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T. A. MARTIN.

ANIMAL SHEARS.

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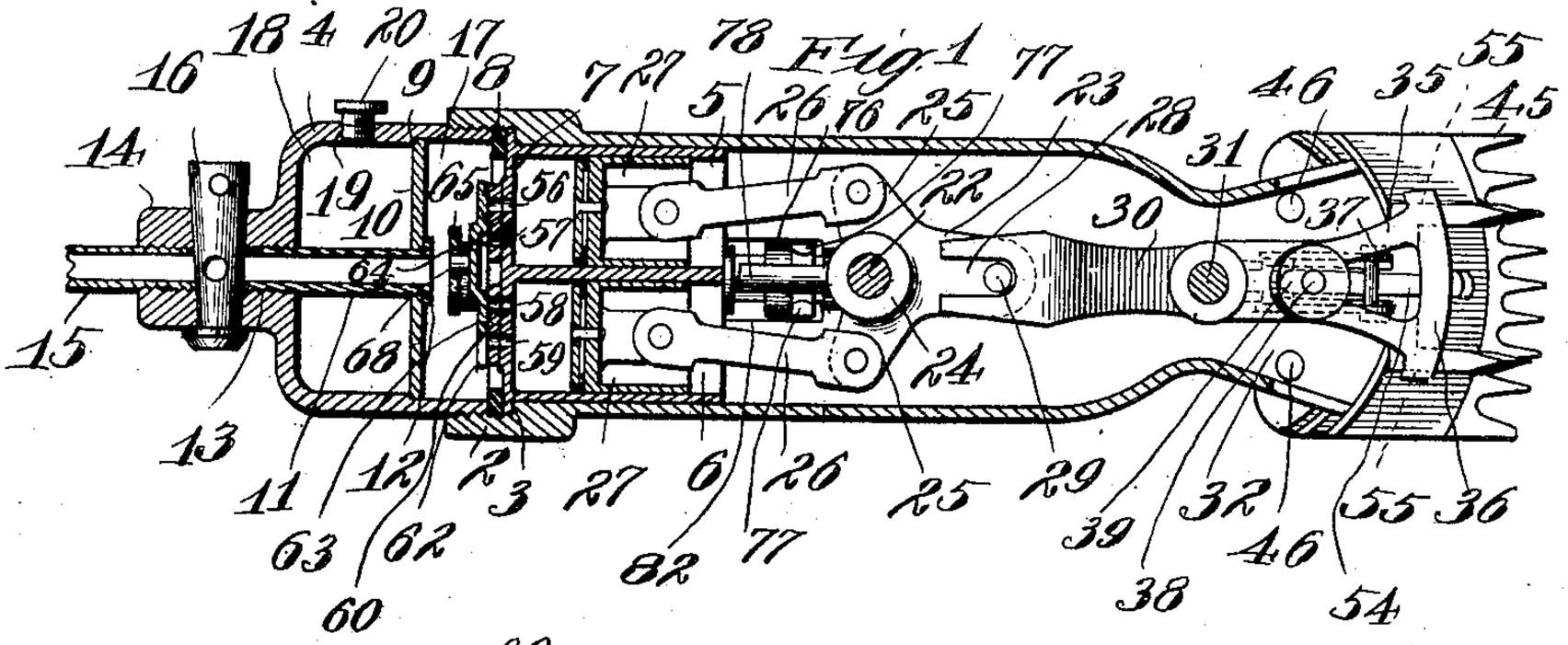

Fig. 1.

