

Aug. 29, 1933.

L. F. KOTT

1,924,946

POWER TOOL

Filed May 25, 1931

4 Sheets-Sheet 1

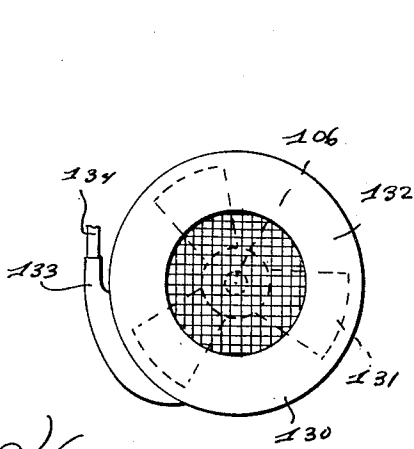


Fig. 16.

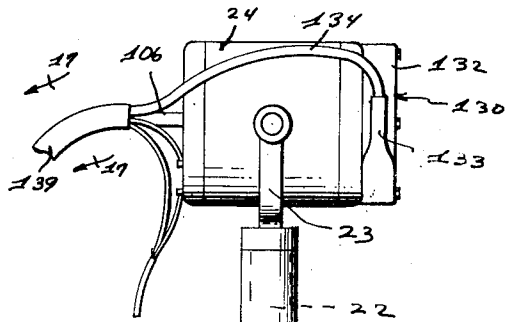


Fig. 1.

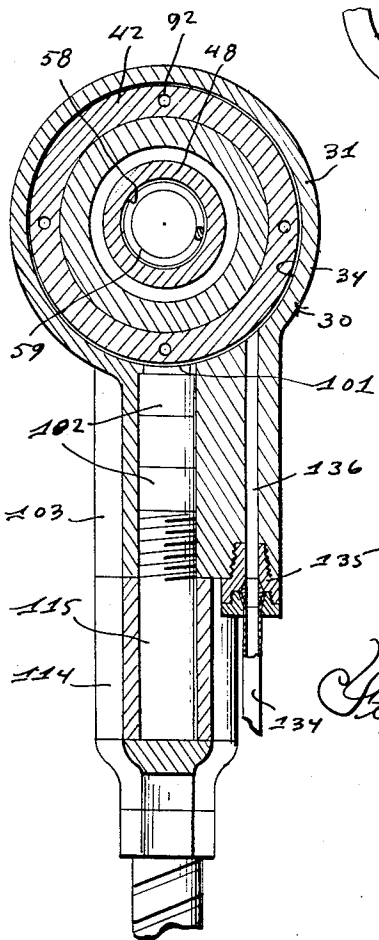
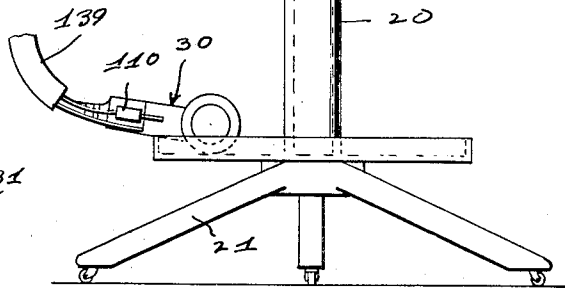


Fig. 5.

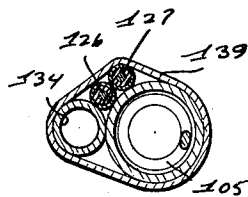


Fig. 17.

INVENTOR
Leo F. Kott
BY Whittmore Hulbert
Whittmore & Hulbert

ATTORNEYS

Aug. 29, 1933.

