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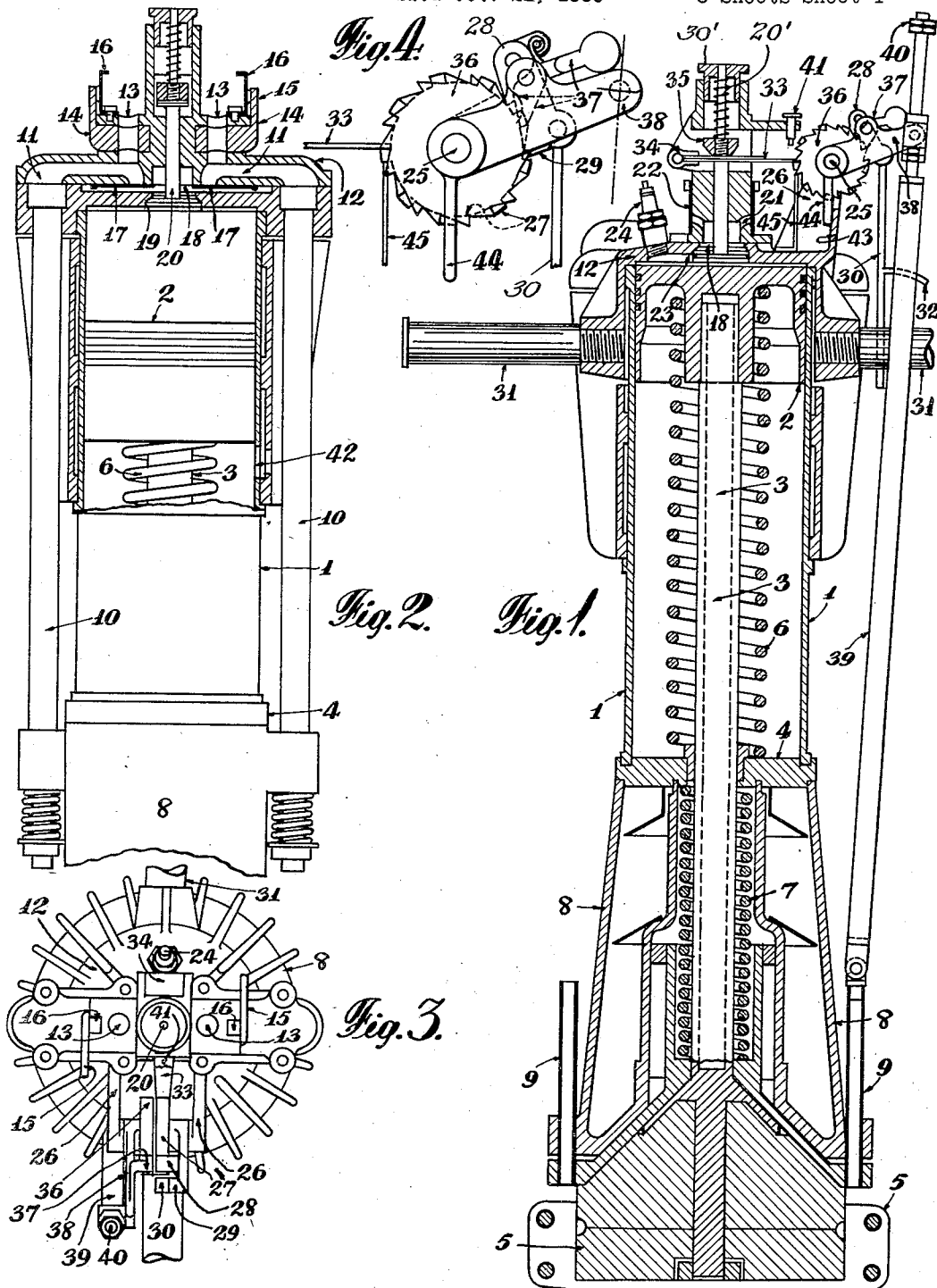
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2,009,929