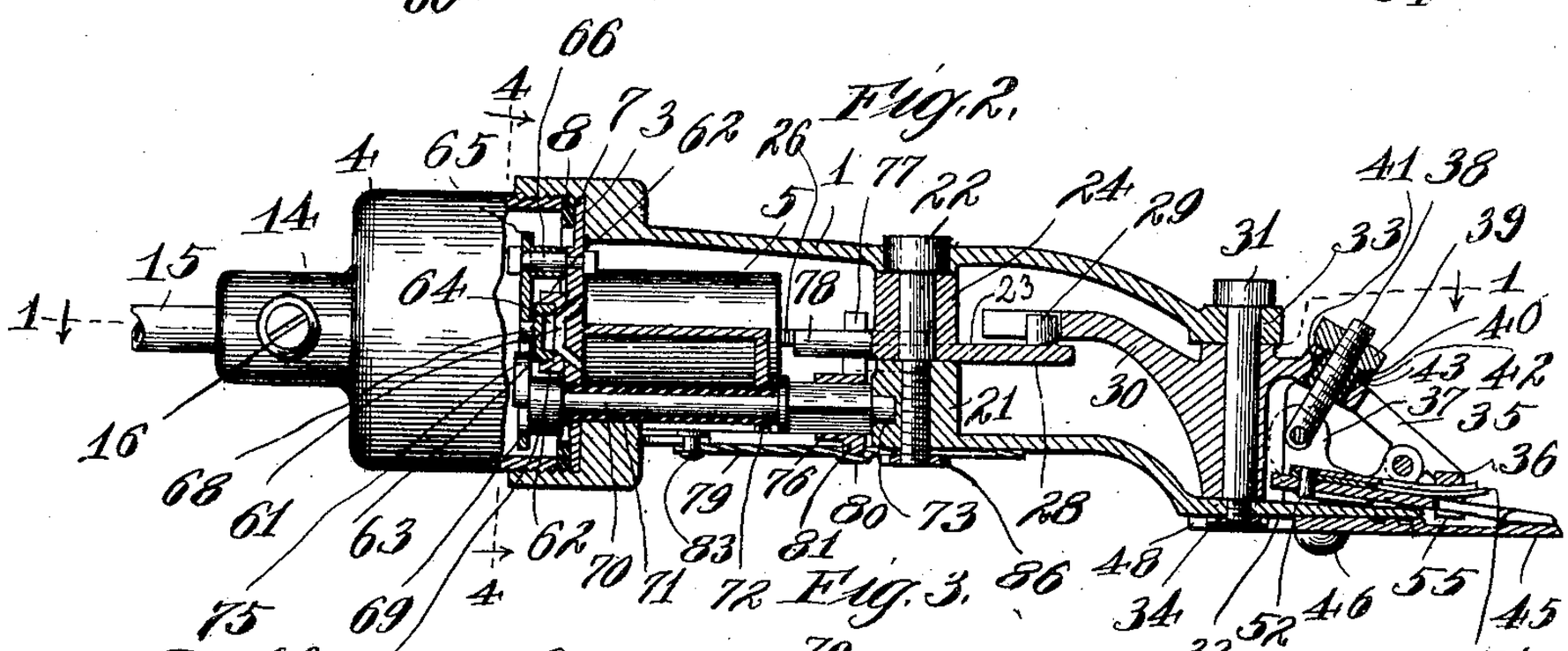

Fig. 2.

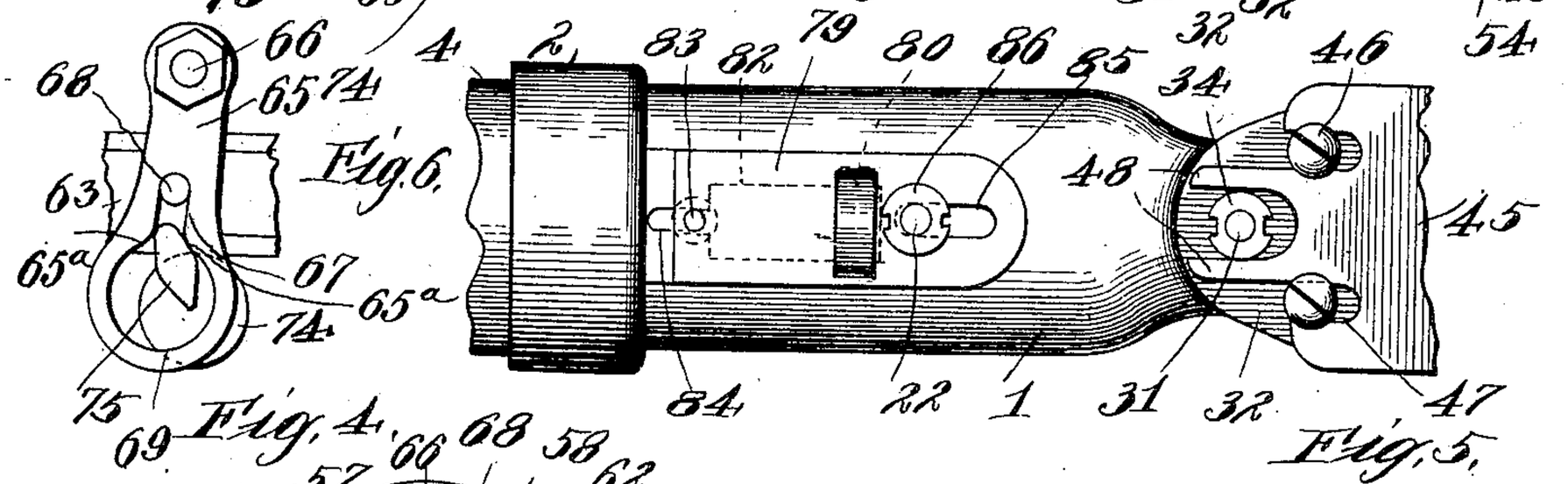

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

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ANIMAL-SHEARS.

