Oct. 6, 1936. H. A. BERLINER 2,056,559

PUNCHING AND RIVETING MACHINE

Filed Oct. 7, 1933 4 Sheets-Sheet 1

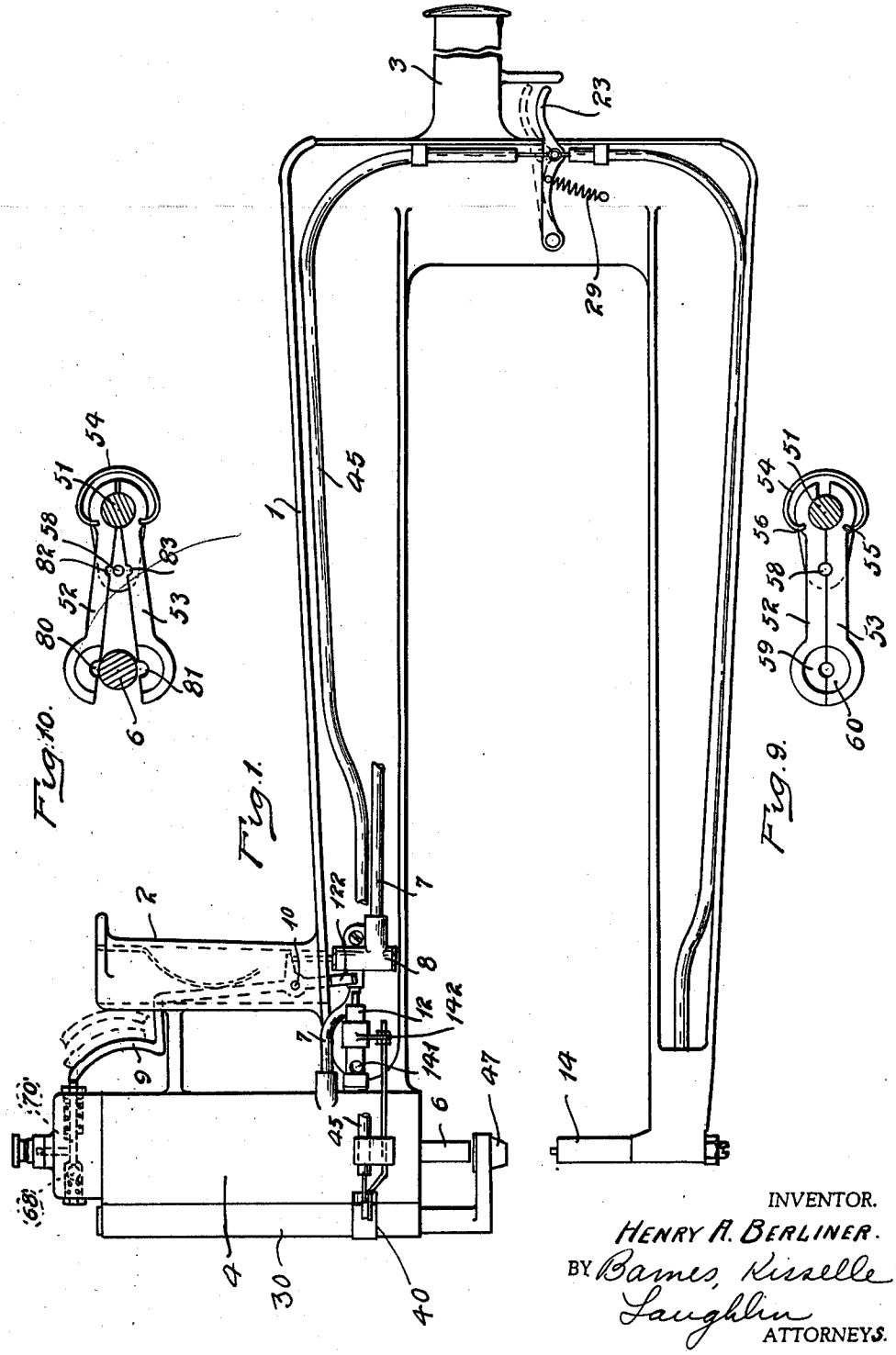


Fig. 10.

Fig. 1.

