

Sept. 21, 1965

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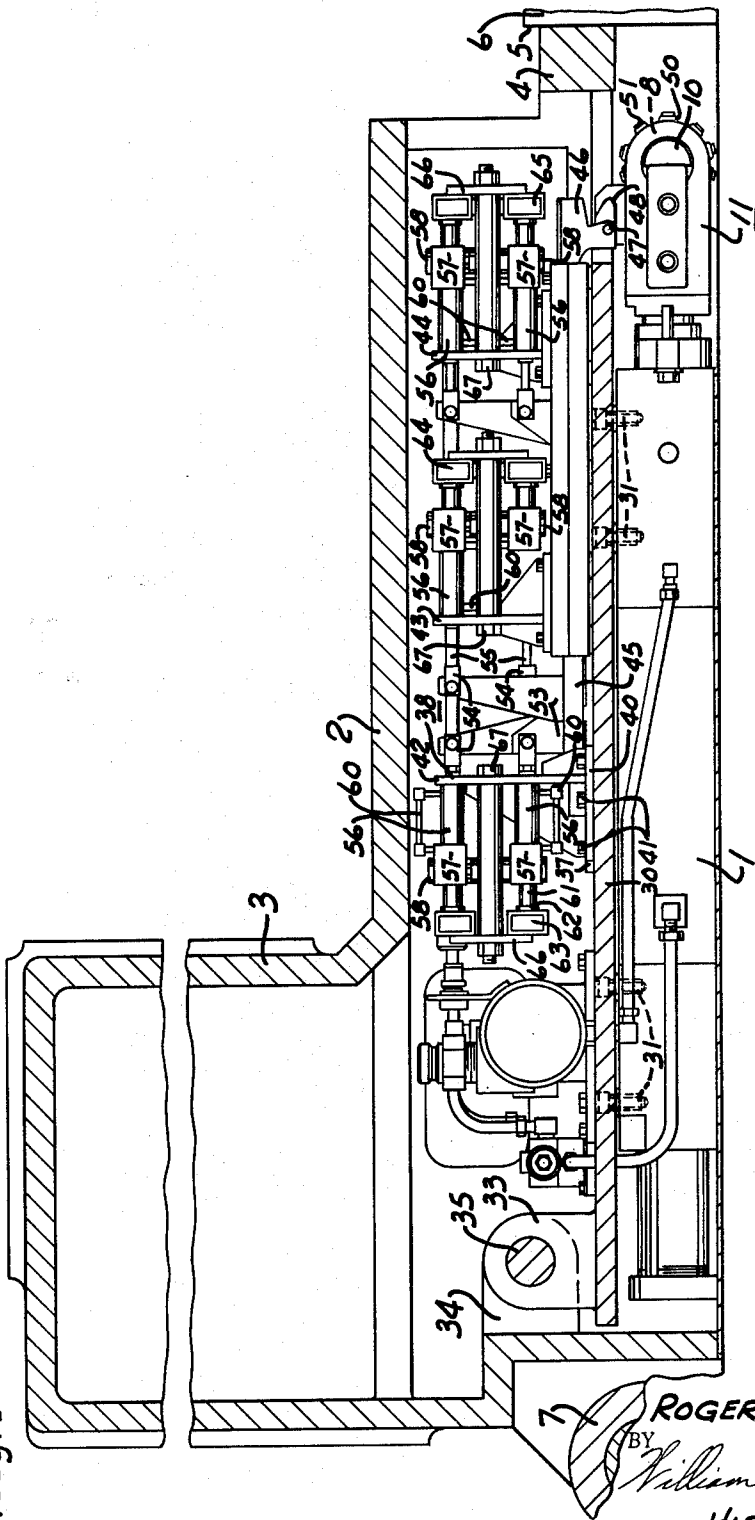
3,207,066