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To all whom it may concern:

Be it known that I, THOMAS ARTHUR MARTIN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Animal-Shears, of which the following is a specification.

This invention relates to power-driven machines for shearing wool or clipping hair, and refers more particularly to that type of power-actuated shears in which a compressed-air or other fluid-pressure motor is employed for actuating the vibratory cutting-member.

One of the objects of this invention is the production of an improved valve mechanism for controlling the passage of the pressure fluid to and from the motor cylinders.

Another object of the invention is the provision of improved means for actuating said valve mechanism.

A further object is the production of means for regulating the operation of said valve mechanism.

The invention also refers to a means for feeding lubricating oil to the various mechanisms of the device.

The invention also relates to the other and further improvements in animal shears hereinafter set forth.

In the accompanying drawings, Figure 1 is a longitudinal central sectional view through an animal shears embodying the features of my invention, said view being taken on the plane of dotted line 1 1 of Fig. 2. Fig. 2 is a central longitudinal section through said machine in a plane at right angles to that of Fig. 1. Fig. 3 is a fragmental lower side view of the shears. Fig. 4 is a transverse sectional view on dotted line 4 4 of Fig. 2. Fig. 5 is a detail view of the vibratory cutting member and certain of the parts to which it is attached. Fig. 6 is an enlarged detail view of a portion of the valve-actuating mechanism. Fig. 7 shows the cutter-adjusting device.

The present embodiment of my invention comprises a tubular casing 1 of such form and dimensions as to be conveniently held in the hand of the operator, the enlarged rear end 2 of the casing being cylindrical. Within said cylindrical end portion 2 is formed an annular shoulder 3, and the interior walls of said end portion, outwardly of said annular shoulder, are screw-threaded to receive the externally-screw-threaded forward end of a cap 4. Within the tubular casing 1 is located the motor mechanism and connections for actuating the vibratory shearing member, said motor mechanism comprising two single-acting cylinders 5 and 6, in this instance formed integral with a circular disk 7 which closes the rear ends of said cylinders, and lies against the annular shoulder 3. A gasket 8 of leather or other suitable material is interposed between the disk 7 and the inner end of the cap 4. Within said cap is formed a circumferential shoulder 9 against which a disk 10 lies, said disk being secured in position by means of a tube 11 having a flange 12 at one end to lie at the forward side of said disk, its opposite end being externally screw-threaded to engage the screw-threaded walls of an opening 13 extending axially through a stem 14 preferably integral with the cap 4. The rear or outer end of the axial opening 13 is connected with a source of pressure fluid, such as compressed air, by means of a flexible tube (not shown) attached to a tube 15 screw-threaded into said axial opening. A taper plug cock 16 of ordinary construction is employed to open and close communication through the axial opening 13. As will be seen by reference to Fig. 1, the disk or wall 10 divides the cap 4 into two chambers which I will denominate the valve chamber 17 and the oil chamber 18. Lubricating oil is admitted to the chamber 18 through a filling opening 19 arranged to be closed by the screw plug 20.

In a tubular, internally screw-threaded post 21, preferably formed integral with the tubular casing 1, is seated a screw 22, the head of which lies in an opening in the upper side of said casing. The screw 22 forms the pivot for a three-arm rocker 23, the hub 24 of said rocker lying between the upper end of the post 21 and the inner side of the top wall of the casing 1. The arms 25 of the rocker 23 are connected by means of the connecting rods 26 with trunk pistons 27 slidably mounted in the cylinders 5 and 6. The arm 28 of the rocker 23 carries a pin 29 engaging the forked rear end of a shear-actuating lever 30. Said lever is pivotally mounted upon a screw 31 engaging in a screw-threaded opening in the flattened forward end 32 of the lower wall of the casing 1, the upper end of said screw lying in an opening 33 in the upper wall of said casing. Upon the projecting threaded end of the screw 31 is turned a nut 34. The forward end of the lever 30 is bifurcated to form two arms 35 united at their forward ends by a cross-bar 36. To the arms 35 is pivoted the forward end of a cradle 37, the rear end of which is pivoted to a screw 38. Upon said screw is turned a knurled nut 39 having a stem 40 lying loosely within an opening 41 in the lever 30. Upon the under side of the nut 39 is formed one or more projections 42 adapted to seat in a plurality of recesses 43 formed in the part of the lever 30 directly beneath said nut, in order to hold said nut against accidental rotation. The rear end of the cradle 37 is guided by means of two guide ribs 44 (Fig. 5) formed upon the hub of the lever 30. To the under side of the broadened forward end 32 of the casing 1 is adjustably secured a stationary cutter or comb 45, screws 46 lying within slotted openings 47 in said plate and extending into the portion 32. Two fingers 48 upon the rear end of the comb 45 lie at opposite sides of the nut 34 and assist to hold said comb against lateral displacement. A vibratory cutter 49, comprising two fingers 50 each

