

July 1, 1930.

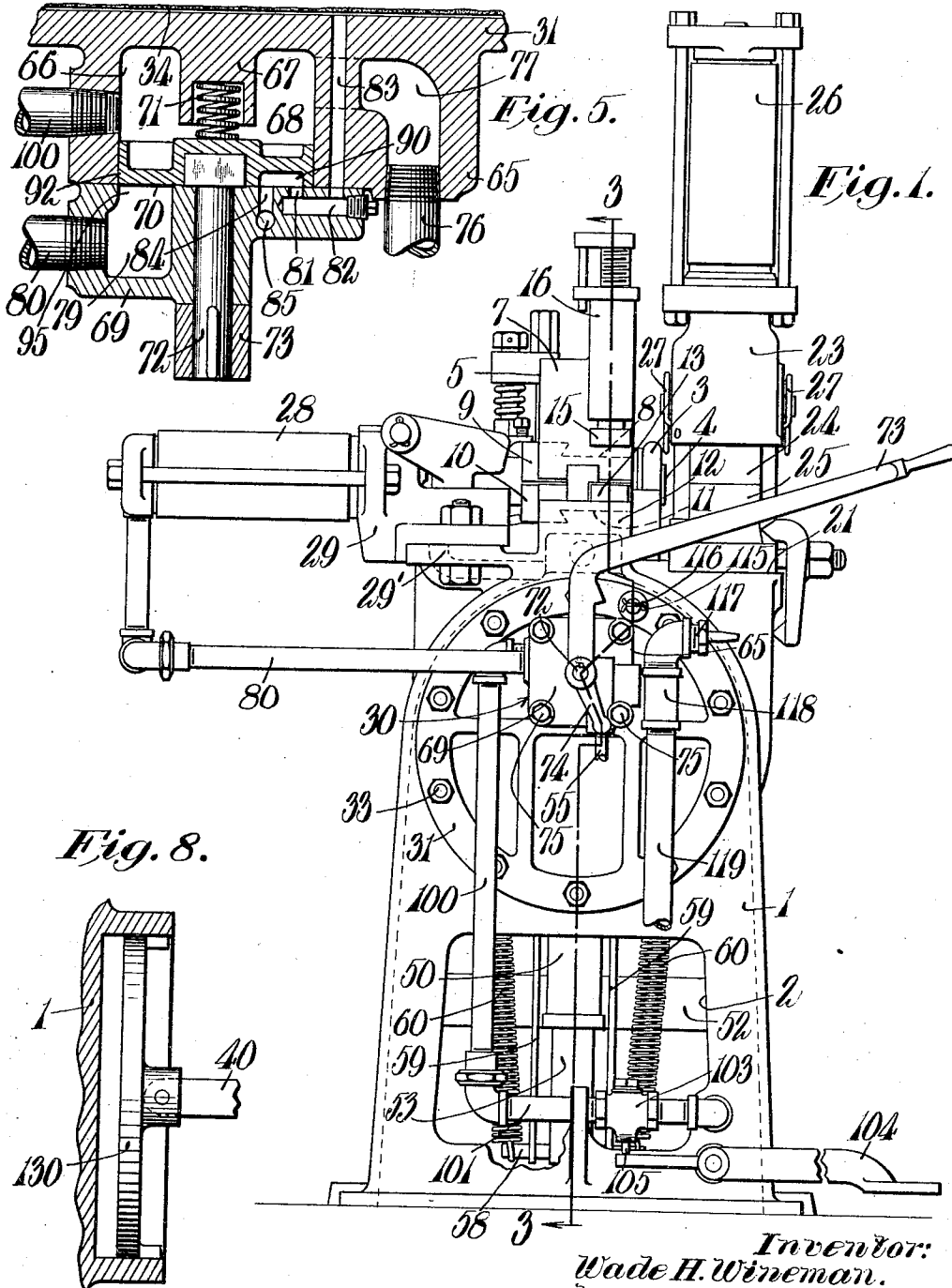
W. H. WINEMAN

1,769,812

FORGING MACHINE

Filed Sept. 29, 1925

4 Sheets-Sheet 1