SELF-CONTAINED STAMPING HAMMER

Filed March 22, 1963

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Fig. 1



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Fig. 2

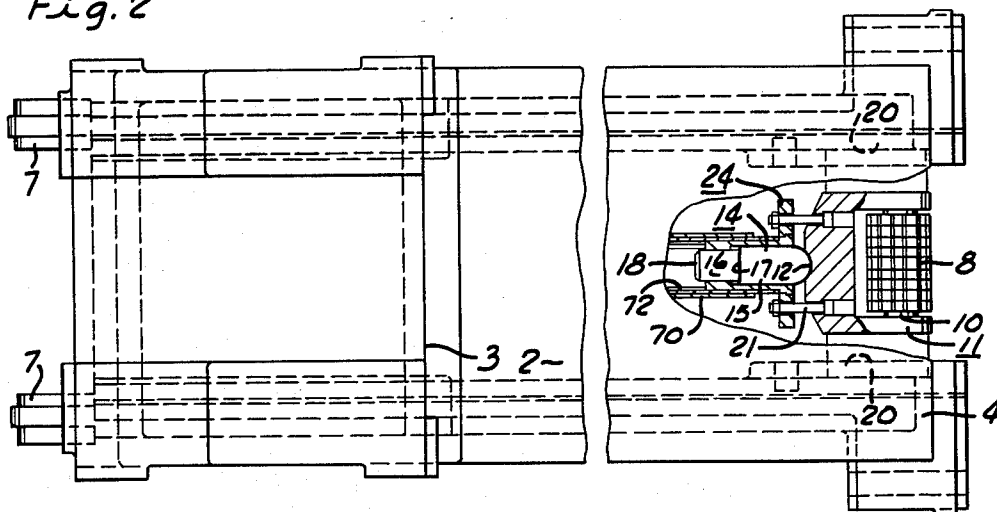
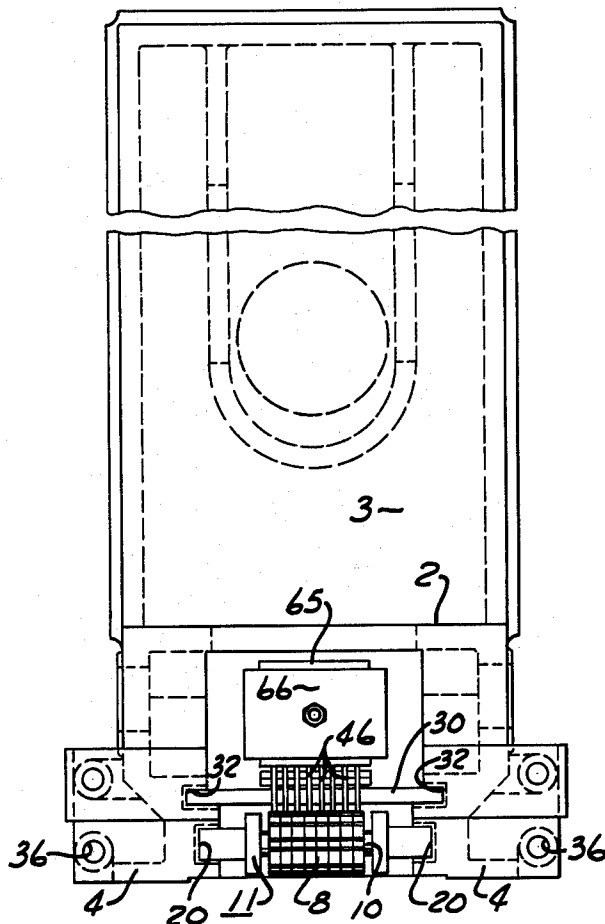


Fig. 3



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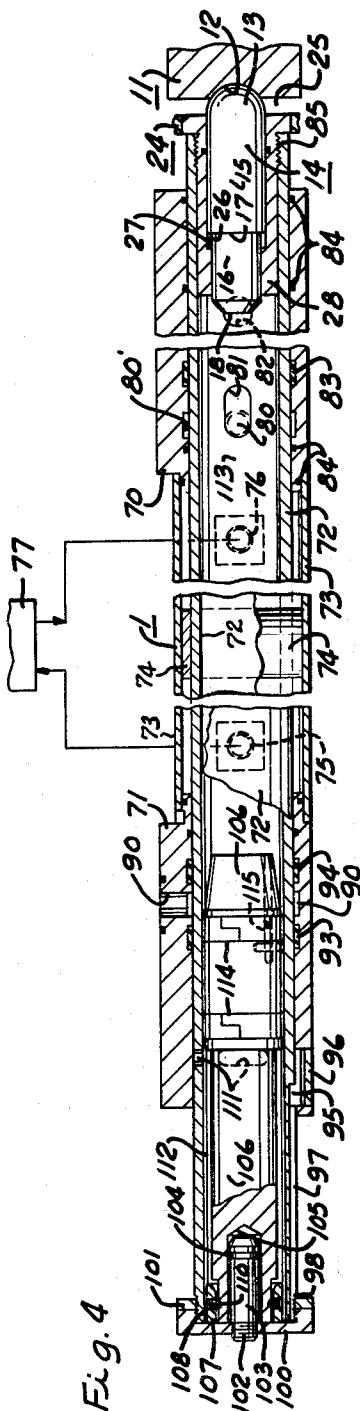
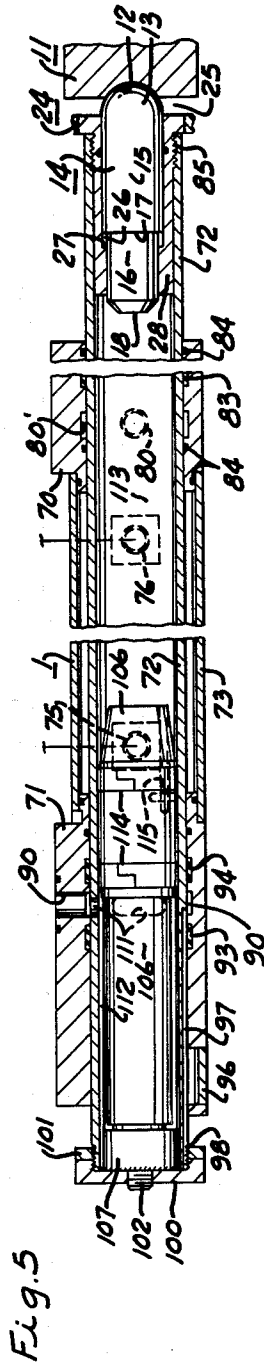
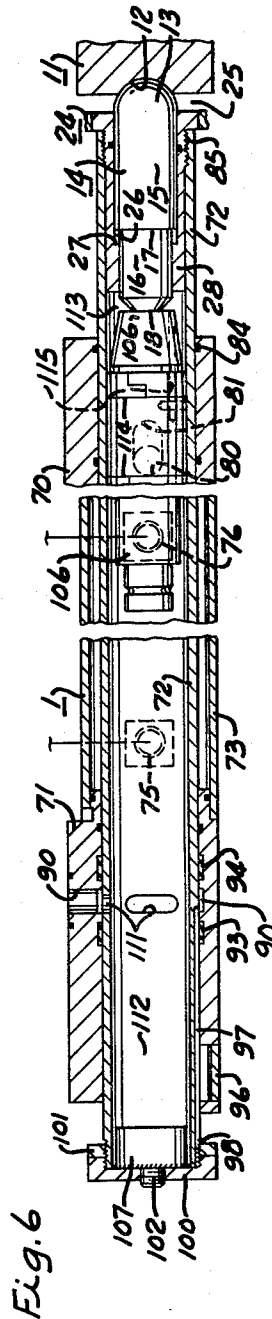
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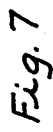
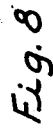
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SELF-CONTAINED STAMPING HAMMER