PORTABLE INTERNAL COMBUSTION ACTUATED TAMPING MACHINE OR RAMMER

Filed Oct. 21, 1933

3 Sheets-Sheet 1



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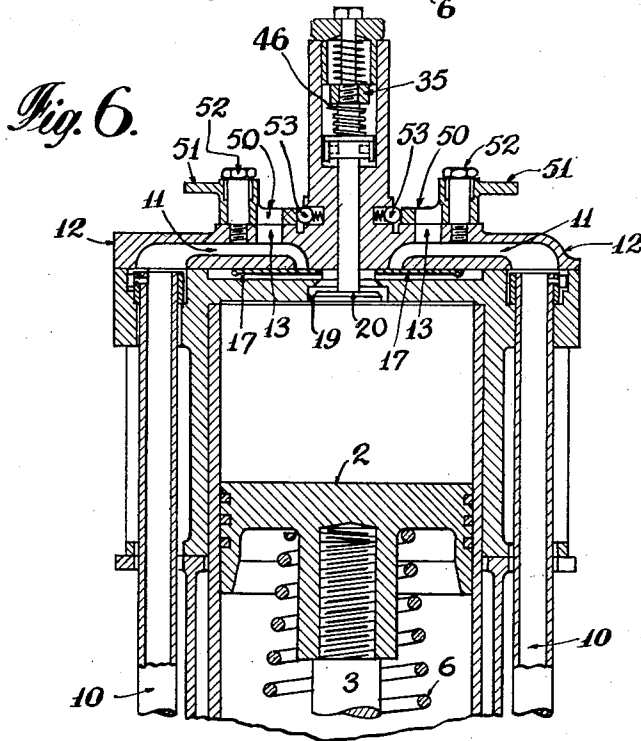
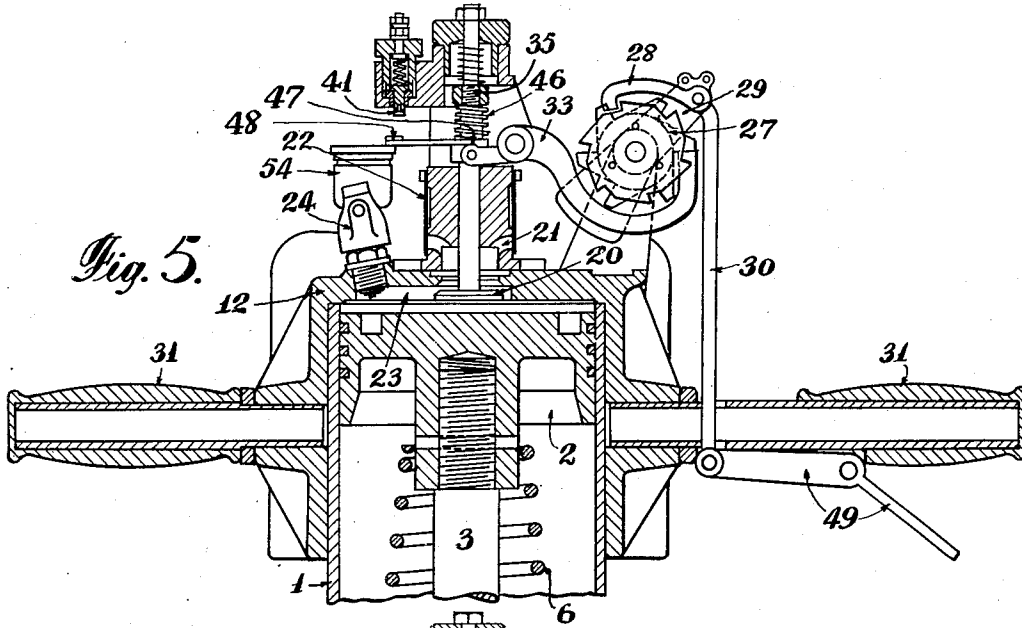
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3 Sheets-Sheet 3

Fig. 7.

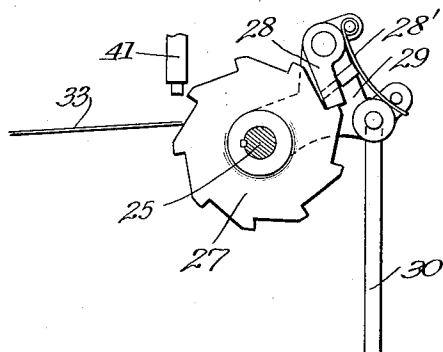


Fig. 8.