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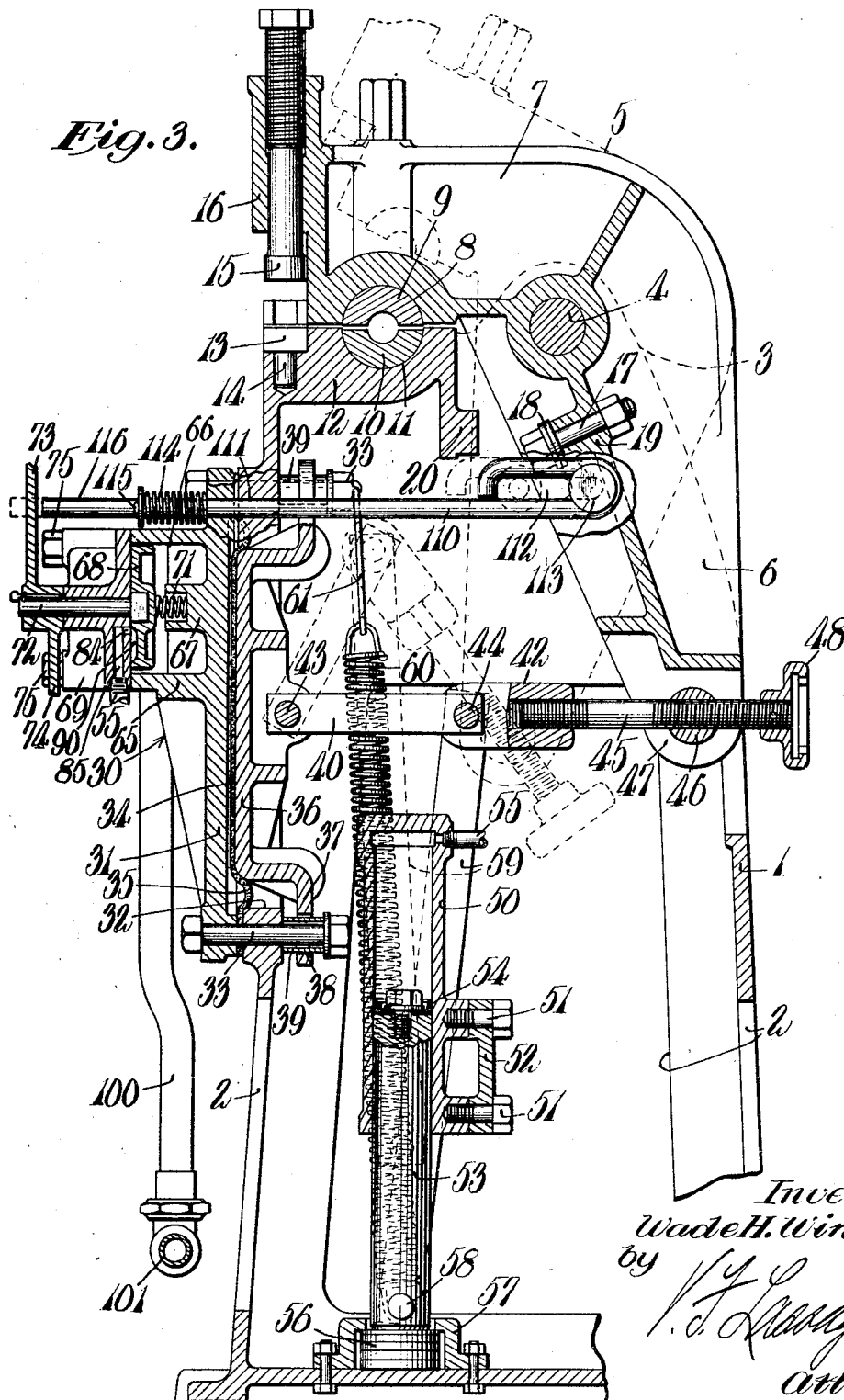
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FORGING MACHINE