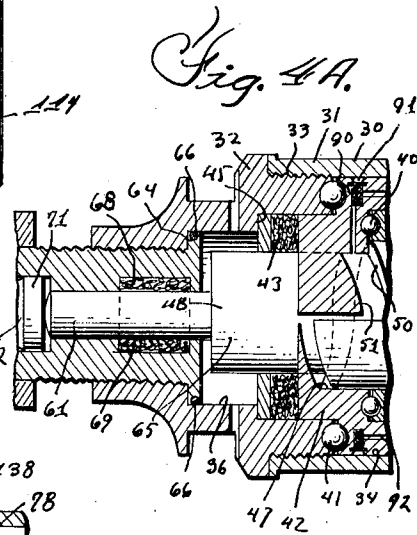
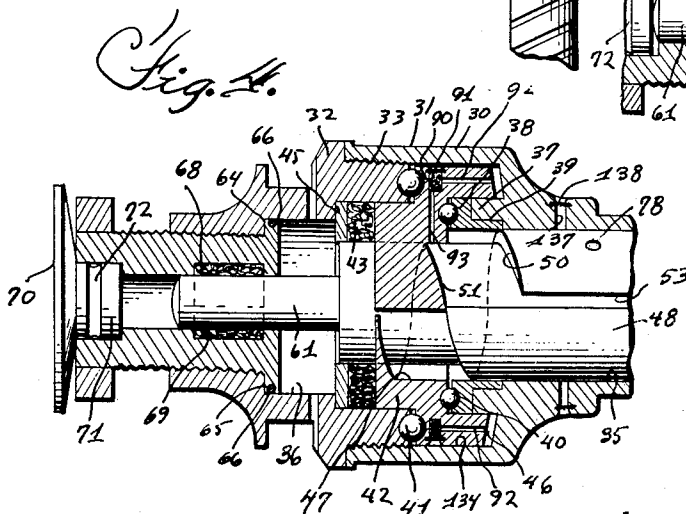
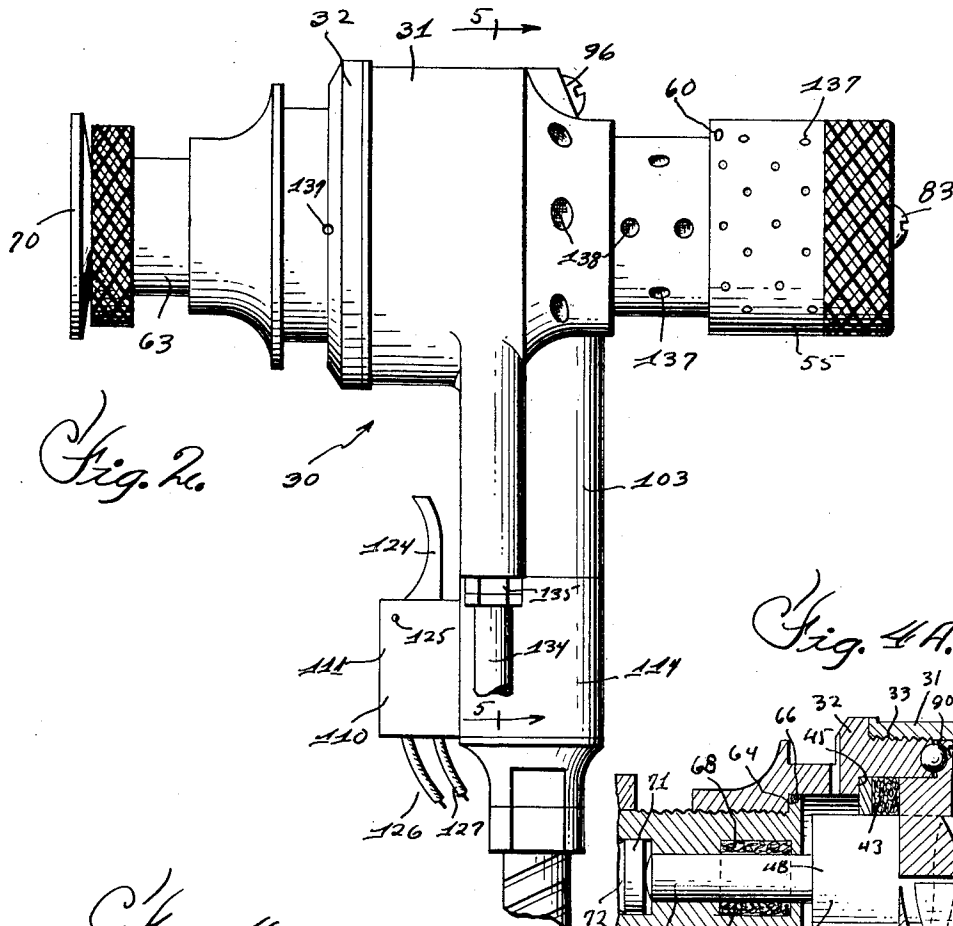
L. F. KOTT

1,924,946

POWER TOOL

Filed May 25, 1931

4 Sheets-Sheet 2



INVENTOR
Leo F. Kott
BY Whittemore Hulbush
Whittemore & Belknap

ATTORNEYS

Aug. 29, 1933.