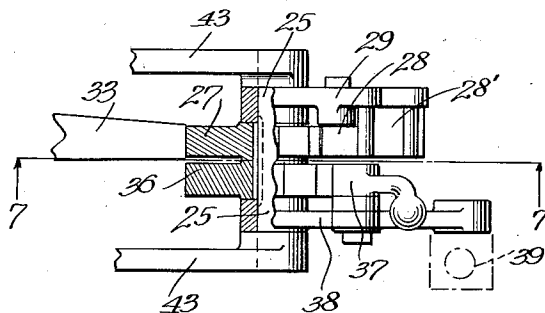


Fig. 9.

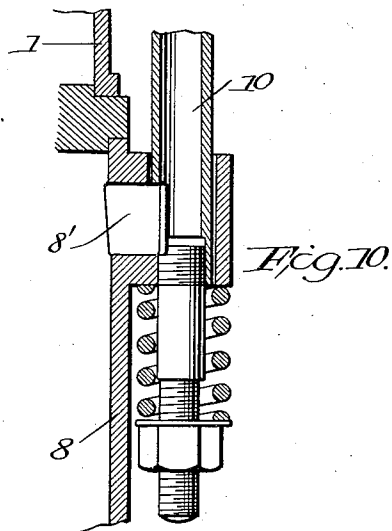
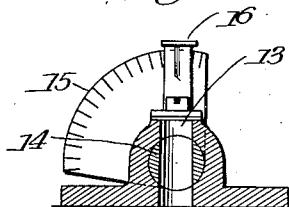
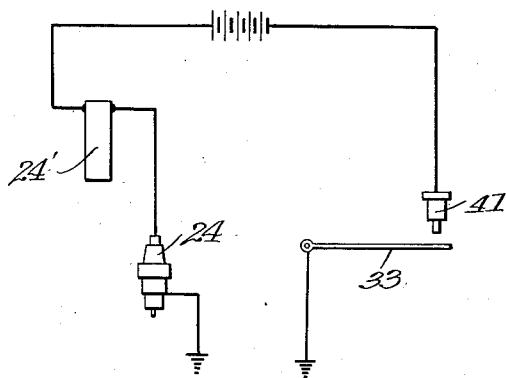


Fig. 11.



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UNITED STATES PATENT OFFICE

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PORTABLE INTERNAL-COMBUSTION ACTUATED TAMPING MACHINE OR RAMMER

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Application October 21, 1933, Serial No. 694,675
In Great Britain October 21, 1932

10 Claims. (Cl. 123—7)

This invention relates to portable tamping machines or rammers operated by an internal combustion engine or motor, and has for its chief object the provision of new or improved mechanism for completing the ignition circuit of the engine and controlling the spring loaded inlet and exhaust valve, said mechanism being of the kind comprising a lever which operates to complete the ignition circuit, whilst retaining the valve closed, and then releases said valve to leave it free to open when its spring-loading overcomes the decreasing pressure in the working space of the engine cylinder during the expansion stroke.

According to the invention, the lever which completes the ignition circuit and controls the inlet and exhaust valve is of a springy nature or is spring controlled and is adapted to be flexed or operated by a toothed wheel so as to co-operate with a fixed contact and thereby complete the ignition circuit, whilst maintaining the valve closed, and then to be tripped by said toothed wheel so as to release the valve and leave it free to open when its spring loading overcomes the pressure in the working space of the engine cylinder during the expansion stroke.

In order that the invention may be clearly understood and readily carried into effect, the same will now be more fully described with reference to and by the aid of the embodiments illustrated in the accompanying drawings; wherein:—

Figure 1 is a vertical section of a portable internal combustion-actuated tamping machine or rammer.

Figure 2 is a part vertical section taken at right-angles to Figure 1.

Figure 3 is a plan of Figure 2.

Figure 4 is an elevation of the ratchet ignition mechanism drawn to an enlarged scale.

Figures 5 and 6 are respectively similar views to Figures 1 and 2 but illustrate a modified construction of rammer.

Figure 7 is a sectional view taken substantially along the line 7—7 of Figure 8.