Filed Sept. 29, 1925

4 Sheets-Sheet 3



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FORGING MACHINE

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4 Sheets-Sheet 4

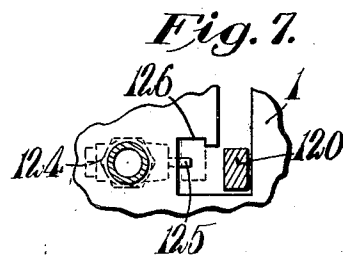
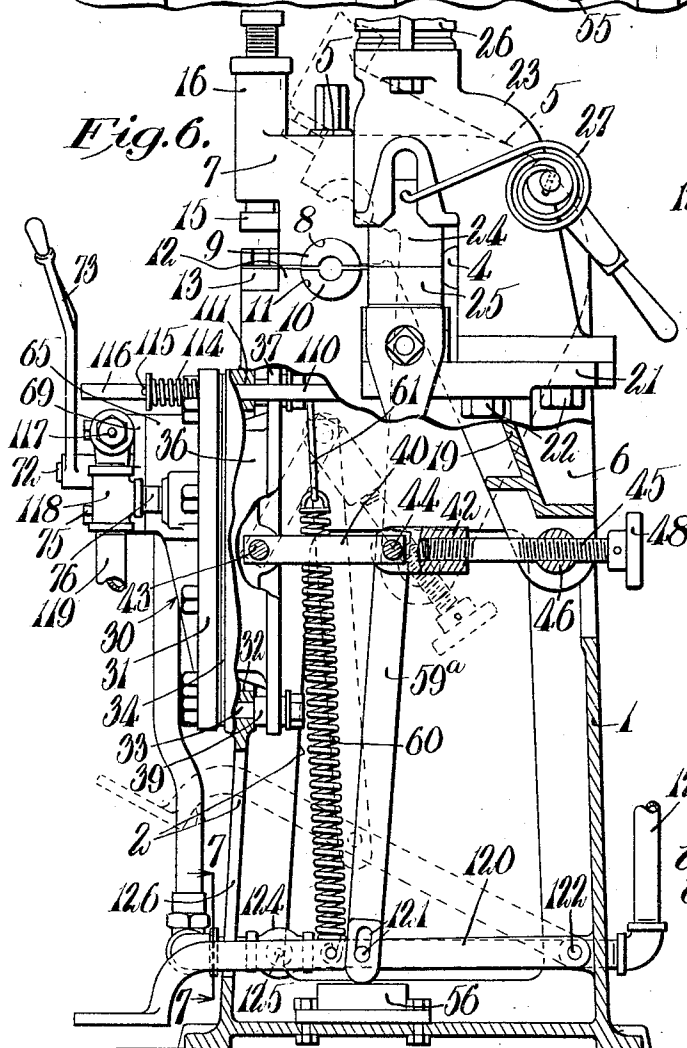
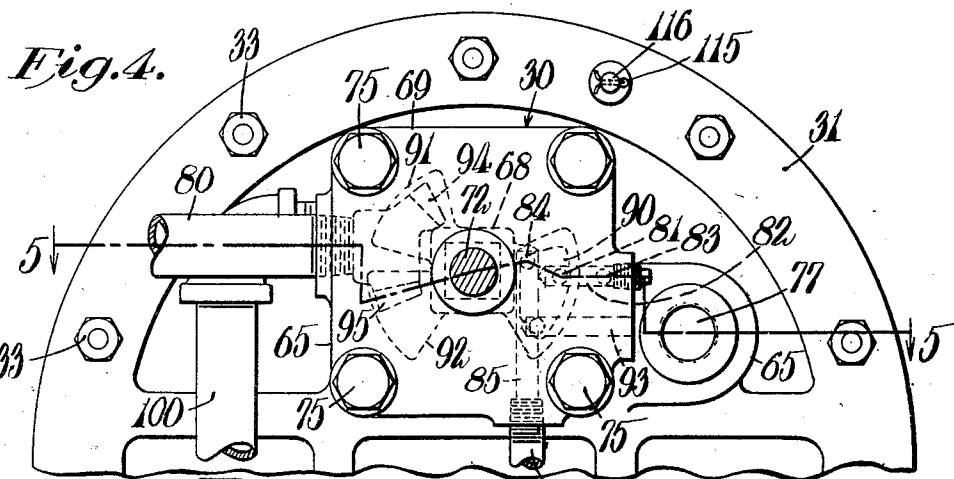
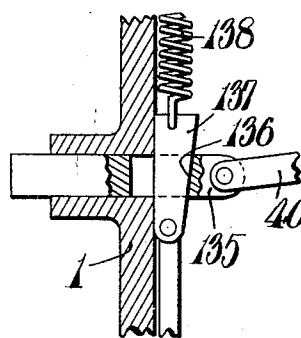


Fig. 9.



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UNITED STATES PATENT OFFICE

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FORGING MACHINE

Application filed September 29, 1925. Serial No. 59,424.

While this invention relates to forging machines generally, it is more particularly directed to drill sharpening machines.

Forging machines of the class to which this invention relates find use not only in blacksmith or forge shops, but also in contracting work such as road building or the like, which necessitates the hauling of all the necessary apparatus to the job. This latter work necessarily involves considerable portable apparatus and it is accordingly highly desirable that the same not only be constructed as light as possible consistent with strength and durability, but that the working elements thereof be highly economical in power consumption. This is particularly true of a forging or other type of machine of the air actuated type for the reason that a portable compressor must be used to generate the necessary air power. The principles employed in my improved machine to effect this saving of power are of course also applicable in devices which are actuated by electrical or mechanical means.

It is accordingly the principal object of my invention to provide novel operating means whereby the power consumption will be a minimum, thereby making my machine particularly applicable to construction jobs although it will be obvious that its other inherent advantages would make this machine very desirable under any other working conditions.

To accomplish this object I have in the specific aspect of the invention employed a plurality of mechanisms for effecting relative movement between two elements constituting, specifically herein, stationary and pivotal clamping jaws. One of these mechanisms may constitute means for initially relatively positioning the jaws prior to final clamping action therebetween which is caused by operation of a second actuating mechanism. The elements whereby the two actuating mechanisms may cause the relative jaw movement are so arranged that the second or final actuating mechanism, like the positioning mechanism, will consume very little power, due to the power element having very limited movement. The limited move-

ment does not, however, reduce the full clamping force between the jaws which is many times greater than that of the positioning mechanism.

A further object is to provide improved adjusting mechanism for the actuating means and to provide improved means for returning the various elements such as the pivotal jaw and positioning mechanism to their inoperative positions upon cut off of the power. A still further object is to provide improved means whereby movement of the clamping jaw, herein specifically pivotally mounted, may be limited and varied so as to regulate the degree of jaw closing.

It is a further object of the invention to provide improved means for supporting drill steel gaging mechanism, one element of which is herein carried on the pivotal jaw and accordingly its position may be controlled by the means for limiting movement of the jaw. A further object is to provide an improved arrangement of parts such as the relation between the pivotal jaw, the actuating mechanisms, and the swaging and upsetting hammers, and generally to provide improved means for supporting these elements relative to each other.