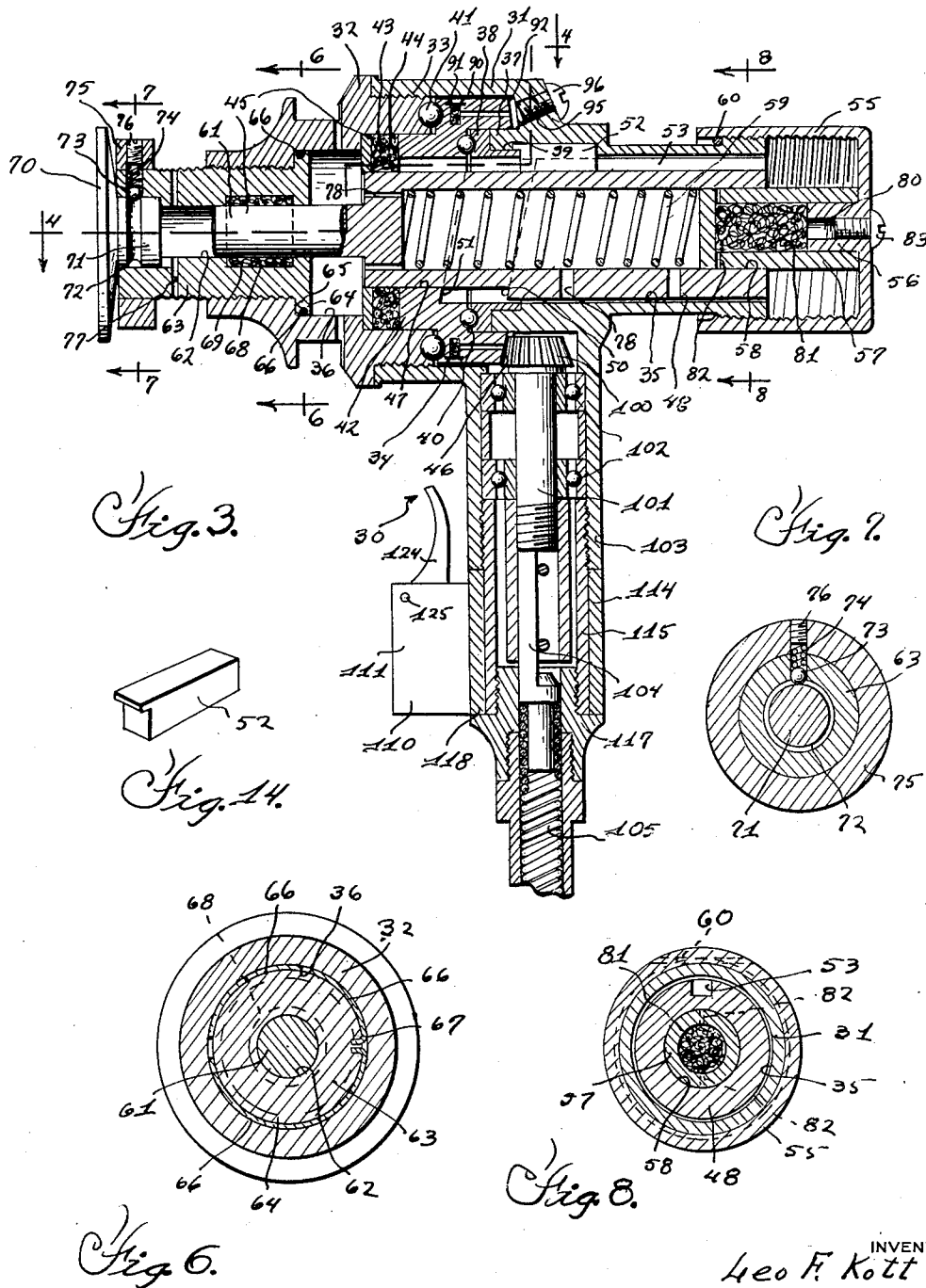
L. F. KOTT

1,924,946

POWER TOOL

Filed May 25, 1931

4 Sheets-Sheet 3



INVENTOR
Leo F. Kott
BY Whittmore Hulbush
Whittmore & Balkman

ATTORNEYS

Aug. 29, 1933.