Figure 8 is a plan view with parts in section of the device.

Figure 9 is a detail sectional view of the turn-cocks.

Figure 10 is a sectional detailed view of parts of the machine, and

Figure 11 diagrammatically shows the ignition circuit.

Referring to Figures 1 to 4 of the drawings, the tamping machine or rammer comprises a

cylinder 1 fitted with a piston 2 whose rod 3 extends through the base plate or bottom 4 of said cylinder and has a foot 5, constituting the impact tool, secured to its lower end. A helical compression spring 6 surrounds the rod 3 and is located in the cylinder 1 between the piston 2 and the base plate or bottom 4 of said cylinder, and a further helical compression spring 7 surrounds the lower portion of the piston rod 3 and bears against the underside of the base plate or bottom 4 and the upper face of the foot or impact tool 5. Surrounding the spring 7 and secured to the base plate or bottom 4 is an annular tank or reservoir 8 constituting a surface carburetor for supplying gas or vapour to the engine, and the foot or impact tool is slidably connected to lugs on said annular tank or reservoir 8 through guide rods or tubes 9 engaging bores therein. The surface carburetor 8 is connected by side supply pipes 10 to ports 11 in the cylinder head 12, and said ports 11 communicate with air inlet ports 13 in the cylinder head which are controlled by turn-cocks 14 adapted to be secured in any position of adjustment by means of toothed levers 15, formed integrally with the movable members of the turncocks 14, being engaged by stationary spring fingers 16 (Fig. 9), whilst the outlets of the ports 11 are controlled by diaphragm valves 17 and lead into a chamber 18 which communicates directly with a centrally located suction inlet port 19 controlled by a valve 20. The interior of the carburetor 8 communicates with the supply pipe 10 through a passage or conduit 8' (Fig. 10). Scavenging of the cylinder 1 also takes place through the port 19 and through scavenging outlet ports 21 controlled by diaphragm valves 22, whilst the cylinder head is formed with a recess or channel at 23 for conducting the charge directly from the suction inlet port 19 to the points of the sparking plug 24.

Fixed to a shaft 25 mounted in bearing brackets 26 on the cylinder head is a square-toothed wheel 27 which is adapted to be actuated by a pawl 28 carried at the outer end of an arm 29 which is rotatably mounted about the shaft 25. The pawl 28 is normally urged into engagement with the teeth on the wheel 27 by the leaf spring 28' carried by the arm 29 (Fig. 7). The outer end of the arm 29 has also pivotally connected therewith a depending operating rod 30 which is guided by being passed through a hole in one of the usual diametrically opposed handles 31, whereby the machine as a whole is controlled by the operator, and said depending rod 30 is provided or

formed with a laterally disposed projection 32 which the operator can engage with his finger or thumb to depress the rod 30 and thereby partially rotate the wheel 27 without releasing his grip on the adjacent handle 31. The teeth of the wheel 27 co-operate with the free end of a springy lever 33 which is pivoted or anchored to the cylinder head fitting at 34 and engages the underside of an enlargement or collar 35 fixed to the stem of the inlet and exhaust valve 20. A coil spring 20' on the stem of the valve 20 is confined between the collar 35 and a screw plug or cap 30' so as to normally urge the valve 20 away from its seat. Also fixed to the shaft 25 is an ordinary ratchet toothed wheel 36 adapted to be operated by a weighted pivoted pawl 37 carried by an arm 38 pivoted about the shaft 25 and having its outer end slidably connected to an actuating rod 39 the lower end of which is pivotally connected to one of the guide rods or tubes 9 on the foot or impact tool 5 (Fig. 8). The upper end of the rod 39 which is slidably connected with the arm 38 to provide for lost motion during the suction and scavenging periods, is fitted at the head with nuts 40, the lower one of which operates upon the arm 38 to partially rotate the shaft 25 and its square-toothed wheel 27.

A fixed insulated contact 41 in the ignition circuit is so positioned on the cylinder head that the lever or arm 33 when sufficiently bent or flexed upwardly will contact with it prior to said lever or arm being tripped or released by the square toothed wheel 27. In Fig. 11 is disclosed the ignition circuit which may be provided with a high resistance coil 24' and which is connected to the various parts in the manner as shown.