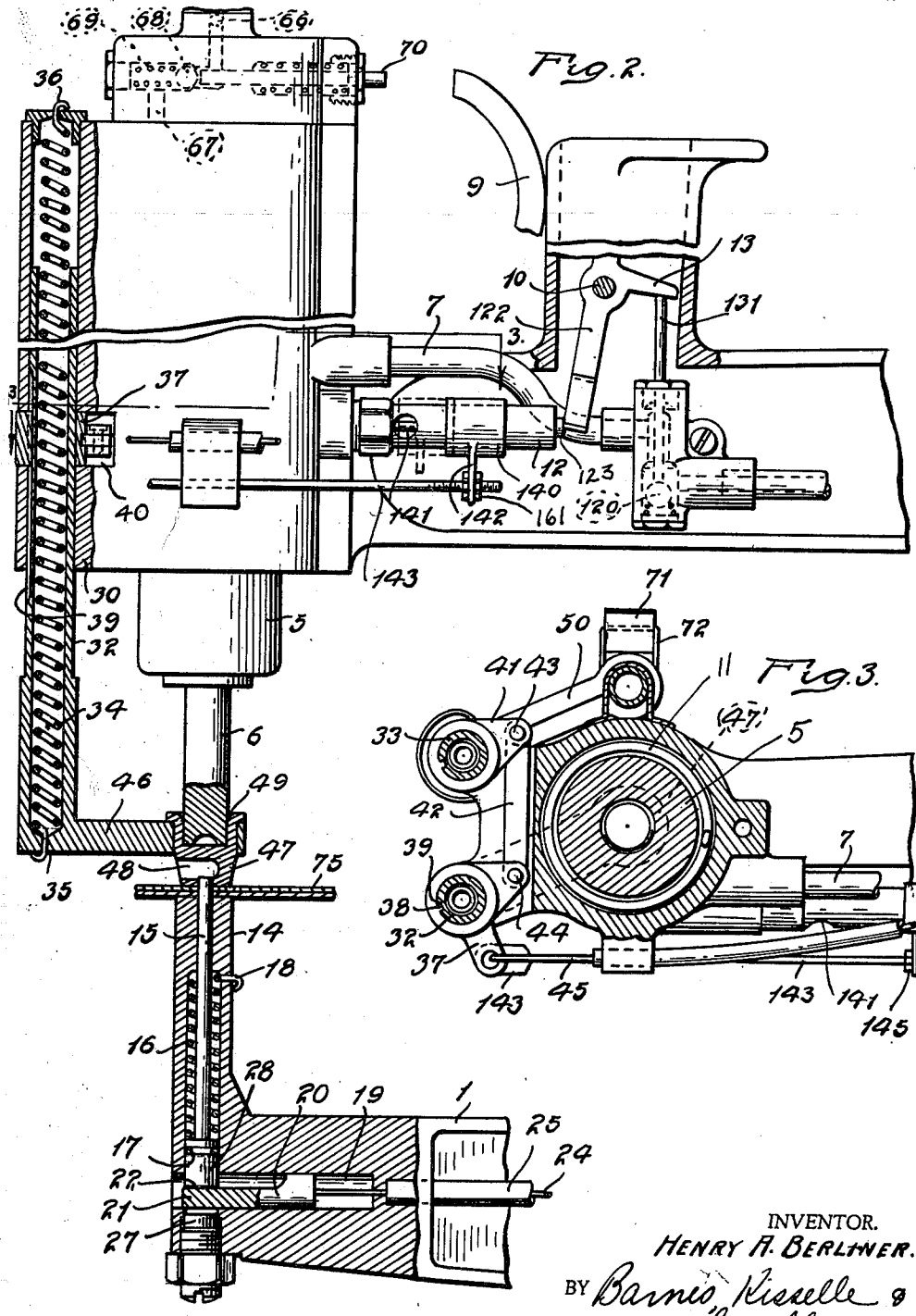
Fig. 9.

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Filed Oct. 7, 1933 4 Sheets-Sheet 2



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PUNCHING AND RIVETING MACHINE

Filed Oct. 7, 1933 4 Sheets-Sheet 3

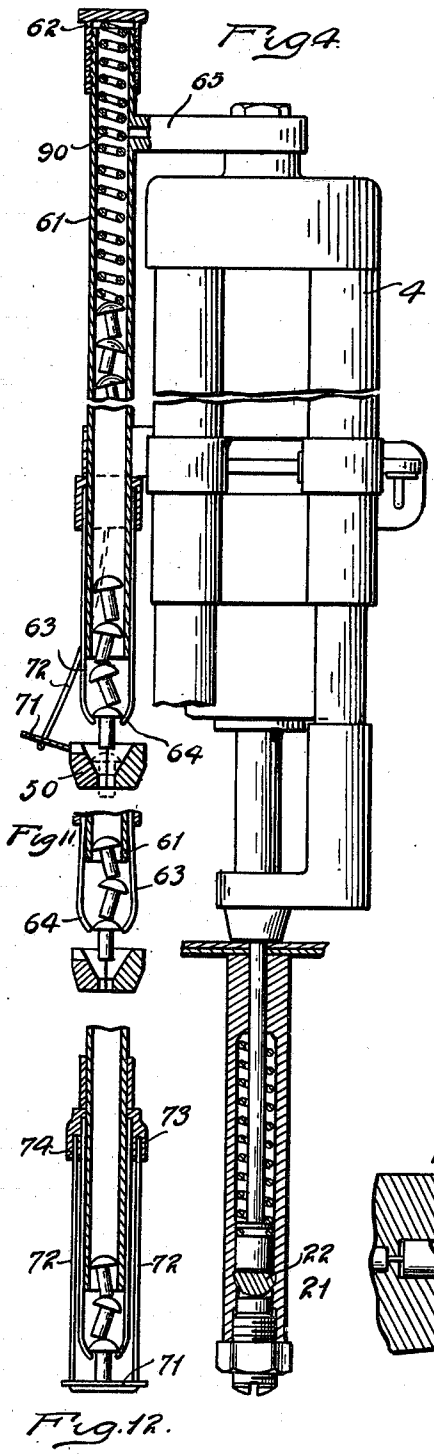


Fig. 4.