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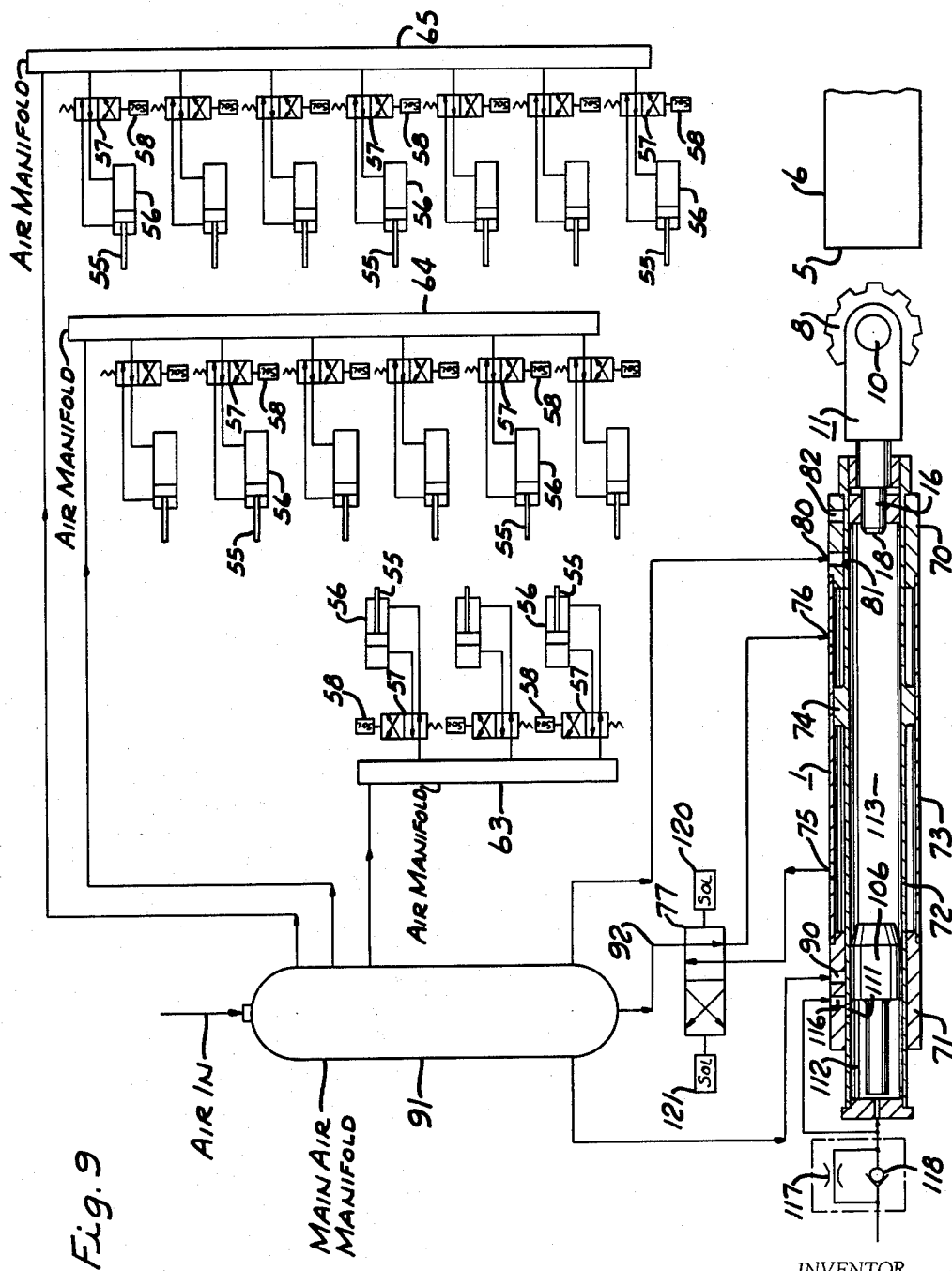


Fig. 9

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SELF-CONTAINED STAMPING HAMMER

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7 Claims. (Cl. 101—4)

This invention relates generally to stamping hammers and more particularly to improved self-contained stamping hammer.