Assuming the parts to be in the position shown in Figure 1 with the foot 5 on the ground and the spring 7 in compression, said spring 7 is allowed to come into action to raise the cylinder 1 into the position shown in Figure 2 so as to draw in a charge of fuel mixture through the diaphragm valves 17 and port 19 ready for firing, the lost motion connection between the arm 38 and rod 39 permitting of this amount of movement. The operator now depresses the depending rod 30 so as to partially rotate the square-toothed wheel 27 and thereby bend or flex the lever or arm 33 to close the valve 20 and, whilst retaining the latter on its seat, engage the contact 41 so as to complete the ignition circuit and thereby fire the charge, whereupon the tooth which has bent or flexed the lever or arm 33 trips past it so as to allow said lever or arm to fall on to the next tooth of said wheel. This leaves the inlet and exhaust valve 20 free to fall or open as soon as the spring-loading of said valve can overcome the pressure in the working space of the cylinder or when the free exhaust port 42 in the cylinder 1 is uncovered. Preferably six ports 42 are equi-distantly spaced around the cylinder (Fig. 2) at the same level so as to permit the complete exhaust of the products of combustion upon the down-stroke of the piston 2. During the expansion stroke the cylinder has been thrown up and the spring 6 has been compressed. This spring 6 now comes into action to throw up the piston 2 with its rod 3 and foot 5 until the piston reaches the position illustrated in Figure 2. The foot 5 now being off the ground and the explosive force having been spent, the machine falls until the foot 5 strikes the ground, and upon impact, the cylinder 1 continues to move downwardly over the piston 2 so as to scavenge the working space by way of the port, 19, ports 21

and diaphragm valves 22 to atmosphere, whilst during this downward movement of the cylinder the spring 7 is again loaded or compressed and the pawl 37 will be actuated by the arm 38 and rod 39 so as to ride back over the teeth of the ratchet wheel 36. When scavenging is completed, the spring 7 again comes into action to throw up the cylinder 1 relatively to the piston 2 so as to draw a fresh charge into the working space and cause the square toothed wheel 27 to be operated or partially rotated to close the inlet and exhaust valve and fire the charge by the action of the wheel 36, pawl 37 arm 38 and rod 39 which is connected to the foot 5, thereby causing the cycle of operations to be repeated automatically. If desired, the pawl 37 may be swung into an inoperative position and the ratchet wheel 27 may be actuated by the hand-operated pawl 28 for firing every charge admitted to the cylinder 1, and in this connection the hand-operated ratchet mechanism has associated therewith a spring for automatically returning the pawl ready for the next firing operation, whilst where hand-operation alone is desired the auxiliary ratchet mechanism operated from the impact tool or foot 5 may be dispensed with entirely.

Projections 43 on the cylinder head co-operate with stops 44 on the arms 29 and 38 to limit the backward or return movements of the pawls 28 and 37; whilst a spring finger 45 serves to prevent backlash of the square toothed wheel 27.

Referring now to Figures 5 and 6 of the drawings, in which like reference numerals to those employed in Figures 1 to 4 indicate like or analogous parts, the lever 33 which operates to complete the ignition circuit is of a rigid character instead of being of a springy nature, and said lever 33 is operated by the ratchet wheel 27 against the action of a helical spring 46 on the spindle of the valve 20 between the fixed collar or enlargement 35 thereon and a collar 47 slidable on said spindle and which is directly actuated by said lever 33. The collar 47 carries a contact member 48 which, when the valve 20 is closed and the spring 46 is sufficiently overcome by the ratchet and lever mechanism, co-operates with the contact 41 to complete the ignition, whereupon the lever 33 is tripped by the ratchet wheel 27 and the spring loading of the valve 20 comes into action to open the latter ready for scavenging. In order to secure increased leverage and easier operation the lever 33 is formed with a long arm which extends to the outer side of the ratchet wheel 27, whilst the depending rod 30 associated with the spring-pressed pawl 28 is adapted to be operated by a pivoted grip lever 49 on one of the handles 31. Also the rotatable arm 29 which carries the pawl 28 is weighted so that it will be automatically returned after each ratchet operation.