Fig. 11.

Fig. 12.

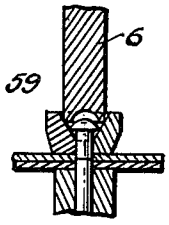


Fig. 7.

Fig. 5.

Fig. 6.

Fig. 8.

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Fig. 13.

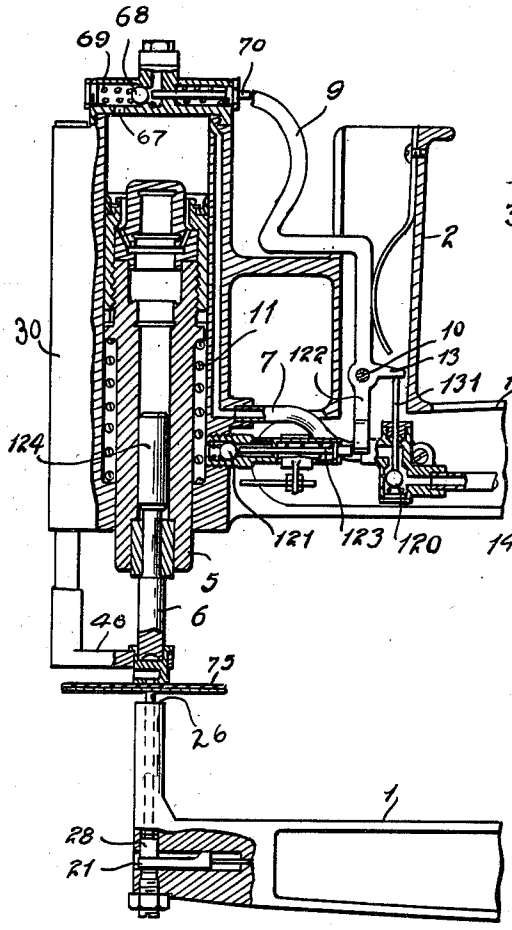


Fig. 14.

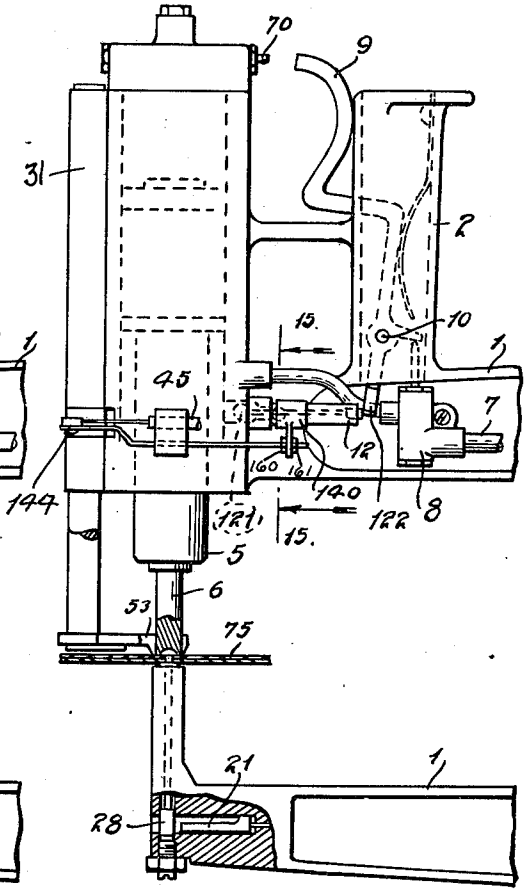
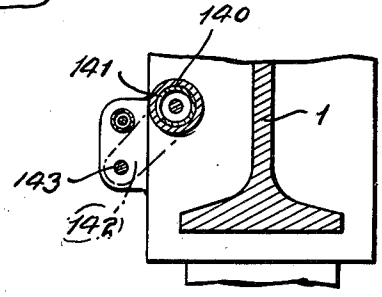


Fig. 15.



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UNITED STATES PATENT OFFICE

2,056,559

PUNCHING AND RIVETING MACHINE

Henry A. Berliner, Washington, D. C.

Application October 7, 1933, Serial No. 692,579

8 Claims. (Cl. 78—49)

This invention relates to a punching and riveting machine.

This invention contemplates a riveter which is sufficiently light so that it can be handled by the operator without the need of any mechanical means for suspending and transporting the same.