Stamping hammers for use in marking hot metal slabs, blooms, billets or ingots must be capable of being subjected to high temperatures and to perform properly they are required to be extended to engage the die characters on the metal and which is followed by a hammer blow to the die characters to complete the impression. When the metal is hot enough to make an impression by merely extending to square the die characters on the steel the extra blow is still desirable to produce a deep mark readable when scaled over. To extend these hammers a carriage was provided to reciprocate on ways by a fluid actuated piston and cylinder connected to the carriage. In this form the hammer and the carriage were made as an independent structure from that of the ways. The carriage had to be relatively large which in some installations made the unit too crowded and difficult if not impossible to use. Again the independent hammer extending the carriage with its independent fluid operator not only increased the number of structural units but also the cost and a greater chance of failure because of the interconnections.

The principal object of this invention is the provision of a compact stamping hammer wherein the hammer extending device is a part and parcel of the hammer unit thus simplifying the structure and the connection and providing a complete unit that extends and automatically operates the hammer and which is materially smaller than the old hammer itself.

Another object is the provision of an improved coupling connecting the hammer with the character head.

Another object is the provision of a novel arrangement for operating the fluid hammer by merely controlling the extension of the hammer to automatically trip the same and by retracting the hammer it automatically returns the same ready for the next firing stroke. This automatic operating feature is actuated by novel structure. The former hammer had a rod which was actuated by the movement of the character head to shift a spring loaded valve that has been eliminated.

Another object is the provision of a novel retention for the free piston. This retention member aids to slow down and cushion the return stroke of the free piston.

Another object is the provision of two novel modes of discharging fluid pressure from behind the free piston to exhaust for the return of the free piston.

Other objects and advantages appear hereinafter in the following description and claims.

The accompanying drawings show for the purpose of exemplification, without limiting this invention or the claims thereto, certain practical embodiments illustrating the principles of this invention wherein;

FIG. 1 is a vertical sectional view illustrating the stamping mechanism in the foot of a gauge stop.

FIG. 2 is a horizontal sectional view illustrating the character wheel changers.

FIG. 3 is a view in front elevation of the shoe with the toe stop plate removed.

FIG. 4 is a sectional view of the hammer in its retracted position.

FIG. 5 is a sectional view of the hammer in its extended position and about to fire.

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FIG. 6 is a sectional view of the extended hammer after firing and imprinting a slab.

FIG. 7 is a sectional view of the extended hammer after firing when no object was in position to be struck.

FIG. 8 is a view in horizontal section of the marking head.

FIG. 9 is a diagrammatical view of the fluid circuit.

Referring to FIGS. 1 to 3 of the drawings the hammer 1 is mounted within the foot 2 suspended from the stem or ankle 3 so as to be moved vertically and laterally over a table of conveyor rolls behind a shear. The front of the foot 2 is provided with a stop toe plate 4 which engages the sheared surface 5 of the workpiece 6, the previously sheared face of which is engaged and stopped by the stop toe plate 4 as it rides on the roller table passing under the shear blade not shown. This stop foot is movable transversely of the table to permit movement of different portions of the shear blade and to properly locate the marking relative to the sheared face of the workpiece. Generally speaking the workpiece that has been sheared and is passed under the shear blade to be engaged by the stop plate is generally square relative to the stop plate. Thus the workpiece is not apt to be misaligned as it engages the stop plate 4 as the rollers of the table hold the workpiece in horizontal alignment and the distance travelled from where it was sheared to the stop is not apt to cause the face of the workpiece to deviate in a transverse plane. The heel of the foot is provided with a roller 7 that would prevent the underside of the hammer and the foot from engaging the workpiece if the foot happened to be lowered thereon.

The foot 2 is hollow to receive the hammer and the fluid actuated mechanism to change the character wheels 8 supported on the shaft 10 of the bifurcated stamping head 11. The rear or transverse portion of the stamping head 11 is provided with the spherical surface 12 for the purpose of receiving in surface contact the semi-spherical ball member 13 on the outer end of the plunger 14 which has an outer enlarged cylindrical portion 15 and a smaller cylindrical portion 16 separated by a shoulder 17. The inner end of the plunger 14 is beveled to form a striking surface 18.

The bifurcated head 11 has the outer portion of its parallel arm slidable in the slots 20 as shown in FIG. 3 for the purpose of guiding the movement of the bifurcated head. The depth of the slots 20 is greater than the lateral dimension of the bifurcated head 11 thus permitting the head to assume different angular positions about the complementary arcuate surfaces 12 and 13 so as to permit the characters on the character wheels 8 to properly align themselves against the sheared surface 5 of the workpiece 6. There is sufficient lateral clearance between the slots 20 and the sides of the marking head 11 to permit the latter to adjust itself to five or more degrees on either side of the center. The height of the slots 20 is sufficiently greater in depth than the depth of the sides of the bifurcated head 11 to permit the same to be raised from the bottom of the slot to an extent of 110°.