Instead of the air inlet ports 13 being controlled by turn-cocks as in Figure 2, they are controlled by perforated plates or quadrants 50 having operating arms or levers 51 and being rotatable about vertical pivot studs 52, spring-pressed balls 53 being adapted to engage the serrated arcuate faces of the plates or quadrants 50 so as to frictionally retain them in any position of adjustment.

To ensure efficient lubrication the cylinder head is fitted with a grease cup 54 from which lubricant is drawn in small quantities at each suction stroke of the piston.

I claim:—

1. A portable internal combustion tamping ma-

chine of the class described having in combination a cylinder, a piston mounted in the cylinder, an inlet and exhaust valve communicating with the interior of the cylinder, said valve having its stem slidably mounted in the head of the cylinder, a ratchet mechanism, a member constituting a movable contact associated with the stem closing the valve and operatively connected to the ratchet mechanism, a fixed contact, means automatically operable for actuating the ratchet mechanism to move said member into engagement with the fixed contact to complete the ignition circuit of the machine while maintaining the valve closed, said member arranged to be tripped by the ratchet mechanism to release the valve and leave it free to open during the expansion stroke of the piston, and an impact tool connected to the piston so as to be movable therewith.

2. A portable internal combustion tamping machine of the class described having in combination, a cylinder, a piston reciprocally mounted in the cylinder, an impact tool connected to the lower end of the piston rod, said cylinder having an inlet and exhaust valve in the head thereof, a member constituting a movable contact connected to the stem of the inlet valve for closing the same, a fixed contact, means operatively connected to the impact tool and said member for moving the latter into engagement with the fixed contact to complete the ignition circuit while maintaining the valve closed, said member subsequently being released to permit opening of the valve during the expansion stroke of the cylinder, and an impact tool connected to the piston so as to be movable therewith.

3. A portable internal combustion tamping machine of the class described, having in combination, a cylinder, a piston reciprocally mounted in the cylinder, an impact tool connected to the lower end of the piston rod, said cylinder having an inlet and exhaust valve in the head thereof, a member constituting a movable contact associated with the valve stem for closing the valve, a ratchet mechanism operatively connected to said member, a fixed contact, manual means for actuating the ratchet mechanism for moving said member into engagement with the fixed contact to complete the ignition circuit while maintaining the valve closed, said member arranged to be tripped by the ratchet mechanism to release the valve and leave it free to open during the expansion stroke of the piston, said impact tool having a lost motion connection with the ratchet mechanism whereby to automatically continue the actuation of the ratchet mechanism for closing the circuit.

4. A portable internal combustion tamping machine of the class described having in combination, a cylinder, a piston reciprocally mounted in the cylinder, an impact tool connected to the lower end of the piston rod, said cylinder having an inlet and exhaust valve in the head thereof, a ratchet mechanism, a member constituting a movable contact connected to the stem of said valve to close the same, a fixed contact, a ratchet mechanism operatively connected to said member, means connecting the impact tool to the ratchet mechanism, manual means adjacent the handle of the machine for initially actuating the ratchet mechanism for moving said member to close the valve and subsequently to bring the member into engagement with the fixed contact to complete the ignition circuit while maintaining the valve closed, said member subsequently be-

ing tripped by the ratchet mechanism to release the valve and permit it to open during the expansion stroke of the cylinder, said ratchet mechanism being subsequently operated by the movement of the impact tool due to its connection therewith, and means for disconnecting the impact tool from the ratchet mechanism to permit operation of said member by the manual means only.

5. A portable internal combustion tamping machine of the class described having in combination, a cylinder, a reciprocating piston having a depending rod mounted in said cylinder, an impact tool connected to the lower end of the rod, a base plate in the cylinder, through which the piston rod extends, a spring confined between the piston and said plate for urging the piston upwardly, a second spring confined between said plate and the impact tool for moving the cylinder relative to the piston, an intake and exhaust valve having a stem mounted in the cylinder head, a member constituting a movable contact associated with the stem to close the same, a fixed contact, and means operatively associated with said member and connected to the impact tool for closing the valve and moving said member into engagement with the fixed contact at predetermined intervals during the operation of the machine.