It has been found that it is not essential to punching the hole through the work or metal members which are to be riveted that the same should be accomplished by a single heavy blow but that the punching operation can be performed by a succession of lighter blows. In view of this discovery it is proposed to use a light motor of the vibrating or "single shot" type which gives a succession of light blows in performing the punching and riveting operations. In other words, it is proposed to punch by a succession of light blows rather than a single heavy blow. The energy content of each blow is preferably within the elastic limit or yield point of the metal, the yield point being a well known variable depending upon the kind and character of the metal being punched. This permits the use of a much lighter motor, preferably of the pneumatic type, which in turn cuts down the overall weight of the machine. This permits the weight to be sufficiently light so that the machine can be carried and transported by the operator unassisted by mechanical suspending and transporting means.

It has been found desirable in punching to use blows of a certain energy content and for riveting to use blows containing a different amount of energy. For example, in punching heavy material each blow would have such a large energy content that a like blow would completely flatten a soft rivet. Then too, in both punching and riveting, on certain occasions it is desirable to be able to regulate the energy content of the punching and riveting blows; for instance, this would permit a powerful machine to be used on light work by decreasing the intensity of the punching and riveting blows. This object has been achieved by throttling the exhaust which decreases the intensity of the blows.

It is also an object of this invention to provide a rivet feeder which is simple and certain in operation. This has been achieved by pneumatically ejecting the rivets from the rivet magazine into the rivet shoe and preferably by utilizing the exhaust pressure set up by the return stroke of the piston of the pneumatic motor for pneumatically feeding the rivets.

In the drawings:

Fig. 1 is a side elevation of the riveter.

Fig. 2 is an enlarged fragmentary side elevation partly in section of the riveter.

Fig. 3 is a section along the line 3—3 of Fig. 2.

Fig. 4 is a sectional view through the rivet magazine and punch showing the rivet shoe about to receive a rivet as the die retreats.

Fig. 5 is a view similar to Fig. 4 showing the shoe depositing the rivet in the punched hole just prior to the upsetting of the rivet.

Fig. 6 is a detail showing the position of the parts as the riveting is completed.

Fig. 7 is a section along the line 7—7 of Fig. 5.

Fig. 8 is a section along the line 8—8 of Fig. 6.

Fig. 9 is a section along the line 9—9 of Fig. 5.

Fig. 10 is a section along the line 10—10 of Fig. 6.

Fig. 11 is a detail of the lower end of the rivet magazine and rivet shoe as the rivet is being ejected from the magazine into the shoe.

Fig. 12 is a view of the lower end of the rivet magazine showing the rivet stop in place.

Fig. 13 is a vertical section showing the position of the parts just prior to the punching of the work by vibration.

Fig. 14 is an elevation showing the position of the parts with the exhaust throttled as the rivet is being upset by vibration.

Fig. 15 is a section along the line 15—15 of Fig. 14.

The machine preferably has a unitary C-shaped frame made from some such light metal as duraluminum. The frame 1 is provided with hand grips 2 and 3 by means of which the operator holds the machine while operating the same.

Since it is an object of the invention to produce a machine of the above mentioned type light enough that the ordinary man can support the same manually while using the same, it is proposed to punch the hole and upset the rivet by a succession of light blows. To this end the frame 1 is provided with a head 4 in which is mounted any suitable motor of the vibrating type or of the "single shot" type but preferably a pneumatic motor. Since this pneumatic motor of the vibrating type may be any of the well-known makes of pneumatic vibrators, such as the moving unit of the RV–1X Yoke Riveter made by the Chicago Pneumatic Tool Company and shown on page 20 of their Catalog No. 564 (Second Edition), Copyright February 1933, it is not shown here in detail and will not be described in detail. The vibrating pneumatic motor generally comprises a cylinder in which is mounted the plunger 5 which carries the set 6. In this form of pneumatic motor the power stroke of the plunger 5 is effected pneumatically through some such compressed gas

as air which is fed into the cylinder through the air line 7 which is controlled by the intake valve 8. The exhaust is controlled by valve 12. The return stroke of the plunger 5 is effected through a coil spring 11 of the compression type. The valve 8 is controlled by the finger trigger 9 pivoted at 10. The valve 8 may be any of the well-known types such as the spring loaded ball check valve 120 which may be released by the arm 13 of the trigger 9 acting through the plunger 131. The exhaust valve 12 likewise may be any suitable type such as the spring loaded ball check valve which is controlled by the arm 122 of the trigger acting through the plunger 123. As shown in the full lines, Figure 1, the trigger 9 is in off position at which time both plungers 123 and 131 are in projected position and both intake and exhaust valves closed so that compressed air is neither admitted into, nor exhausted from, the cylinder of the motor. In Fig. 2 the trigger 9 is shown in completely retracted position. If the trigger 9 is moved to the middle position, as shown in the dotted lines in Fig. 1, that is, between the released position shown in the full lines of Fig. 1 and the fully retracted position shown in Fig. 2, then the valve 8 will be open and at this time air will be admitted into the cylinder but not permitted to exhaust. Plunger 5 will execute a power stroke and remain in the projected position shown in Fig. 2. If the trigger 9 is now retracted fully to the position shown in Fig. 2, arm 122 acting through plunger 123 will open exhaust valve 12 which in the well-known way, will cause the piston 124, reciprocably mounted within the plunger 5, to reciprocate or vibrate thus effecting the succession of light blows upon the set 6.