This relative movement by the plunger 14 is attained through the bolts 21, the heads of which are inserted through enlarged bores in the transverse portion of the head 11 and the stems of the bolts are provided with ample clearance in these bolt openings 22 and the threaded ends of the bolts 21 extend through enlarged holes 23 in the transverse plate 24 and are held thereto by a suitable nut and washer as illustrated in the drawings. Thus any movement against the characters on the character wheels 8 may provide relative adjustment between the arcuate surfaces 12 and 13 and the gap 25 between the bifurcated head 11 and the transverse plate 24 represents the full extent of relative movement of the bifurcated

head relative to the semi-spherical end 13 whether it is vertical or lateral or any combination thereof. The clearance 25 is substantially the same as the distance 26 between the shoulder 17 and the shoulder 27 of the sleeve 28 that has complementary bores for receiving the dual cylindrical portions 15 and 16 of the plunger 14.

The hammer 1 is secured to the underside of the plate 30 by cap screws 31 and the sides of the plate 30 extend laterally to be received in the slots 32 that extend longitudinally of the foot 2 to the heel thereof. The rear portion of the plate 30 is provided with an upward extending plate bracket 33 which extends between the spaced ears 34 integral with the heel of the foot 2 below the hollow stem or ankle 3. The ears of the bracket are provided with aligned holes for the assembly pin 35 which extends from the side of the foot 2 and passes inwardly through the ears 34 shown in FIG. 2. When the stop toe plate 4 is removed by withdrawing the mounting bolts 36 and the assembly pin 35 is withdrawn and the fluid and electrical connections to the apparatus have been disconnected, the whole of the plate 30 and all the parts attached thereto may be withdrawn through the front of the foot 2. Thus one may duplicate this mechanism and if anything goes wrong with any of the valves or any parts of the mechanism or the marking head or if it is desirable to change the marking head one may do so by having a duplicate or complementary assembly which permits the stamping mechanism to be replaced within a very short period of time and without any material delay in milled operations.

As shown in FIGS. 1 and 2 the gauge block 37 is provided on the top surface of the plate 30 for receiving the character wheel changing device as illustrated at 38. This is made up of a base plate 40 which may be bolted by several bolts as indicated at 41 to the top of the plate 30 and which carries the spaced brackets 42, 43 and 44 which represents three independent mounting for the distribution of the solenoid valve and cylinder servomotors for actuating the slides 45 each of which carries a depending pawl 46 with a pivot as indicated at 47 at the forward end of its respective slide to pivotally support a pawl finger 48 for the purpose of engaging the tooth sector 50 of a character wheel 8. As shown in FIG. 1 each of the character wheels 8 carries ten different characters indicated at 51 and a spring biased ratchet (not shown) engages in the same tooth sector 50 to prevent counterclockwise movement of the character wheels 8 as shown in FIG. 1. Each slide is connected to a dog 53 and each dog is provided with a clevice 54 connected to the end of a piston rod 55 operable on a piston in the cylinder 56 and actuated by a valve 57 which is operated by its respective solenoid 58. Each valve 57 controls the opposite ends of the cylinders 56 through a lateral connection such as illustrated at 60, some of which are shown at the top or on the bottom of the cylinders and some at the sides of the cylinders. Each valve 57 is provided with an outwardly extending tube 61 slidable in the tube 62 that has an O-ring for sealing the same and the tube 62 in turn is connected to the internal portion of the reservoir of which there are three shown, 63, 64 and 65 for the purpose of supplying each of the three banks of valves. The reservoirs are the same structure and provide a supply manifold of rectangular shape that extends laterally of the plate 30 and has an outwardly extending plate 66 on each end thereof that are held by the bolts 67 from their respective brackets 42, 43 and 44. Each bolt 67 has a sleeve slidable thereon to function as a gauge between the spaced plates 66 and the bracket to which the manifold is attached. This gauge tube 68 thus fixes the relative positions of the tube 61 telescoped within the O-ring seals carried by the tube 62. Thus upon the actuation of any one or a combination of the valves 57 of the solenoids 58 the selective solenoid 58 of the corresponding character wheel 8 will be adjusted

to present the proper character in the stamping position as shown in FIG. 1 in dotted lines wherein the stamping wheel is illustrated to have been extended so as to imprint the character 51 within the sheared surface 5 of the workpiece 6. As shown in FIGS. 2 to 9 the manifold 63 supplies fluid under pressure to three cylinders 56 whereas the manifold 64 supplies fluid under pressure to six slides 45 and their respective character wheels 8 and the manifold 65 supplies controls for seven of the character wheels 8. Thus the particular marking head 11 carries 16 character wheels that may be adjusted through remote control. This head may also be provided with manual movable marking wheels which would indicate the plant and the year and perhaps the particular mill which indicia would not be changed frequently.