6. A portable internal combustion tamping machine of the class described having in combination, a cylinder, a reciprocating piston having a depending rod mounted in said cylinder, an impact tool connected to the lower end of the rod, a base plate in the cylinder, through which the piston rod extends, a spring confined between the piston and said plate for urging the piston upwardly, a second spring confined between said plate and the impact tool for moving the cylinder relative to the piston, an intake and exhaust valve having a stem mounted in the cylinder head, a ratchet mechanism, a movable contact member associated with said stem for closing the same and connected to said ratchet mechanism, a fixed contact, manual means for actuating said ratchet mechanism whereby to move said member first to close the valve and subsequently to bring the member into engagement with the fixed contact to complete the ignition circuit of the machine while maintaining the valve closed, said member arranged to be moved to release the valve and leave the valve free to be opened during the expansion stroke of the cylinder, and means connecting the impact tool to the ratchet mechanism for continuing the actuation of said member at predetermined intervals after the machine is started by said manual means.

7. A portable internal combustion tamping machine of the class described having in combination a cylinder, a reciprocating piston mounted in the cylinder, an inlet and exhaust valve communicating with the interior of the cylinder, said valve having its stem slidably mounted in the head of the cylinder, a ratchet mechanism, a member constituting a movable contact associated with the stem for closing the valve and operatively connected to the ratchet mechanism, a fixed contact, means for actuating the ratchet mechanism to move said member first to close the valve and then subsequently to bring the member into engagement with the fixed contact to complete the ignition circuit of the machine while maintaining the valve closed, and means upon the tripping of said member by the ratchet

mechanism to release the valve and leave it free to open during the expansion stroke of the piston, and an impact tool connected to the piston so as to be movable therewith.

5 8. A portable internal combustion tamping machine of the class described having in combination a cylinder, a reciprocating piston mounted in the cylinder, an inlet and exhaust valve communicating with the interior of the cylinder,
10 said valve having its stem slidably mounted in the head of the cylinder, said stem having a projection thereon, a ratchet mechanism, a flexible member pivoted at one end to said cylinder and engaging the ratchet mechanism at its opposite
15 end, said member extending beneath the projection for moving the valve to its closed position, a fixed contact, means upon the initial actuation of the ratchet mechanism to move said member to close the valve and subsequently to bring the
20 member into engagement with the fixed contact to complete the ignition circuit while maintaining the valve closed, said member arranged to be tripped by the ratchet mechanism to release the
25 valve and leave it free to open during the expansion stroke of the piston, and an impact tool operatively connected to the reciprocating piston so as to be movable therewith.

9. A portable internal combustion tamping machine of the class described having in combination, a reciprocating piston mounted in the cylinder, an inlet and exhaust valve communicating with the interior of the cylinder, said valve having its stem mounted in the head of the cylinder, said valve stem having a fixed collar and
30 a spaced movable collar, a spring on the stem confined between said collars, a lever connected to said movable collar for actuating the same

to close the valve, a ratchet mechanism operatively connected to said lever, said movable collar having a laterally extending arm constituting a movable contact, a fixed contact, means for actuating the ratchet mechanism to move said
5 lever first to close the valve and subsequently to bring the movable contact into engagement with the fixed contact to complete the ignition circuit while maintaining the valve closed, means upon the tripping of said lever by the ratchet mechanism
10 to release the valve and leave it free to open during the expansion stroke of the piston, and an impact tool connected to the piston so as to be movable therewith.

10. A portable internal combustion tamping machine of the class described having in combination, a cylinder, a piston reciprocably mounted in the cylinder, an impact tool connected to the lower end of the piston rod, said cylinder having an inlet and exhaust valve in the head
20 thereof, a member connected to the valve stem and arranged to be moved to close the valve, a ratchet mechanism operatively connected to said member, a fixed contact, means for actuating the ratchet mechanism for moving said member
25 into engagement with the fixed contact to complete the ignition circuit while maintaining the valve closed, said member being arranged to be tripped by the ratchet mechanism to release the valve, means when the valve is released to open
30 the same, and means operatively connecting the impact tool with said ratchet mechanism whereby to automatically continue the operation of the ratchet mechanism during the subsequent operation of the machine.

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