If desired the succession of light blows may be obtained by the well-known "single shot" type of pneumatic motor in which a single blow, preferably light, is struck for each pull of the trigger. With such a motor the hole will be punched or the rivet upset with fewer blows than is necessary where the vibrating or reciprocatory motor is used.

The lower end of the frame 1 carries the anvil 14 in which is reciprocably and yieldably mounted the punch 15. The punch 15 is yieldably supported by the coil spring 16, the lower end of which is secured to the punch 15 as at 17 and the upper end of which is fixed in a wall of the anvil as at 18.

Since the punch 15 is yieldably mounted and while in projected position serves as a punch and while in retracted position serves as a portion of the anvil during the riveting operation, the punch 15 must necessarily be backed up by a suitable stop during the punching operation. To this end the frame 1 has reciprocably mounted in the cylindrical opening 19 the plunger 20. The outer end 21 of the plunger is in the form of a semi-cylinder, the upper flat face 22 of which serves as a seat for the punch 15 during the punching operation. The reciprocation of the plunger 20 is controlled by the trigger 23 which is connected to the plunger by the Bowden control, such as the wire 24 slidably mounted within the tubular casing 25. The trigger 23 is held in the normal retracted position, shown by the full lines in Fig. 1 by the tension spring 29, one end of which is secured to the trigger and the other end to the frame 1.

Since the punch 15 during riveting operation acts as a portion of the anvil, therefore the upper end of the punch must be flush with the face 26 of the anvil. To insure this flush relation between the upper end of the punch 15 and the face of the anvil both at initial installation and subsequently when the punch is ground to size after being worn down by use, an adjustable stop 27 is threaded into the frame 1 beneath and in alignment with the punch 15. By screwing the adjustable stop 27 inwardly or outwardly the same can be adjusted so that when the punch 15 is in fully depressed position, as shown in Fig. 6, for instance, the lower end 28 of the punch 15 will be seated upon the stop 27 and the upper end of the punch 15 will be flush with the upper face 26 of the anvil.

The head 4 is provided with a pair of cylinders 30 (Fig. 2) and 31 (Fig. 5) in which are rotatably and reciprocably mounted the plungers 32 and 33 respectively. Since the plungers 32 and 33 are the same a description of one will serve as a description of the other. The plunger 32 is hollow and has mounted therein the tension coil spring 34, one end of which is secured to the plunger 32 as at 35 and the other end of which is secured in the cap 36 which is threaded in or otherwise fixed to the upper end of the cylinder 30 for closing the same. The spring 34 is a tension spring and normally holds the plunger 32 in raised or retracted position. The plunger 32 has splined thereon the bell crank 37 provided with a spline 38 which slidably engages the longitudinal splineway 39 in the plunger 32. The bell crank 37 is rotatably supported in the slot 40 in the wall of the cylinder 30. Hence, the plunger 32 is free to move upwardly and downwardly relative to the bell crank 37 but owing to the spline 38 and splineway 39 must rotate with the bell crank 37.

The plunger 33 has splined thereon the crank 41 in the same fashion as the bell crank 37 is splined on to the plunger 32. The crank 41 is also rotatably mounted in a slot in the wall of the cylinder 31 the same as the slot 41 in the wall of the cylinder 30 so that the plunger 33 has to rotate with the crank 41 but can slide upwardly and downwardly relative thereto. The cranks 41 and 37 are connected by the link 42 as at 43 and 44 respectively. The bell crank 37 is connected to the trigger 23 by the Bowden control 45.

The plunger 32 supports and preferably has formed integrally therewith, the die carrier 46 which carries the die 47. The die 47 is provided with the opening 48 for ejecting the slugs of metal during the punching operation and is provided with an opening 49 for receiving the end of the driving pin 6. When the trigger 23 is in released position the die 47 is positioned beneath the tool 6 as shown in Figs. 1 and 3. If the trigger 23 is now pulled upwardly or to the position shown in the dotted lines in Fig. 1, the Bowden wire 45 moves to the left causing the bell crank 37 to move clockwise as viewed in Fig. 3, thus causing the plunger 32 to rotate clockwise, swinging the die 47 from beneath the set 6. The rotation of the bell crank is transmitted through link 42 to crank 41 thus causing plunger 33 to rotate clockwise and in turn swing the rivet shoe 50 beneath the set 6.