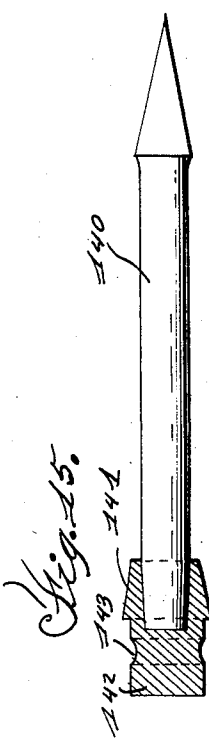
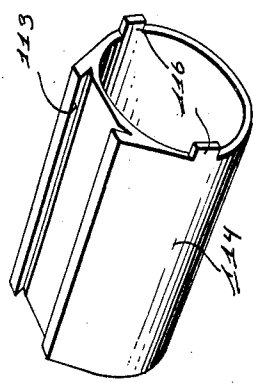
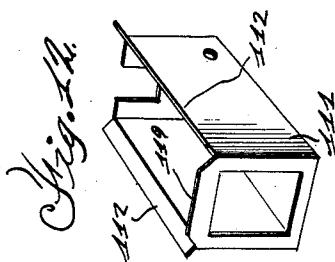
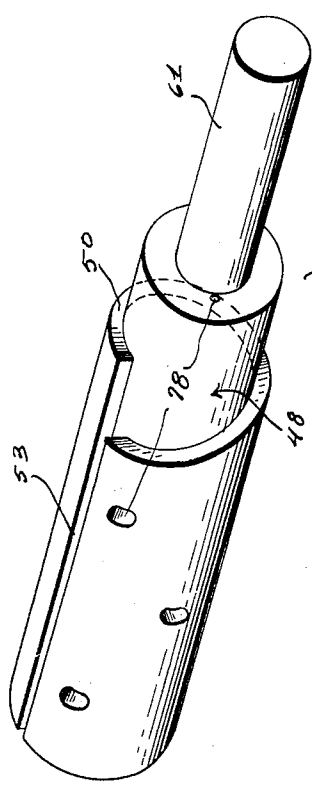
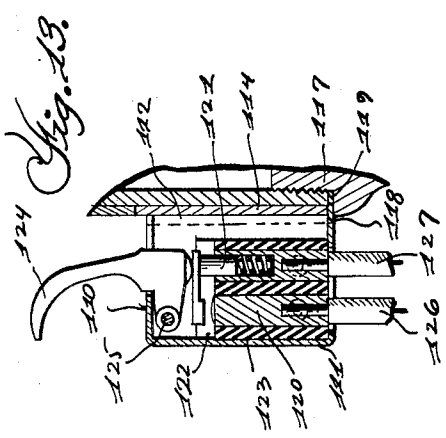
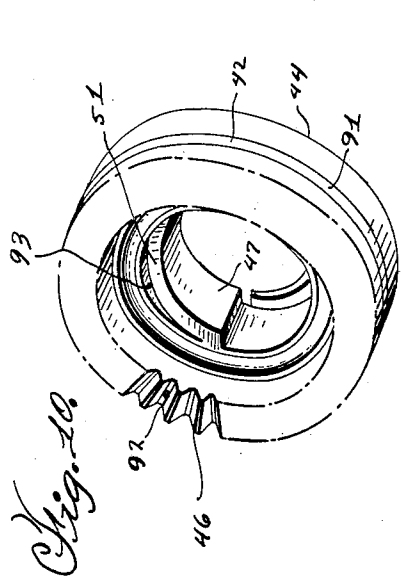
L. F. KOTT

1,924,946

POWER TOOL

Filed May 25, 1931

4 Sheets-Sheet 4



INVENTOR
L. F. Kott
BY Whittemore Halbur
Whittemore & Belknap

ATTORNEYS

UNITED STATES PATENT OFFICE

1,924,946

POWER TOOL

Leo F. Kett, Detroit, Mich.

Application May 25, 1931. Serial No. 539,980

20 Claims. (Cl. 153--48)

This invention relates to a power tool and has particular reference to a power tool for imparting a plurality of blows or the like to a piece of work.

5 One of the primary objects of this invention is to provide a power tool of the above mentioned character which will include a reciprocating plunger or the like and which will include an improved means for effecting a reciprocation of
10 this plunger.

The invention further contemplates the provision of an improved means for lubricating the several moving parts of a power tool.

Still further the invention contemplates the
15 provision of a unitary construction which will include means for cooling the moving parts of the power tool whereby the power tool may be conveniently handled by an operator.

Numerous other objects and advantages of
20 this invention will become more apparent as the following description proceeds, particularly when reference is had to the accompanying drawings wherein:

Fig. 1 is a semi-diagrammatic elevational view
25 showing a power tool constructed in accordance with the teachings of this invention and a power device for driving said tool;

Fig. 2 is an elevational view of the power tool
30 itself;

Fig. 3 is a sectional view through the power
tool shown in Fig. 2;

Fig. 4 is a sectional view taken substantially
on the line 4--4 of Fig. 3;

Fig. 4A is a view similar to Fig. 4 showing
35 the parts in a slightly different position;

Fig. 5 is a sectional view taken substantially
on the line 5--5 of Fig. 2;

Fig. 6 is a sectional view taken substantially
on the line 6--6 of Fig. 3;

Fig. 7 is a sectional view taken substantially
on the line 7--7 of Fig. 3;

Fig. 8 is a sectional view taken substantially
on the line 8--8 of Fig. 3;

Fig. 9 is a perspective view of the plunger
45 forming a part of the structure shown in Fig. 3;

Fig. 10 is a perspective view of the gear for
reciprocating the plunger shown in Fig. 9;

Fig. 11 is a perspective view of a portion of
50 the structure shown in Fig. 3;

Fig. 12 is a perspective view of a casing for
the controlling switch;

Fig. 13 is a sectional view through the switch
55 mechanism forming a part of the structure shown in Fig. 3;

Fig. 14 is a perspective view of one of the elements
of the structure shown in Fig. 3;

Fig. 15 is a sectional view showing a slightly
60 modified form of tool for use with the construction;

Fig. 16 is an end elevational view of a portion of the structure shown in Fig. 1; and

Fig. 17 is a sectional view taken substantially
on the line 17--17 of Fig. 1.