A further object is to provide improved means whereby these elements, some of which may be disposed within a base, are readily accessible and removable. Another object is to provide improved mechanism for controlling, in the proper sequence, power flow to the swaging and upsetting hammers and to the plurality of clamp actuating mechanisms. A further object is to provide improved means for preventing actuation of the upsetting hammer prior to closing of the clamping jaws. A still further object is to provide improved means for supporting a drill steel hole cleansing mechanism.

These main, and other minor objects which will become apparent as the description proceeds, are attained by the organization and details of construction hereinafter more specifically described.

In the accompanying drawings I have shown for purposes of illustration several

forms which my invention may assume in practice.

In these drawings,—

Fig. 1 is a side elevation of a forging machine constructed in accordance with one illustrative embodiment of my invention.

Fig. 2 is a front elevation of the machine.

Fig. 3 is a vertical transverse section of the machine taken substantially on the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary enlarged elevation of the controlling valve mechanism.

Fig. 5 is a horizontal section on line 5—5 of Fig. 4.

Fig. 6 is a front elevation of a modified form of clamp actuating means partly broken away to show details of construction.

Fig. 7 is a vertical section on line 7—7 of Fig. 6.

Figs. 8 and 9 are modified forms of clamp actuating mechanism.

In the illustrative embodiment of my invention I have shown a vertical hollow, generally rectangular shaped, base 1 having a series of openings 2 in the sides thereof to permit access to the various mechanisms disposed within said base. The upper end of the base has spaced sides 3 for supporting a shaft 4 upon which a vise jaw support 5 is pivotally mounted. The vise support comprises a depending arm 6 and a laterally extending arm 7 which carries in a cylindrical recess 8 a vise jaw 9. A cooperating stationary vise jaw 10 is likewise seated in a circular recess 11 which is formed in an inwardly extending supporting portion 12 of the frame 1. Gaging mechanism made operative by movement of the jaw support 5 comprises a fixed gaging die 13 supported as by a pin 14 in the support 12 while a cooperating adjustable gaging die 15 is carried by a lug 16 formed on the support 5, the gaging mechanism per se being my invention disclosed in my Patent No. 1,565,838, dated December 15, 1925. Means for limiting opening movement of the vise jaw comprises a bolt 17 disposed adjustably as by shims 18 in a bore formed in the web 19 of the arm 6. The head of a bolt 17 is engageable with an abutment 20 depending from the stationary jaw support 12.

A small platform 21 formed on the frame 1 removably supports as by bolts 22 a swaging hammer standard 23. A swaging die 24 cooperating with a stationary die 25 is actuated by a suitable air actuated hammer mechanism 26. The movable die 24 is controlled by suitable spring means 27 such as described and claimed in the patent to Frank A. Halleck, No. 1,666,287, dated April 17, 1928. From Fig. 2 it will be noted that the swaging dies 24, 25 are offset from the vise jaws 9 and 10 and from Fig. 1 that the swaging dies 24, 25 are disposed forwardly of the clamping jaws. An upsetting or horizontal

hammer 28 is supported by a bracket 29 which has a recess receiving a supporting portion 29' of the base and is held by suitable bolts. The hammer 28 cooperates with the vise jaws during forging of the work piece.

Actuating mechanism for the pivotal jaw includes a final actuating servo-motor of high power generally indicated 30 which has a stationary plate 31 secured to the frame 1 adjacent an opening 32 as by a series of bolts 33. A diaphragm 34, made of leather or suitable heat resisting material, is clamped between the plate 31 and frame 1 and has an annular slack portion 35 sufficient to permit movement by the diaphragm of a plate 36. The plate 36 has supporting portions 37 provided with openings 38 slidably mounted upon bushings 39 which surround and are clamped in position by the bolts 33. Toggle mechanism for connecting the plate 36 and arm 6 comprises a link 40 pivoted to the plate 36 and to an adjustable element 42 as at 43, 44, respectively. The element 42 is connected by left hand threads to a rod 45 which in turn is connected by right hand threads to a bar 46 pivotally mounted between spaced ears 47 formed on the lower end of the arm 6. A handle 48 secured to the shaft 45 is adapted upon rotation to vary the operative relation of the plate 36 and clamping jaw. When the arms of the toggle mechanism are in alinement as shown in full lines in Fig. 3, the plate 36 will cause the leather diaphragm 34 to be substantially against the face of the plate 31 and the clamping jaw to be possibly in contact with the work piece to be clamped. Upon flow of compressed air to the diaphragm chamber, very little movement of the diaphragm will be necessary, for the clamp has already traveled substantially its maximum distance during its positioning operation which is caused by bringing into alinement the links of the toggle mechanism.