The rivet shoe 50 is shown in detail in Figs. 5, 9 and 10. The lower end of the plunger 33 carries the pin 51 upon which is rotatably mounted the two similar halves 52 and 53 which form the rivet shoe 50. The parts 52 and 53 of the rivet shoe are held together by the spring 54, one end of which is secured to the part 53 at 55 and the

other end of which is secured to the part 52 as at 56. The shoe 50 is held on the pin 51 by the arm 57 which is mounted in fixed relation on the pin 51. Since the shoe 50 is formed of the two parts 52 and 53 which are yieldably held together by the spring 54 and which are rotatably mounted upon the pin 51 the shoe 50 is free to float about the pin 51. It is essential that the shoe rotate with the plunger 33. Therefore, the arm 57 carries the pin 58 which fits between the parts 52 and 53 and thus causes the shoe 50 to rotate with the shaft 33. The parts 52 and 53 have the semi-cylindrical recesses 80 and 81 respectively in their abutting faces which when in opposed matched relation cooperate to form the cylindrical opening 60 which receives the stem of the rivet. The parts 52 and 53 likewise have semi-conical recesses which cooperate to form the conical mouth 59 for initially receiving the rivet and feeding the same into opening 60. Whether the stem of the rivet is tubular or solid is immaterial. The abutting faces of parts 52 and 53 also have opposed recesses 82 and 83 (Fig. 10) which cooperate when in matched abutting relation to receive pin 58. It will be noted that tension on each of the parts 52 and 53 is equal and that they are maintained in matched relation so that the recess 80 is directly opposite recess 81 thus insuring at all times an exact size and shape (in this example, cylindrical) for opening 60 so that the rivet upon being fed to the shoe will with certainty be received in the rivet opening 60.

Since the rivets are to be pneumatically or otherwise forcibly fed into the rivet shoe, to this end the head has secured thereon the rivet magazine 61 provided with a removable cap 62. The magazine 61 is in the form of a tube, the lower end of which is open and preferably approximately the same diameter as that of the rivet head. The lower end or mouth of the rivet magazine 61 is surrounded by a plurality of spring fingers 63 which depend from the end of the magazine and then turn somewhat inwardly as at 64. These spring fingers serve to yieldably hold the lowermost rivet by the head.

The rivets are arranged to be fed into the magazine 61 stem first, as shown, and the cap 62 fastened in place. Although the rivets are arranged to be pneumatically fed to the rivet shoe 50 preferably the compressed air produced on the return stroke of the piston may be utilized to "puff" or pneumatically force the rivet from the grip of the spring fingers 63 into the shoe 50. To this end the magazine 61 is connected with the inside of the cylinder by means of the tube 65. The tube 65 communicates with the opening 66 which in turn communicates with the exhaust port 67 in the cylinder head. The communication between the openings 66 and 67 is controlled by the ball valve 68 which is yieldably held against the valve seat by the coil spring 69. The ball valve 68 may be thrown to open position by the plunger 70 when it is moved to the left by the trigger 9, as shown at Fig. 1.

Since a gush of air passes through the magazine 61 upon each return stroke of the plunger 5 and the rivets act in the nature of a piston, it is necessary to prevent the rivets from being released by the spring finger 63 when the rivet shoe 50 is not beneath the magazine. To this end a rivet stop in the form of a platform 71 is mounted on the ends of the spring fingers 72 mounted on opposite sides of the magazine as at 73 and 74.

In case the riveting machine is to be used upside down a suitable coil spring 90 may be inserted in the rivet magazine 61 to yieldably back up the rivets in the magazine. If desired, the coil spring 90 may be used to eject the rivets from the magazine instead of pneumatically ejecting them by the exhaust. In such case the coil spring will be of sufficient strength to eject the rivet from the spring fingers 64 into the rivet shoe when the rivet stop 71 is removed.

Since it has been found expedient in some cases to use a lighter blow for riveting than for punching, it is proposed to decrease the intensity of the riveting blows by throttling the exhaust. To this end the exhaust valve 12 (Fig. 2) has slidably mounted thereon the sleeve 140 which is arranged to partially close the exhaust port 141. The sleeve 140 is provided with an arm 142 which has adjustably connected thereto the rod 143 which is pivotally connected to the bell crank arm 37 as at 144. The rod 143 is adjustably connected to the arm 142 so that the amount the sleeve 140 throttles the exhaust port 141 can be varied. The adjustable connection between the arm 142 and the rod 143 can be effected in any suitable way such as by threading the end of the rod 143 on each side of the arm 142 and providing the threaded end of the rod with a nut, one on each side of the arm 142, the one nut serving as a locking nut for the other when the arm is adjusted to the position desired. Inasmuch as the rod 143 is connected to the bell crank 37 the throttling of the exhaust port 141 will be effected by operation of the trigger 23 which, through the Bowden control 45 controls the crank lever 37. It is, of course, understood that this means of controlling the throttling of the exhaust port is shown by way of example only.