Referring specifically to FIGS. 4, 5, 6 and 7 which illustrate the relative positions of the hammer 1, it will be noted that the hammer 1 is constructed to provide for a front block 70 and a rear block 71 each of which are provided with cylindrical bores to slidably receive the cylinder 72. The blocks 70 and 71 are spaced apart by the housing 73 that extends over projections of each of the blocks that are sealed by O-rings. Thus the bore of the intermediate section 73 of the housing is larger in diameter than the bores of the blocks 70 and 71, which form the end parts of this housing, and section 73 is larger in diameter than the cylinder 72 and the intermediate portion of the cylinder 72 is provided with a piston head 74 that engages the bore of the intermediate section 73 of the housing. On either side of the piston head 74 the intermediate section of the housing is provided with the ports 75 and 76 which are connected to the four-way valve 77 which is a solenoid operated valve as illustrated in FIG. 9.

The front block 70 is provided with a port member 80 which when the cylinder 72 is retracted is in line with the left end of the elongated port 81 in the cylinder 72. The bore of the front block 70 is also provided with an exhaust port 82. Intermediate of the ports 80 and 82 the bore of the front block 70 is provided with an annular bearing member 83 which is preferably made of a plastic material such as Teflon. Additional O-rings for the purpose of sealing the cylinder within this bore are provided at 84. An annular relief as shown in FIG. 4 is cut in the front block bore adjacent the port 80 as indicated at 80'. The sleeve 28 is threadably engaged in the end of the bore of the cylinder 72 as indicated at 85 and the outer end of the sleeve is provided with a T head 86, shown in FIG. 8, forming an annular shoulder to set on the annular shoulder 87 of the plate 24. An interlocking annular slit ring 88 is provided between cylinder 72 and the plate 24. Thus when the sleeve 28 is threaded in the threaded bore 85 of the cylinder 72 it locks the transverse plate 24 against the end thereof and thus firmly secures the stamping head 11 to the front end of the cylinder.

The rear block 71 is provided with a port 90 which is connected to the main fluid pressure manifold 91 with the fluid port 80 and fluid pressure is thus maintained in each of the ports 80 and 90 at all times and the fluid pressure main manifold 91 is also provided with a supply line 92 to supply fluid under pressure to either of the ports 75 or 76 depending upon the position of the solenoid valve 77 as shown in FIG. 9.

As shown in FIG. 4 the port 90 is closed by the cylinder 72 and the bore of the rear block 71 is provided with spaced annular plastic bearing members 93 and 94 and an annular relief is provided opposite the port 90. Since pressure is provided through the valve 77 to the forward or front side of the piston 74 on the cylinder 72 the latter is moved to the extreme left position and the cylinder is stopped in this position by the key 95 that is mounted in the block 71 that is held in place by the plate 96. The key 95 rides in the longitudinal exterior

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slot 97 on the cylinder 72 and this slot extends to the very end of the cylinder even through its threaded end 98. This key and slot not only prevent the cylinder 72 from rotating but also functions as a restricted direct exhaust for the left or rear end of the housing and functions somewhat in the same manner as the exhaust 82 in the front or forward end of the hammer. The thread 98 at the end of the cylinder 72 receives the cap member 100 which is locked by the lock nut 101. The center portion of the cap 100 is provided with a threaded opening to receive the threaded stem 102 of the post 103 which is provided with an O-ring 104 adjacent its inner end. This post is positioned to be received in the bore 105 on the end of the stem of the free piston 106. As the free piston is returned the post 103 projects into the bore 105 and entraps all of the air therein for the purpose of cushioning the return blow of the piston against the cap 100.

The cap 100 is also provided with an annular shell or ring 107 which receives an annular series of eight spring loaded detents 108 which project into the bore of the ring 107 and are displaced by the end of the stem of the free piston 106 until the latter slides inwardly to engage the inner face of the cap 100. The inner end of the detents 108 are received in an annular groove 110 adjacent the inner end of the stem of the free piston. The post 103 provides a chamber to compress the fluid, which is preferably air, within the chamber formed in the bore 105. However, the detents 108 will also have some retarding effect on this free piston, but when the detents 108 are lodged in the groove 110 they will hold the free piston until a sufficient pressure is applied thereto to cause the free piston to move to the other end of the cylinder. The purpose of this is to retain the free piston 106 at the rear of the cylinder 72 even though fluid under pressure has been transmitted through the port 75 to move the cylinder forward and until this forward movement opens the port 111 to the port 90 the free piston 106 will remain in the retracted position.

Let it be assumed that the valve 77 is actuated to connect the port 76 to exhaust and the port 75 to pressure. Under this condition the piston 74 will move to the right from the location illustrated in FIG. 4 to the position as illustrated in FIG. 5 and when the port 111 in the cylinder 72 uncovers itself to the port 90 after passing the bearing block 93, the fluid under pressure is effective within the chamber 112 at the rear of the free piston causing the latter to move to the right. When the cylinder 72 has moved to the right as shown in FIG. 5 the port 81 has opened to the exhaust port 82 and exhausted the chamber 113 ahead of the piston 106 before the port 111 passed beyond the bearing block 93 to receive pressure from the port 90. Thus the chamber 113 in the forward end of the cylinder 72 is exhausted through the ports 81 and 82.