Referring then particularly to the drawings 65 wherein like reference characters designate corresponding parts throughout all views, the reference character 20 designates a suitable standard supported from the floor or the ground by legs 21 which may be assembled in the form of a 70 tripod. The standard 20 is preferably bored adjacent its upper end to rotatably receive a pin or the like 22 which carries a yoke 23. Pivotally mounted between the arms of the yoke 23 is an electric motor or the like 24 which provides the 75 power for driving the tool as will hereinafter be more fully brought out. It will be noted that this motor is mounted for substantially universal movement in that it may rotate with the pin 22 about the axis of this pin and may pivot between 80 the arms of the yoke 23.

The power tool is designated generally by the reference character 30 and comprises a casing formed of the parts 31 and 32. The part 32 is threaded in one end of the part 31 as designated 85 by the reference character 33, and the two casing parts, when so assembled, provide an enlarged chamber 34 terminating at its opposite ends in reduced portions 35 and 36.

The casing part 31 is provided within the 90 chamber 34 with a shoulder 37, and a ring 38 has a pressed fit within this shoulder, as clearly designated by the reference character 39. The annular ring 38 is provided with a ball race for receiving a plurality of ball bearings 40. The end 95 of the casing part 32 within the chamber 34 is provided with a ball race for receiving a plurality of ball bearings 41, and rotatably journaled within the chamber 34 by the ball bearings 40 and 41 is a combined gear and cam member 42. Suitable packing rings 43 are preferably arranged 100 between the end 44 of the combined gear and cam member and a shoulder 45 formed on the inner periphery of the casing part 32.

The member 42 is provided on its end opposite 105 the end 44 with gear teeth 46 and is bored as at 47 to loosely receive a plunger 48. This plunger is mounted for reciprocation within the bore 47 and within the reduced chamber 35 formed within the casing part 31. 110

Formed on the outer periphery of the plunger 48 and adjacent one end thereof is a cam surface 50, and the member 42 is counterbored to provide a cam surface 51 adapted to cooperate with the cam surface 50. A key 52 anchored within 115 the casing part 31 by engagement between a portion of the ring 38, and the casing part engages a longitudinal groove 53 in the plunger to prevent rotation of the latter. The arrangement is such that upon rotation of the member 42, cam sur- 120

faces 50 and 51 cooperate to effect an intermittent movement of the plunger to the right, as viewed in Fig. 3 of the drawings.

Threaded on the free end of the casing part 31 is a cap 55 provided substantially centrally with a boss 56. A tubular member 57 engages this boss and is telescopically received in a bore 58 formed within the plunger 48. A spring 59 is located within the bore 58 and engages the member 57 to normally urge the plunger to the left, as viewed in Fig. 3 of the drawings. It will be apparent that by threadedly adjusting the cap 55 on the end of the casing part 31, the force exerted by the spring 59 tending to move the plunger to the left against the action of the cam surfaces may be adjusted to thus vary the force of the blow imparted by the plunger during its striking movement. A pin 60 is adapted to be forced through the cap 55 to lock the same against removal.

The plunger is provided on its striking end with a reduced portion 61 which is mounted for reciprocation in a bore 62 formed in a bushing 63. This bushing is threaded in the free end of the casing part 32 and is provided on its inner end with a shoulder 64 adapted to abut against a shoulder 65 formed interiorly of the said casing part. A pair of spring strips 66 are mounted in a groove in the shoulder 64 of the bushing and engage the inner periphery of the casing part 32 to restrain the bushing 63 against rotation within the casing part. The end portions 67 of the strips 66 may be bent to engage in recesses formed in the shoulder, as clearly shown in Fig. 6. The bore 62 is preferably provided with an enlarged portion 68 to receive packing 69.

The reference character 70 designates an impact member, and this member is provided with a boss 71 adapted to be received in the end of the bore 62. The boss 71 is provided with an annular groove 72, and a ball 73 is resiliently urged into this groove by means of a spring 74 which is mounted in a bore formed in the bushing 63. A ring 75 has a press fit on the bushing adjacent the outer end thereof and carries a set screw 76 which engages the spring 74 to provide for adjustment of this spring to vary the force with which the ball 73 engages the groove 72.

