above its adjacent associated structure to provide clearance upon all sides of said anvil and below the level thereof, a loading station located a substantial distance to one side of said first station, a source of supply of upsettable members, means for transferring said upsettable members from said source to said loading station, and a carriage for bodily supporting and transferring said upsettable members from said loading station to said elevated anvil.

HAROLD A. TOMKINS.

CERTIFICATE OF CORRECTION.

Patent No. 2,163,440.

June 20, 1939.

HAROLD A. TOMKINS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, line 10, for the word "has" read have; page 5, first column, line 7, claim 9, for "rim" read ram; and second column, line 6, claim 12, for "hopper" read source; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of August, A. D. 1939.

(Seal)

Henry Van Arsdale,

Acting Commissioner of Patents.