The mechanism for bringing into alinement the toggle mechanism links prior to actuation of the diaphragm comprises a second, toggle-operating servo-motor of low power, having a cylinder 50 secured as by cap screws 51 to a transverse support 52 which is carried by the frame 1. A plunger or piston 53 extends downwardly within the cylinder and carries a usual cup washer 54 to prevent air leakage thereby. Air is supplied to the cylinder as by a pipe 55. The lower end of the plunger 53, when in its lowermost position, rests upon a suitable support 56 such as a spring, leather, or other suitable means which is held in position by a housing 57 having an opening in the top thereof. Links 59 are pivotally connected as at 58 to the lower end of the plunger 53 and to the pivot 44. The support 56 prevents the toggle links from moving in a downward direction past their alining position. This downward movement could also be prevented by provid-

ing suitable usual types of cooperating lugs on the links. Mechanism provided for breaking the toggle links so as to open the vise jaws comprises a pair of springs 60 disposed one on each side of the cylinder 50 having their ends connected respectively to the pivot 58 and to a pair of the supporting bolts 33. The latter connection is effected by links 61 passing through suitable holes in the bolt 33 and through a suitable loop in the ends of the springs. It will thus be seen that when air pressure is released from the cylinder 50, the springs 60 will pull upwardly on the links 59 to effect opening of the vise jaws, the diaphragm plate 36 being limited in its movement by the heads of the bolts 33.

The valve mechanism for controlling flow of fluid to the toggle cylinder 50, diaphragm 34, and the upsetting or horizontal hammer 28 comprises a valve housing 65 herein preferably carried by the plate 31, which, as noted in Fig. 1, is disposed on the side of the frame 1. More specifically, the valve housing 65 has a cylindrical bore or chamber 66 provided with a central recessed lug 67 and within this chamber is an oscillatable cylindrical valve 68. A cover 69 is provided with a valve seating surface 70 against which the valve 68 is held by a spring 71 disposed within the recessed lug 67. A shaft 72 connected to the valve extends outwardly through the cover 69 and is provided with an operating handle 73 which is swung down from the position shown in Fig. 1 in order to actuate the various mechanisms. A depending arm 74 is adapted to limit movement of the handle 73 by engagement with the heads of bolts 75 which hold the cover 69 to the valve housing 65. Fluid is supplied to the chamber 66 from a supply pipe 76 through a passage 77 while fluid flows to the horizontal or upsetting hammer past the valve 68 through a chamber 79 and pipe 80. Fluid flows to the diaphragm 34 through passages 81, 82, 83, the passage 83 being in direct communication with the diaphragm inasmuch as the valve housing is a part of the plate 31. Fluid flows to the toggle cylinder through a horizontal passage 84 and a vertical passage 85 which is connected to the pipe 55. The valve 68, as shown in Fig. 4, comprises one closed chamber 90 and two flat wings 91 and 92. So as to make sure that fluid will flow in order to the toggle cylinder, then the diaphragm and finally the upsetting hammer, the following arrangement of valve controlled passages has been provided. In the neutral position, which is shown in Fig. 4, all passages (that is to say, 81, 84, 94 and 95) are cut off from the chamber 66, the valve 68 covering them all; hence no pressure fluid can pass to any of them. Upon initial movement of valve 68 the passage 84 which is higher than the passage 81 is uncovered first (this brings down the toggle), next the pas-

sage 81 is uncovered (this delivers air to the diaphragm 34), and finally the ports 94 and 95 which have, until now, been covered by the broad wings 91 and 92, are uncovered, thereby permitting flow of fluid directly from the chamber 66 to the pipe 80 leading to the upsetting hammer 28. It is therefore apparent that not until both the toggle and the diaphragm have been actuated and the valve 68 has been turned to its full on position does pressure fluid pass from the chamber 66 to the ports 94, 95 and the chamber 79 to the upsetting hammer 28. Returning to the valve 68, it is to be noted that one part of it consists of the closed chamber 90. An exhaust passage 93 always vents the chamber 90 to atmosphere, but fluid cannot flow from the chamber 66 to the atmosphere for the reason that the chamber 90 is closed, as clearly shown in Figs. 4 and 5.

Fluid flows to the vertical or swaging hammer 26 from the chamber 66, through pipes 100, 101, and 102. A usual type of valve 103 disposed within the line 101 is controlled by a foot lever 104 which engages a valve stem 105. Inasmuch as the fluid flow through the pipe 100 is not controlled by the valve 68, the swaging hammer may be actuated at any time merely by pressing the foot lever 104. Interlocking mechanism between the swaging hammer and other mechanisms of the forging machine is not necessary for the reason that no harm can come even though the swaging hammer is operated at any time.

It is desired to insure that the vise jaws are in closed position prior to actuation of the horizontal or upsetting motor, this to prevent the possibility of the drill steel or work piece being driven outwardly from the vise jaws by the horizontal hammer as might be the case if the work piece were not clamped prior to the operation of the upsetting motor. To accomplish this a rod 110 extends through a frame opening 111 and has a reversely bent portion to form a slot 112. A pin 113 carried on the outside of the arm 6 is received in the slot 112 and engages the rod at the right hand end of the slot when the jaw is nearing its clamping position. A spring 114 presses against a transverse pin 115 carried by the rod 110 to cause the latter to be moved outwardly when the jaw 5 is moved to open position. When the jaw is open an extension 116 of the rod will traverse the path of the valve handle 73 at a point so as to prevent rotation of the latter to a position beyond that which allows flow of fluid only to the toggle cylinder.