With the construction as thus far described, rotation of the member 42 moves the plunger to the right against the tension of the spring 59 until the high portions of the cam surfaces 50 and 51 are moved out of engagement with each other to the position shown in Fig. 4A. At this time the spring 59 forces the plunger to the left and causes the reduced end thereof to engage the boss 71 on the impact member 70. Obviously, the force exerted by the spring tending to move the plunger into engagement with the impact member may be adjusted by threadedly adjusting cap 55 on casing part 31. Further, the stroke of the plunger may be varied by adjusting the bushing 63 within the casing part 32 to vary the spaced relation of boss 71 from the end of the plunger. It will be noted that suitable openings 77 are formed in the bushing 63 to permit air to freely enter and leave the space between the end of the plunger and the boss 71, while openings 78 are also formed in the end and sides of the plunger to permit air to enter and freely leave the bore 58 within the plunger.

For lubricating the periphery of the bore 58 so that the member 57 may telescope freely within this bore, a bore 80 is formed in the boss 56.

The member 57 is provided with the chamber 81 adapted to be filled with packing, and suitable passages 82 provide communication between the chamber 81 and the engaging surfaces of the member 57 and the inner periphery of the plunger. A threaded bolt or the like 83 provides means for closing the outer end of the bore 80, the arrangement being such that this bolt may be removed to permit the introduction of lubricant into the chamber 81, it being understood that this lubricant will flow through the passages 82 to lubricate the engaging surfaces, as above brought out.

It also constitutes a feature of this invention to provide means for lubricating the cam surfaces 50 and 51 and to provide means for supplying a lubricant to the teeth 46 on the member 42. To provide for this, an annular channel 90 is formed in the member 42, this channel being closed by a suitable cover plate 91 which may be held in position in any desired manner, as by swaging over the walls of the channel adjacent the outer end thereof. At spaced points circumferentially of the member 42, bores 92 are provided, these bores providing communication between channel 90 and the gear teeth 46. A bore 93 provides communication between the channel 90 and the cam surfaces 51. A bore 95 normally closed by a bolt 96 provides means through which lubricant may be supplied to a point adjacent the teeth of member 42 from where the lubricant may flow into channel 90. Obviously, during actuation of the device, lubricant will be supplied to the teeth and cam surfaces by bores 92 and 93, respectively.

For rotatably driving the member 42, there is provided a pinion 100. This pinion is fixed to the end of a shaft 101 which is rotatably journaled by suitable ball races 102 in an extension 103 formed on the casing part 31. The shaft 101 is detachably connected as at 104 to a flexible shaft 105 which in turn is directly connected to the shaft 106 of the motor 24. It will be obvious that rotation of the shaft 106 will be transmitted to the shaft 101 to rotate the pinion 100 and to thus rotate the member 42.

To provide means for controlling the actuation of the motor 24, a switch designated generally by the reference character 110 is provided. This switch includes a housing 111 which is provided with the flared bottom edges 112 adapted to be engaged in the dove-tailed grooves 113 formed in a sleeve 114. This sleeve snugly engages the outer periphery of a nipple 115 which is threaded in the end of the extension 103 of the casing part 31. For preventing rotation of sleeve 114, this sleeve is provided with projections 116 adapted to engage suitable recesses in the end of extension 103.

For securing the sleeve 114 in position on member 115, a bushing 117 is threaded in the end of member 115, this bushing being provided with a shoulder 118 which engages the free end of sleeve 114. The housing 112 is also provided adjacent its one end with a lip 119 adapted to be engaged between the end of sleeve 114 and bushing 117 whereby the housing is prevented from disengagement with the sleeve 114.

Within the switch there is provided a stationary contact 120 and a movable contact 121. The movable contact is mounted for movement in a slot 122 formed in an insulating block 123 within the housing 111. A finger piece 124 pivoted as at 125 within the housing provides means for

moving the movable contact into electrical engagement with the stationary contact.

Suitable electric conductors 126 and 127 are electrically connected to the movable and stationary contacts and to the motor and to a suitable source of current (not shown) whereby, upon movement of the movable contact into engagement with the stationary contact, the electric circuit through the motor 24 will be completed.