As the cylinder 72 is extended to the right as shown in FIG. 5 the characters on the character wheel 8 will have been slammed against the sheared surface 5 of the workpiece 6 and since the chamber 113 has been exhausted of pressure the plunger 16 will move inwardly until the shoulder 17 engages the shoulder 27 which takes up almost all of the clearance 25 or to that extent where the head 11 was oriented to square the characters against the face of the workpiece at which time the back of the bifurcated head will strike the plate 24 assuming that the degree of angle is greater than that of the distance between the two shoulders 17 and 27. In this position the bolts 21 will be loose in their sockets and the arcuate surface 13 of the plunger 16 may even be withdrawn from the arcuate surface 12. In any event, the forward movement of the cylinder 72 will square the heads of the stamping head 11 against the surface to be marked and the plunger 16 is in readiness to have the piston engage the striking face 18 and thus hammer the previously set characters into the surface of the

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workpiece as illustrated in FIG. 6. As the piston passes the port 81 in the cylinder its central relief portion 114 will be open to the port 81 in the cylinder 72 and the port 82 in the front bearing block 70 and the free piston 106 has the passageway 115 from the relief 114 to the front thereof so as to completely exhaust the chamber. Thus in the structure as illustrated in FIG. 6 the actual workpiece forms the forward stop. If, however, no workpiece was present, the structure would take the position as illustrated in FIG. 7 wherein the cylinder 72 would be moved to the right until the lock nut 101 engaged the end of the block 71 which carries the port 81 beyond the exhaust port 82 and thus closes the chamber 113 from exhaust and the piston 106 would then compress all the air within the chamber 113 which is quite small and the bolts 21 on the head 11 would be extended their full length when the piston assumed the position as illustrated in FIG. 7. The pressure built up in the chamber 113 is sufficient to render harmless the striking engagement on the striking surface 18 of the plunger 16 as shown in FIG. 7.

As illustrated in FIG. 4 when fluid pressure is within the chamber 113 the piston 106 is not only retained in the retracted end of the cylinder 72, but this pressure is effective on the striking surface 18 of the plunger 16 to retain the arcuate surfaces 12 and 13 under pressure contact which will place a tension on each of the bolts 21 and maintain the head in its extended and locked position and the pressure is maintained in the chamber 113 during the whole of the time the cylinder is retracted as this is the period during which the slides are operated to reset the character wheels 8. The pressure is sufficiently high to hold the head extended in a square position as determined by the bolts 21 and in the proper position to engage each of the pawl fingers 48 for the purpose of setting the character wheels for the next operation. Thus the head 11 is locked by pneumatic pressure when the cylinder is returned and in this locked position gauged by the bolts 21. It cannot be disturbed by the pressure of the pawl fingers in locking the character wheels in the proper position.

When the piston and the cylinder are extended as shown in FIGS. 6 and 7 the valve 77 may be reversed to the position that it would normally supply pressure to the front side of the piston 74 and thus move the cylinder 72 to the left or in its retracted position by exhausting the chamber on the opposite side of the piston head 74 through the valve 77.

As the cylinder is retracted the valve port 111 passes the port 90 but as illustrated in FIG. 5, the key slot 97 is open to the space within the bore or the block 71 and thus exhausts this bore from around the cylinder 72 to the end of the bore through this key slot. When the port 111 passes the bearing 93 it is open to the bore of the block 71 and thus the chamber 112 is exhausted through the port 111 to the space in the bore of the block 71 and thence through the key slot 97 to atmosphere.

As shown in FIG. 9 another form of exhaust is shown by use of the port 116 that is open to the port 111 when the cylinder 72 is in its fully retracted position as shown in FIG. 9 which exhausts the chamber 112 when pressure is applied through the ports 80 and 81 to return the piston 106 and to extend the plunger 16. The port 116 is connected to a limit exhaust orifice 117 which is also connected in multiple with the check valve 118 for allowing a ready influx of air into the chamber 112 to prevent the drawing of a low pressure therein. It will be obvious from FIG. 9 that the port 111 will be closed from the port 116 before it opens to the pressure port 90 when pressure is applied into the chamber 112.

The valve 77 is shown to have two positions which merely reverse and the solenoids 120 and 121 operate in conjunction with each other to move the valve from the position as shown to the reverse position as illustrated.

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Each of the valves 57 and their respective solenoids 58 are spring biased so that the solenoid need only be actuated to reverse the valve and extend the cylinder in the first bank to change the character number. However, in the second and the third bank feed from the manifold 64 and 65 the piston rods are retracted to actuate the slide rods and manipulate their independent character wheels.