A drill steel hole-blowing mechanism 117 is disposed in a pipe T 118 which communicates with the chamber 66 as by a pipe 76. The source of fluid is connected to said T by a pipe 119.

In the operation of the preferred form of device, assuming the vise jaws to be open, 120

the operator upon placing the work piece such as a drill steel on the lower jaw 10, will first turn the handle 73 in a clockwise direction viewed from Fig. 4 until it strikes the extension 116. This operation first uncovers the passage 84, whereupon fluid flows from the chamber 66 through passages 84, 85 and pipe 55 to the upper end of the toggle cylinder 50, causing downward movement of the plunger 53. This brings into alinement the toggle mechanism links 40 and 45, thus causing the pivoted jaw to be brought into close relation to the stationary jaw. During the final closing movement of the pivoted jaw, the extension 116 of the rod 110 will be pulled out of the path of the handle 73, whereupon further movement of the valve will uncover the passage 81 to permit flow of fluid to the diaphragm. Due to alining of the toggle links, the diaphragm 34 will be brought in close proximity to the face of the plate 31. The plate 36 due to practically complete closing of the pivoted jaw will now only have to move a very small distance to exert a final clamping force. The effective clamping force by the diaphragm 36 is not in any way reduced due to its limited movement for the total clamping force is equal to the effective area of the diaphragm multiplied by the air pressure. Though the usual effective clamping pressure is maintained, yet the volume of air for actuating the diaphragm is reduced considerably from that which would be necessary to move the pivoted jaw from full opening to closing position by the diaphragm alone or its equivalent such as a piston and cylinder. The drill steel now being firmly clamped, the operator may further turn the valve to uncover the ports 94 and 95, thereby allowing flow of fluid to the horizontal upsetting hammer through the pipe 80. After the jaw has been initially positioned, the upsetting and diaphragm mechanisms may be quickly actuated without fear of the drill steel being driven from between the jaws, for the small amount of diaphragm movement will permit the steel to be tightly clamped before the upsetting mechanism can be started. To remove the drill steel or other work piece, the handle 73 will be brought to its neutral position and the diaphragm and toggle cylinder vented to the atmosphere through the exhaust passage 93. The springs 60 will break the alinement of the toggle links and return the plunger 53 to its upper position. If it is now desired to perform a swaging operation on the drill steel, the dies 24, 25 may be used and the hammer 26 actuated by pressing down the foot lever 104, thereby actuating the valve 103. After roughing out the drill steel, the same may be properly gaged by use of the gaging mechanism including the dies 13 and 15, it being noted that only the actuating force of the toggle cylinder piston may be

used if desired. If for any reason the toggle links are not suitably adjusted so as to cause the plates 36 and 31 to be moved close together when the vise jaws are initially closed, the links may be adjusted by rotating the handle 48.

While in the preferred form two air actuated mechanisms are employed for initial positioning of the vise jaw and exerting the final clamping force thereon, it will be understood that various modifications thereof may be made to effect broadly; first, positioning of the vise jaws, and then a final clamping action therebetween. These modifications would not necessarily require the particular disposition of the actuated mechanisms as disclosed or the use of the toggle mechanism or a plurality of motors. Neither would it be necessary that the actuating mechanism be of the air type for usual mechanical equivalents such as manual means, or power driven rack and pinion means, could be used to cause reciprocation of the various reciprocable elements. To illustrate certain of the above mentioned possible modifications, attention is directed to Fig. 6 wherein the link 59^a is connected to a foot lever 120 by a pin and slot connection 121, the foot lever being pivotally connected at 122 to the frame 1 in a suitable manner so that lateral movement of the foot lever may be had, the pin and slot connection 121 also permitting lateral movement. The springs 60 are connected to the foot lever, thereby always having a tendency to pull the pin upwardly in the slot of the connection 121. Instead of having fluid flow directly to the diaphragm from the valve chamber, a pipe 123 may be employed leading to a valve 124 which will control flow of fluid to the diaphragm. A reciprocable valve stem 125 is engageable by the foot lever 120 upon lateral movement thereof and during this engagement the springs 60 will cause the foot lever to be drawn upwardly into a recess 126 to hold the valve open.

In the operation of this device, assume the jaws to be open and accordingly the alinement of the toggle links 40 and 45 broken and the foot lever in its uppermost position as indicated in dotted lines in Fig. 6. Upon placing a steel between the jaws the operator will press the foot lever 120 into downward position causing alinement of the toggle links 40 and 45 after which by a slight lateral movement the valve stem 125 may be actuated to allow flow of fluid to the diaphragm to effect complete clamping action. This flow of fluid can be maintained by a slight raise of the operator's foot to permit the lever 120 to be received in the recess 126. The link 59^a is not brought out of engagement with the rest 56 when the foot lever is permitted to rest in the recess 126 on account of the pin and slot connection 121. To release the

vise jaws the operator need only to depress slightly the foot lever and shift the same laterally to cut out fluid flow to the diaphragm and exhaust the same, whereupon by taking his foot wholly from the foot lever the springs
5 60 will cause opening of the jaws.