It has been found that in the operation of a power tool such as above described, considerable heat is generated within the casing by the moving parts therein. To effect a cooling of the casing, the present invention provides a fan designated generally by the reference character 130, this fan being associated with the motor 24 to be driven thereby. The fan comprises a suitable propeller blade 131 fixed to the horizontal shaft 106 of the motor 24 to be driven thereby. This propeller blade is mounted in a suitable housing 132 which is fixed to the end of the motor housing, and this housing is provided with a tangentially arranged outlet 133 to which a suitable air hose 134 is connected. The air hose is extended upwardly to adjacent the extension 103 of the casing part 31 to which it is connected as designated by the reference character 135. The air hose is adapted to discharge into a bore 136 formed in the extension 103, this bore being extended to discharge into the chamber 34 adjacent the member 42. The casing part 31, the cap 53 and the casing part 32 are provided with a plurality of discharge ports 137 through which the air discharged into the chamber 34 from the bore 136 may be discharged into the atmosphere. To prevent dirt from entering the interior of the casing through the ports 137, each port may be suitably closed by a screen or the like 138, these screens being held in position by suitable swaging the outer edges of the openings. Since the air hose 134, flexible cable 105 and electrical conductors 126 and 127 all extend from the motor 24 to adjacent the extension 103, all of these members are preferably suitably enclosed in a cover or the like designated by the reference character 139 in Fig. 17 of the drawings.

From the above it is believed that the operation of the construction will be clearly apparent. The power tool may be suitably held in the hand of the worker, with the impact member 70 in engagement with the work. By proper actuation of the finger piece 124, the electric circuit through the motor 24 will be completed, whereupon the member 42 will be rotated by the pinion 100. The cam surfaces on the member 42 and the plunger will operate upon rotation of the member 42 to periodically move the plunger to the right against the tension of spring 59, but each time the high parts of the cam surfaces move out of engagement with each other, the plunger will be forced to the left by spring 59. The force exerted by the spring 59 may be adjusted by proper adjustment of cap 55, while the stroke of the plunger may be adjusted by adjusting the spaced relation of boss 71 from the end of the plunger.

The cam surfaces and the gear teeth formed on member 42 may be lubricated by lubricant supplied to the channel 90, while the inner periphery of the plunger may be lubricated by lubricant supplied to chamber 81. Each time the motor is actuated to rotate member 42, the fan will be actuated to force air through hose 134 into the chamber 34. This air will be forced around the moving members within the casing and will cool these members, as will be readily apparent.

While in the embodiment of the invention above

described a flat impact member 70 is disclosed as being associated with the power tool, it is to be understood that any suitable tool may be substituted for the member 70. Thus, as illustrated in Fig. 15 of the drawings, a chisel or the like 140 may be fixed in a bushing 141. This bushing may be provided with a boss 142 having a groove 143 whereby this boss is adapted to be inserted in the bore 62 in place of the boss 71. It will thus be apparent that any suitable tool may be associated with the device in a position to be struck by the plunger upon reciprocation of the latter.

While the invention has been described with some detail, it is to be understood that the description is for the purposes of illustration only and is not definitive of the limits of the inventive idea. The right is reserved to make such changes in the details of construction and arrangement of parts as will fall within the purview of the attached claims.

What I claim as my invention is:

1. In a power tool, a reciprocable plunger, a spring constantly urging said plunger in one direction, and means for intermittently urging said plunger in the other direction, said means including a rotatable gear bored to receive said plunger and counterbored to provide a cam surface engageable with said plunger.

2. In a device of the character described, a reciprocable plunger having a cam surface formed on its outer periphery, a spring constantly urging said plunger in one direction, and means for intermittently moving said plunger in the other direction against the tension of said spring, said means including a rotatable gear bored to receive said plunger and counterbored to provide a cam surface engageable with the cam surface on said plunger.

3. In a device of the character described, a reciprocable plunger having a cam surface on its outer periphery, a spring constantly urging said plunger in one direction, and means for intermittently urging said plunger in the other direction against the tension of said spring, said means including a rotatable member having gear teeth on its one end and having a cam surface on its inner periphery engageable with said plunger.

4. In a device of the character described, a reciprocable plunger having a cam surface on its outer periphery, a spring constantly urging said plunger in one direction, and means for intermittently moving said plunger in the other direction against the tension of said spring, said means including a gear member having gear teeth on its one end, said gear member being bored to receive said plunger and being counterbored to provide a cam surface on its inner periphery engageable with the cam surface on the outer periphery of said plunger.

5. In a power hammer, a reciprocable plunger, means including a rotatable gear for reciprocating said plunger, a motor for driving said gear, and means operable upon the actuation of said motor to force air from a point remote from the hammer and to discharge the same in proximity to said gear and plunger to cool the same.

6. In a power hammer, a casing, a reciprocable plunger within said casing, means including a rotatable member within said casing for reciprocating said plunger, a motor for driving said rotatable member, and means actuated by said motor for forcing cooling air from a point remote from said casing into said casing to cool said plunger and said rotatable member.

7. In a power hammer, a reciprocable plunger, means including a rotatable member for reciprocating said plunger, a motor spaced from said rotatable member and connected thereto for rotating the same, and means operable upon actuation of said motor to force air from a point remote from the hammer to adjacent the plunger and rotatable member to cool said reciprocable plunger and said rotatable member.