I claim:

1. A stamping hammer consisting of a housing having a central portion with a uniform central bore defined between front and rear end portions each with a smaller bore, a cylinder extending through said housing and having a slidable fit in said smaller bores of said end portions and having a bore, a perimetral piston secured to said cylinder and operative within said central bore, a rear head closing said cylinder and to engage said rear end portion of said housing and limit the forward movement of said cylinder, a front head on said cylinder closing the front thereof, a stamp head movably fastened to the outer end of said front head, a plunger slidably mounted to extend through said front head and having a striking portion in said cylinder and an arcuate end engaging said stamp head to strike said stamp head against the work to be stamped, a free piston operable in the bore of said cylinder to strike said plunger striking portion at the front end and said rear head at the rear end, ports in said cylinder to connect said cylinder bore to fluid pressure on opposite sides of said free piston, ports in the central portion of said housing on opposite sides of said cylinder piston, and valve means when in one position to control said housing ports to operate said cylinder and said free piston successively to move said cylinder forward and open a cylinder port to actuate said free piston and engage said striking head, said valve means when in another position to reverse said cylinder and uncover a port to return said piston.

2. A stamping hammer consisting of a housing having a central portion with a uniform central bore defined between front and rear end portions each with a smaller bore, a cylinder extending through said housing and having a slidable fit in said smaller bores of said end portions and having a bore, a perimetral piston secured to said cylinder and operative within said central bore, a rear head closing said cylinder and to engage said rear end portion of said housing and limit the forward movement of said cylinder, a front head on said cylinder closing the front thereof, a stamp head movably fastened to the outer end of said front head, a plunger slidably mounted to extend through said front head and having a striking portion in said cylinder and an arcuate end engaging said stamp head to strike said stamp head against the work to be stamped, a free piston operable in the bore of said cylinder to strike said plunger striking portion at the front end and said rear head at the rear end, ports in said cylinder to connect said cylinder bore to fluid pressure on opposite sides of said free piston, ports in the central portion of said housing on opposite sides of said cylinder piston, and valve means when in one position to control said housing ports to operate said cylinder and said free piston successively to move said cylinder forward and open a cylinder port to actuate said free piston and engage said striking head, said valve means when in another position to reverse said cylinder and uncover a port to return said piston, and a port in each end portion of said housing directly connected to a fluid supply to cooperate with said cylinder ports and said valve control means in operating said hammer.

3. A stamping hammer consisting of a cylinder carrying a marking head and movable forwardly to square the characters of said marking head against a workpiece, said cylinder having a bore in which a free piston is reciprocal and is moved forward to strike a plunger closing the front end of the bore and connected with said marking

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head to stamp the characters on the workpiece, a housing having spaced small bores in the ends thereof and an enlarged intermediate bore, said cylinder being reciprocal in said small bores, a piston secured to said cylinder and operable in said enlarged intermediate bore, valve means alternately connecting fluid and discharge to the opposite sides of said cylinder piston to reciprocate said cylinder and move it forwardly to square said marking head against the workpiece and to retract the same, a constant supply fluid pressure port in said housing on each of the opposite sides of said large intermediate bore, a discharge port in said housing forwardly beyond said corresponding fluid pressure port, and two ports in said cylinder to cooperate with said two fluid pressure and said discharge housing ports for supplying fluid pressure to maintain said free piston retracted when said cylinder is retracted and for exhausting said cylinder bore in front of said piston and supplying fluid pressure behind said free piston to move said free piston forwardly when said cylinder is moved to its forward position.

4. A stamping hammer marking head support consisting of a cylinder carrying a marking head and movable forwardly to square the characters of the marking head against a workpiece, said cylinder having a bore in which a free piston is reciprocal to strike a plunger closing the front end of the bore and connected with said marking head to stamp the characters on the workpiece, said plunger having a large diameter with an arcuate surface on its outer end and a small diameter on its inner end forming a shoulder therebetween, a sleeve secured in the forward end of the cylinder bore and having large and small bores with a shoulder therebetween to slidably receive said plunger, a flange with said sleeve and cylinder, an arcuate socket on said marking head to mate with and engage said arcuate surface on the outer end of said plunger, bolts loosely holding said flange and marking head together with said mating arcuate surfaces in engagement, said bolts loosely holding said marking head spaced from said flange approximately the distance as between said shoulders.

5. A stamping hammer consisting of a cylinder carrying a marking head and movable forwardly to square the characters of the marking head against a workpiece, said cylinder having a bore in which a free piston is reciprocal to strike a plunger closing the front end of the bore and connected with said marking head to stamp the characters on the workpiece, a cap closing the back end of the cylinder bore, a discharge for said cylinder being adjacent the back end thereof, a fluid restriction, a port in said cap and connected in parallel with said fluid restriction to allow fluid from discharge to freely enter said port, said free piston closing said port when retracted.

6. A stamping hammer consisting of a cylinder carrying a marking head and movable forwardly to square the characters of the marking head against a workpiece, said cylinder having a bore in which a free piston is reciprocal to strike a plunger closing the front end of the bore and connected with said marking head to stamp the characters on the workpiece, a cap closing the back end of said cylinder bore, and an annular series of radially disposed spring loaded detents mounted in said bore and engaging said free piston when retracted to retain said piston against movement upon the movement of said cylinder.

7. The stamping hammer of claim 6 wherein said annular series of radially disposed spring loaded detents are mounted on the inner face of said cap and supported in said bore.

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