The operation of the device is as follows: The operator releases triggers 9 and 23, at this time the plunger 70 is thrown to the left, as shown in Fig. 1, thus opening the ball valve 68 to permit the exhaust of the return stroke of the piston to pass through the rivet magazine. At this time likewise the die 47 is positioned beneath the set 6 and the punch seat 20 is in the projected position shown in Fig. 2, with the face 22 in position to receive the lower end 28 of the punch 15. At this time the operator places the work or metal sheets which are to be riveted upon the punch 15 in the proper position. The operator then pulls the trigger 9 to the middle position, shown in the dotted lines in Fig. 1. This causes the arm 13 of the bell crank trigger 9 to depress the plunger 131 of the intake valve 8 to open the same but does not affect the exhaust valve plunger 123. This opens the air line 7 so that the compressed air is fed to the pneumatic motor whereupon the plunger 5 and set 6 move downwardly on the power stroke, the set 6 first seating itself in the seat 49 of the die 47 and then forcing the die downwardly till it engages the metal sheets 75 which are to be riveted together. If the initial power stroke is strong enough, i. e., exerts a stress beyond the yield point of the metal being punched, the punch 15 will pierce the metal sheets 75 and the slug will be ejected through the opening 48. This will often occur if the metal stock is of thin enough gauge. If the initial punch is not strong enough to do this, the operator then pulls the trigger to the full open position shown in Fig. 2 thus causing the arm 122 to depress the plunger 123 and open exhaust valve 12 which causes piston 124 to vibrate or reciprocate and in turn the set 6 and die 47 to vibrate or reciprocate. These intermittent

vibratory blows will in turn force the punch 15 to pierce the metal sheets 75 to form the hole for the rivet. Each of these successive blows is light enough to be within the yield point of the particular metal being punched.

After the hole is vibrated through the metal sheets 75, trigger 9 is released thus causing the plunger 70 to open the ball valve 68 and permitting the return stroke of the plunger 5. As the plunger 5 moves upwardly the exhaust passes through the opening 67, past the ball valve, through the conduit 66 and tube 65 into the magazine 61. This exhaust of air through the magazine 61 "puffs" or pneumatically forces the lowermost rivet from the grip of the curved finger ends 64 into the rivet shoe 50, as shown in Figs. 4 and 5. (At this time rivet shoe 50 is in the position shown in Figs. 3 and 4, that is, directly beneath the magazine 61 with the rivet stop 71 pushed to one side.) The trigger 9 being released the operator now pulls upwardly on the trigger 23 to move the same to the dotted line position shown in Fig. 1. The punch 15 is still yieldably held in raised position by the coil spring 16 and remains in the hole through the metal sheets 75 and thus keeps them properly positioned. As the trigger 23 is pulled to the dotted line position, this retracts the plunger 20 from beneath the lower end 28 of the punch 15 to the position shown in Fig. 6, and at the same time the Bowden wire 45 swings the bell crank 37 clockwise which rotates the shaft 32 and through the link 42 rotates the shaft 33 thus causing the die to be swung from beneath the set 6 and the loaded rivet shoe 50 beneath the set 6. The removal of the rivet shoe 50 from beneath the magazine 61 permits the stop 71 to spring back into the position shown in Fig. 12 directly beneath the spring finger 63. At this time the operator again pulls the trigger 9 which causes the plunger 5 and set 6 to descend carrying with it the loaded rivet shoe 50 to the position shown in Fig. 5. The rivet is then upset by the initial power stroke of the set 6 or by subsequent vibration or reciprocation of the set.

As the trigger 23 is pulled to the dotted line position, it acts through the Bowden wire 45 to swing the bell crank lever 37 clockwise which draws rod 143 to the left. This in turn causes the throttling sleeve 140 to partially close the exhaust port 141. Inasmuch as the exhaust port 141 is partially throttled, a certain amount of air is entrapped within the cylinder and this cushions the power stroke of the reciprocating piston 124 within the plunger 5. This cushioning action, due to the throttling of the exhaust, in turn weakens or decreases the energy content of each of the successive blows given the rivet by the reciprocating piston 124 acting through set 6. The weakening of the energy content of the blow given by the reciprocating piston is proportionate to the throttling of the exhaust port 141, that is, the more the exhaust port is throttled or closed by the throttling sleeve the weaker the blow.

As the set 6 descends it engages the sides of the conical opening 59 of the work shoe forcing the parts 52 and 53 apart, shown in Figs. 7 and 8, thus releasing the rivet from the work shoe. As the rivet is forced downwardly by the pin 6 it engages the upper end of the punch 15, depresses the same and follows the same through the hole which has been previously punched in the metal sheets 75. The punch 15 can retreat because the plunger 20 is in the position shown in Fig. 6. The punch 15 retreats until the lower end 28 engages the adjustable stop 27 which locates the upper end of the punch 15 flush with the face 26 of the anvil 14. Thus the punch cooperates with the anvil 14 to form an anvil for riveting over the stem of the rivet.

The operator now releases the trigger 9 which moves to the left or full line position as shown in Fig. 1. The plunger 5, inasmuch as the air line 7 is now cut off, now makes its return stroke exhausting the air as above described through the magazine 61 and permits the coil spring 34 to raise the plunger 33 and the rivet shoe. At this time the rivet shoe is not beneath the rivet magazine but the lower rivet will not be puffed or pneumatically ejected from the spring fingers 63 because stop 71 is now beneath the spring fingers. As soon as the trigger 23 is released, the spring 29 will return it to its original full line position thus causing the Bowden wire 45 to move to the right as viewed in Fig. 3. This movement of the Bowden wire 45 acting through the crank 37, link 42 and crank 41 again moves the die 47 directly beneath the set 6 as shown in Fig. 1 and the rivet shoe beneath the magazine 61 as shown in Figs. 3 and 4. As the rivet shoe 50 moves beneath the spring fingers 63, it swings the stop 71 to one side and thus is in position to again receive the lowermost rivet upon the return stroke of the piston when the punching is completed if the rivets are fed to the shoe pneumatically, but receives the lowermost rivet as soon as the stop 71 is removed if the rivets are fed by spring 90.