8. In a power hammer, a reciprocable plunger, a spring urging said plunger in one direction, means including a rotatable member for intermittently moving said plunger in the other direction against the tension of said spring, a motor having a drive shaft, said motor being spaced a substantial distance from the rotatable member, a flexible driving connection between one end of said drive shaft and said rotatable member for driving the latter from the former, and a fan fixed to said drive shaft for effecting a circulation of cooling air adjacent said plunger and said rotatable member upon actuation of said motor.

9. In a power hammer, a reciprocable plunger, means including a rotatable gear for reciprocating said plunger, a substantially horizontally positioned electric motor, said motor having a drive shaft, a flexible connection between one end of said shaft and said rotatable gear for driving the latter from the former, a fan mounted on the other end of said shaft, and means for conducting cooling air from adjacent said fan to adjacent said rotatable gear and said plunger to cool the latter.

10. In a power hammer, a casing, a reciprocable plunger within said casing, said casing being provided with a plurality of discharge ports, means for reciprocating said plunger, and means operable upon reciprocation of said plunger to discharge a cooling fluid into said casing to cool said plunger, said cooling fluid passing out of said casing to the atmosphere by way of said discharge openings.

11. In a power hammer, a casing having a discharge opening, a screen closing said discharge opening, a reciprocable plunger within said casing, means for reciprocating said plunger, and means operable upon the reciprocation of said plunger to discharge a cooling fluid into said casing, said cooling fluid passing out of said casing by way of said discharge opening.

12. In a power hammer, a casing, a reciprocable plunger within said casing, means including a rotatable gear within said casing for reciprocating said plunger, a motor spaced from said casing, a flexible connection between said motor and said rotatable gear for driving the latter upon actuation of said motor, a fan associated with said motor and driven thereby, and an air hose extending from said fan to said casing for conducting cooling air from adjacent said fan to said casing upon actuation of said motor.

13. In a power hammer, a reciprocable plunger, and means including a rotatable member having a toothed portion and a cam portion for reciprocating said plunger, said rotatable member being provided with a lubricant reservoir and being provided with bores for conducting lubricant from said reservoir to adjacent its toothed portion and to adjacent its cam portion.

14. In a power hammer, a reciprocable plunger, a spring constantly urging said plunger in one direction, and means including a rotatable mem-

ber for intermittently moving said plunger in the other direction against the tension of said spring, said rotatable member being bored to receive said plunger and being counterbored to provide a cam surface engageable with said plunger, said rotatable member also being provided with gear teeth by which the same may be driven, said rotatable member being provided on its outer periphery with an annular groove providing a lubricant reservoir and being provided with axially and radially extending bores for conducting lubricant from said reservoir to said gear teeth and cam surface respectively.

15. In a power hammer, a reciprocable plunger having a longitudinally extending bore, and a member telescopically engageable in the bore in said plunger, said member being provided with a lubricant reservoir and being provided with passages for conducting lubricant from said reservoir to the periphery of the bore in said plunger.

16. In a power hammer, a reciprocable plunger, a spring mounted in a bore in said plunger for constantly urging said plunger in one direction, and a member telescopically engageable in the bore in said plunger and constituting an abutment for one end of said spring, said member being provided with a lubricant reservoir and being provided with passages for discharging lubricant from said reservoir into the bore in said plunger.

17. In a power hammer, a casing, a plunger reciprocably mounted in said casing, a spring mounted in a bore in said plunger for constantly urging said plunger in one direction, a cap threaded on one end of said casing, said cap being provided with a boss, a member engaging said boss and telescopically engaging in the bore in said plunger and constituting an abutment for one end of said spring, said member being provided with a lubricant chamber and the boss on said cap being provided with a passage for admitting lubricant to said chamber, and means carried by said cap providing a removable closure for said bore.

18. In a power hammer, a casing, a plunger reciprocably mounted in said casing, an impact member, a bushing mounting said impact member and adjustably threaded in a bore formed in one end of said casing, said bushing being adjustable longitudinally of said casing to vary the stroke of said plunger, and resilient means arranged between the outer periphery of said bushing and the inner periphery of said casing for holding said bushing in adjusted position.

19. In a power tool, a casing, a reciprocable plunger within said casing, an annular member surrounding said plunger and having a cam face on its inner periphery engaging a cam on said plunger for moving the plunger in one direction, and bearings engaging opposite sides of said annular member for rotatably mounting the same within said casing.

20. In a power tool of the class described, a casing, a plunger mounted for reciprocation within said casing, a gear in said casing bored to receive said plunger, said gear being provided with a cam surface on its inner surface engageable with a cam on said plunger, and bearings disposed on opposite sides of said gear for rotatably mounting the same within the casing.

LEO F. KOTT.