It will of course be understood that in either form of the device the link 59 or 59^a may be of such a length that the common pivot point 44 of the toggle links 40 and 45 will be slightly below a line connecting the pivot points 43 and 46, thereby relieving any upward strain on the plunger 53 or upon the foot lever 120 during clamping action.
10 When the foot lever is used, the passages 81 and 84 in the valve mechanism may be omitted although the interlocking rod 110 may be retained to prevent operation of the horizontal hammer until the vise jaws are in clamping position. A still further possible modification of the final actuating mechanism regardless of which form of initial positioning means might be used consists, as shown in Fig. 8, of having a plate piston 130 instead
15 of a diaphragm. An annularly waved metal disk could also be used in place of the piston 130 or leather diaphragm. A further modification is shown in Fig. 9 wherein the link 40 might be pivotally connected to an element 135 reciprocally mounted in the frame 1. This element has a slot with an inclined surface 136 engageable by a wedge 137 which may be moved downwardly by any suitable means which could take the form of manually
20 actuated means, a solenoid, or an air cylinder, any one of which would be returned to its normal position by a spring 138.

While I have in this application specifically described several forms which my invention may assume in practice, it will be understood that these forms of the same are shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing
25 from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A forging machine having in combination cooperating vise jaws, a fluid actuated motor for effecting an initial juxtaposed positioning of said jaws, a fluid actuated motor for finally clamping said jaws, a fluid operated hammer motor adapted to act upon a
30 work piece held in said jaws, controlling means comprising a single valve for controlling fluid flow successively to said positioning, clamping, and hammer motors in a definite sequence, and a detent interrupting and preventing further movement of said valve after flow of fluid to the positioning motor has begun until said vise jaws are in substantial clamping position.

2. In a forging machine, the combination
35 of relatively movable vise jaws, a fluid op-

erated actuating motor for effecting an initial juxtaposed positioning of said jaws, a fluid operated clamping motor for finally clamping said jaws, a fluid operated hammer motor adapted to act upon a work piece held
40 in said jaws, controlling means comprising a single valve for controlling fluid flow successively to said positioning, clamping, and hammer motors in a definite sequence, and means for preventing rapid movement of said valve from one of its operating positions to the next.

3. A forging machine comprising relatively movable clamping jaws, motor actuated means for effecting an initial juxtaposed positioning of said jaws, motor actuated means for finally clamping said jaws, a motor actuated hammer adapted to act upon a work piece held in said jaws, means for controlling
45 actuation of said motor actuated means and hammer in a definite sequence including a rotatable valve element, and means for controlling rotation of said valve element including an element actuated by said motor actuated positioning means.

4. A forging machine comprising relatively movable clamping jaws, motor actuated means for effecting an initial juxtaposed positioning of said jaws, motor actuated means for finally clamping said jaws, a motor actuated hammer adapted to act upon a work piece held in said jaws, said motor actuated means and hammer each having a motor individual thereto, means for controlling
50 actuation of said motors in a definite sequence including a rotatable element, and means for controlling rotation of said element including an element actuated by said motor actuated positioning means, said last mentioned element being disposable in the path of movement of said rotatable element.

5. In a forging machine, a fluid actuated hammering motor, work clamping means including clamping elements, mechanism including a fluid actuated motor for effecting an initial juxtaposed positioning of said elements and mechanism including a fluid actuated motor for finally clamping said elements, and valve means for supplying fluid in a definite sequence first to said initial positioning mechanism, second to said final
55 clamping mechanism, and third to said hammering motor, said valve means having a single operating means.

6. In a forging machine, a fluid actuated hammering motor, work clamping means including clamping elements, mechanism including a fluid actuated motor for effecting an initial juxtaposed positioning of said elements and mechanism including a fluid actuated motor for finally clamping said elements, and controlling means for said motors including a single valve movable in a single direction for supplying fluid in a definite sequence first to said initial positioning mechanism
60 120 125 130

anism, second to said final clamping mechanism and third to said hammering motor.

7. A forging machine having in combination cooperating vise jaws, a fluid actuated motor for effecting a juxtaposed position of said jaws, a fluid actuated motor for effecting final clamping action of said jaws, a fluid operated hammer motor to act upon work held by said jaws, and controlling means for said several motors comprising a single valve whose movements effect supply of actuating fluid to all of said motors in a definite sequence and means controlled by operation of said first mentioned motor for controlling movement of said valve from the position in which fluid is supplied to said first mentioned motor to the succeeding positions.