I claim:

1. In a machine of the type described, a work performing tool, a pneumatic motor of the reciprocable type for actuating said work performing tool to effect a blow of a given energy content, the said pneumatic motor having an exhaust port, and means for throttling said exhaust port to vary the energy content of the blow effected by said tool.

2. In a machine of the type described, a work performing tool, a pneumatic motor of the reciprocable type for actuating said work performing tool to effect a blow of a given energy content, the said pneumatic motor having an exhaust port, and an adjustable closure for partially closing the said exhaust port to vary the energy content of the blow.

3. In a riveting machine having an anvil for receiving the work and a pneumatic motor having a cylinder and a reciprocable plunger for cooperating with the said anvil to upset the rivet, a rivet magazine adapted to receive a plurality of rivets and having an outlet, a rivet shoe receiving the rivets from said outlet for positioning them to be fed to the work and upset by said plunger, an exhaust outlet in said cylinder communicating with the said magazine whereby the exhaust created by the return stroke of the plunger pneumatically ejects the rivets from the said rivet magazine into the said rivet shoe.

4. In a riveting machine having an anvil for receiving the work and a pneumatic motor having a cylinder and a reciprocable plunger for cooperating with the said anvil to upset the rivet, a rivet magazine adapted to receive a plurality of rivets and having an outlet, a rivet shoe receiving the rivets from said outlet for positioning them to be fed to the work and upset by said plunger, resilient means adjacent the outlet of the said rivet magazine for retaining the rivets therein, an exhaust outlet in said cylinder communicating with the said magazine whereby the

exhaust created by the return stroke of the plunger pneumatically ejects the rivets from the said rivet magazine into said rivet shoe.

5. In a riveting machine of the type having an anvil for receiving the work, and a pneumatic motor of the type having a cylinder and a reciprocable plunger for cooperating with the said anvil to upset the rivet, a rivet magazine adapted to receive a plurality of rivets and having an outlet, a rivet shoe receiving the rivets from said outlet for positioning them to be fed to the work and upset by said plunger, a plurality of spring fingers adjacent the outlet of the said rivet magazine for yieldably holding the rivets therein, an exhaust outlet in said cylinder communicating with the said magazine whereby the exhaust created by the return stroke of the plunger pneumatically ejects the rivets from the said rivet magazine into said rivet shoe.

6. In a combined punching and riveting machine comprising an anvil for receiving the work, a pair of cylinders, each of said cylinders having a plunger rotatably and slidably mounted therein, a die mounted on one of said plungers, a rivet shoe mounted on the other of said plungers, an operative connection between the said plungers whereby the plungers rotate simultaneously, a punch reciprocably mounted within the said anvil, power means including a driving pin alternately cooperating with said die and punch for punching the work and with the rivet shoe and anvil for upsetting the rivet, a retractable punch seat positioned beneath the inner end of the said punch whereby the outer end of the punch projects beyond the work face of the anvil during the punching operation, and means operatively connected to the said plungers and to the retractable punch seat for alternately positioning the die and shoe between the anvil and the driving pin and for retracting the punch seat from the inner end of the punch when the rivet shoe is between the anvil and the driving pin whereby the outer end of the punch retreats to a position flush with the work face of the anvil to serve as a part of the anvil to upset the rivet.

7. In a machine of the type described, an anvil, a punch retractably mounted within the anvil, resilient means operatively connected to said punch for projecting the punch beyond the work face of the anvil, a retractable seat for the said punch for holding the same in projected position during the punching operation, and an adjustable stop for the said punch for aligning the outer end of the punch flush with the work face of the anvil during the riveting operation whereby the punch serves as a part of the anvil during the riveting operation.

8. In a riveting machine of the type having an anvil for receiving the work, a rivet magazine having an outlet at one end adapted to receive a plurality of rivets in the form of a stack, a shiftably mounted shoe positioned beneath the outlet end of the magazine for transferring the rivets from the magazine to the work upon the anvil and for supporting the stack of rivets when positioned beneath the outlet end of the magazine, a retractable stop positioned beneath the outlet end of the said magazine in the path of movement of the said shiftable shoe for supporting the stack of rivets within the magazine whereby the stop is engaged and retracted from the outlet end of the magazine by the rivet shoe when the shoe is shifted beneath the outlet end of the magazine for receiving a rivet and the rivet stack is alternately supported by the shoe and the retractable stop, and resilient means for effecting a thrust upon the said rivet stack to eject one of the rivets from the magazine into the said rivet shoe when the rivet stop is retracted from the outlet of the magazine.

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