8. In a forging machine, a base, a hammering mechanism carried by said base, and clamping mechanism for holding a work piece in position to be acted upon by said hammering mechanism comprising relatively movable vise jaws, an abutment, a bell crank lever pivoted to said base having a laterally extending arm carrying one of said vise jaws and a depending arm, and mechanism for swinging said lever about its pivot including toggle links pivoted respectively to the abutment and to said depending lever arm, said links when in alinement extending horizontally, a power actuated vertically reciprocable member for alining and breaking the toggle, and a motor adapted to move said abutment in the direction of said depending lever arm.

9. In a forging machine, a base, a hammering mechanism carried by said base, and clamping mechanism for holding a work piece in position to be acted upon by said hammering mechanism comprising relatively movable vise jaws, an abutment, a bell crank lever pivoted to said base having a laterally extending arm carrying one of said vise jaws and a depending arm, and mechanism for swinging said lever about its pivot including toggle links pivoted respectively to the abutment and to said depending lever arm, said links when in alinement extending horizontally, a power actuated vertically reciprocable member for moving the mid-pivot of the toggle downwardly to aline said links and upwardly to break the toggle, and a motor adapted to move said abutment in the direction of said depending lever arm.

10. In a forging machine, a base, a hammering mechanism carried by said base, and clamping mechanism for holding a work piece in position to be acted upon by said hammering mechanism comprising relatively movable vise jaws, an abutment, a bell crank lever pivoted to said base having a laterally extending arm carrying one of said vise jaws and a depending arm, and mechanism for swinging said lever about its pivot including toggle links respectively pivoted to the abutment and to said depending lever

arm, said links when in alinement extending horizontally, a vertically reciprocable member for straightening and breaking the toggle, a fluid motor for reciprocating said member, and a fluid motor adapted to move said abutment in the direction of said depending lever arm.

11. In a forging machine, a base, a hammering mechanism carried by said base, and clamping mechanism for holding a work piece in position to be acted upon by said hammering mechanism comprising relatively movable vise jaws, an abutment, a bell crank lever pivoted to said base having a laterally extending arm carrying one of said vise jaws and a depending arm, and mechanism for swinging said lever about its pivot including toggle links pivoted to the abutment and to said depending lever arm, said links when in alinement forming with said bell crank lever three sides of a trapezoid, a vertically reciprocable member for alining and breaking the toggle, a fluid motor for reciprocating said member, and a fluid motor of relatively higher power than said first mentioned motor adapted to move said abutment in the direction of said depending lever arm.

12. In a forging machine, a base, a hammering mechanism carried by said base, and clamping mechanism for holding a work piece in position to be acted upon by said hammering mechanism comprising relatively movable vise jaws, an abutment, a bell crank lever pivoted to said base having a laterally extending arm carrying one of said vise jaws and a depending arm, mechanism for swinging said lever about its pivot to effect an initial juxtaposed positioning of said vise jaws including wedging or prying means cooperating with the abutment and with said depending lever arm, and a vertically reciprocable member and a fluid motor for actuating said wedging or prying means, and mechanism for effecting final clamping action of said vise jaws including a fluid motor adapted to move said abutment in the direction of said depending lever arm.

13. In a forging machine, a base, a hammering mechanism including a fluid operated actuating motor carried by said base, and clamping mechanism for holding a work piece in position to be acted upon by said hammering mechanism comprising relatively movable vise jaws, an abutment, a bell crank lever pivoted to said base having a laterally extending arm carrying one of said vise jaws and a depending arm, mechanism for swinging said lever about its pivot including toggle links pivoted respectively to the abutment and to said depending lever arm, said links when in alinement extending horizontally, a vertically reciprocable member for straightening and breaking the toggle, a fluid motor for reciprocating said member, a fluid motor adapted to move said abutment

in the direction of said depending lever arm, and valve means for supplying fluid to said motors in a definite sequence, first to said initial positioning mechanism, second to said
5 final clamping mechanism, and third to the actuating motor of said hammering mechanism, said valve means having a single operating means.

14. In a forging machine, a fluid actuated
10 hammering mechanism and clamping mechanism for holding a work piece in position to be acted upon by said hammering mechanism including relatively movable vise jaws, a pivoted jaw support having a depending
15 arm and a laterally extending arm, said latter arm carrying one of said vise jaws, fluid actuated mechanism for effecting an initial relatively close positioning of said jaws comprising a relatively low powered fluid actuated
20 vertical cylinder and piston device, a relatively high powered fluid actuated horizontal cylinder and piston device for finally clamping said jaws, connections between said latter piston and said depending arm including
25 a toggle, connections between said first mentioned piston and said toggle whereby the links of the latter may be disposed in substantially horizontal alinement, said high powered piston acting lengthwise of said
30 alined toggle during the clamping operation, a valve having a controlling handle and adapted to supply fluid pressure to said hammering mechanism, said vertical positioning device and said horizontal clamping device
35 in a definite sequence, and a member connected to said depending arm and movable into the path of movement of said valve handle for preventing movement of said valve to a position to supply fluid to said
40 hammering mechanism prior to the admission of fluid to said positioning device.

In testimony whereof I affix my signature.

WADE H. WINEMAN.

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