having shearing edges formed upon its opposite sides, is removably secured to the oscillatory cutter-actuating lever 30. The stem 51 of said cutter lies within the cradle 37 and between the guide ribs 44 and has a projection 52 upon its under side adapted to lie behind a transverse bar 53 comprised in said cradle, for preventing separation of said cutter and cradle. Spring means consisting, in the present instance, of two leaf springs 54 attached to the stem 51 by means of the rivet that forms the projection 52 provides means for holding said projection in engagement with the bar 53 and for holding the fingers 50 in contact with the comb 45. The degree of pressure exerted by said springs and the position of the fingers 50 with reference to the comb 45 is adjusted by means of the knurled nut 39. The cutter 49 is held from sidewise displacement by means of two lugs 55 on the cross arm 36, which lie at opposite sides of said cutter.

The valve chamber 17, as hereinbefore explained, is in communication with the source of pressure fluid through the tubes 11 and 15. The admission of compressed air from said chamber to the cylinders 5 and 6 is controlled by a valve mechanism to be next described.

In the rear ends of the cylinders 5 and 6 are formed four pairs of ports 56, 57, 58 and 59 opening in a valve face 60 secured to or formed integral with the rear face of the disk 7. An exhaust port 61 is formed centrally of said valve face, said exhaust port opening upon the forward side of the disk 7 as shown in Fig. 2. Between guide ribs 62 formed at opposite sides of the valve face 60 is mounted a slide valve 63 having a central recess 64 adapted to connect the ports 57 and 58 with the exhaust port 61. The means herein employed to reciprocate the slide valve 63 comprises an arm 65, the hub of which is pivotally mounted upon a pin 66 fixed in the disk 7. In said arm is formed a slotted opening 67 in which a stud 68 fixed to the slide valve 63 is arranged to move. In the lower portion of the arm 65 is formed a substantially circular opening 69 communicating with the slotted opening 67. A rock shaft 70 is rotatably supported beneath the cylinders 5 and 6 in any suitable way, as by mounting said shaft within a sleeve 71 fixed in the disk 7 and a lug 72 on said cylinders. The forward end of the rock shaft 70 finds a bearing in an opening 73 in the post 21. Upon the rear end of said shaft is fixed a face plate 74 carrying a crank pin 75 that lies within the circular opening 69, the upper end of said crank pin being adapted to enter the lower end of the slotted opening 67 and in its oscillation to rock the arm 65 from side to side and reciprocate the slide valve 63. Said crank pin is elongated radially of its center of oscillation. During the early part of an oscillatory movement of the crank pin 75 (Fig. 4), the side of said crank pin slides or "wipes" over the portion 65^a at one side of the slotted opening 67, until at the middle of the arc of movement of the crank pin the upper end of said pin engages the walls of the lower end of the opening 67. It will thus be seen that the distance of the place of engagement between the crank pin and the arm 65 from the center of oscillation of the crank pin gradually increases during the first half of each movement of the crank pin. By reason of said sliding engagement and said gradually increasing distance the beginning of each pivotal movement of the arm 65 is slow and the movement of said arm is gradually accelerated, thus preventing injurious shock and hammering. Toward the latter end of the movement of the crank pin, when its upper end engages the portion 65^a the movement of the arm 65 is comparatively slow.

A portion of the rock shaft 70 near the forward end thereof is made square in cross-section. Upon said square portion is slidably and non-rotatably mounted a sleeve 76 carrying two tappets 77 arranged to lie at opposite sides of a pin 78 fixed to and extending rearwardly from the rocker 23. It will be seen that the oscillation of said rocker will rock the shaft 70 and reciprocate the slide valve 63. In order to permit of conveniently moving the tappets 77 toward and away from the center of oscillation of the pin 78 and thereby govern the rate of reciprocation of the slide valve 63, I provide a plate 79 slidably mounted upon the under side of the tubular casing 1, said plate having a groove 80 therein to receive the projecting lower portion 81 of the sleeve 76. The lower wall of the casing has an opening 82 therein shown in dotted lines in Fig. 3 to permit of the movement of said sleeve. Upon the rear end of the plate 79 is fixed a headed rivet 83 slidably mounted in a slotted opening 84 in the lower wall of the casing 1. In the forward end of the plate 79 is formed an elongated opening 85 through which the pivot screw 22 extends, a nut 86 being screwed upon the projecting end of said screw at the outer side of said plate.

In use, the oil chamber 18 is filled with oil, and the tube 15 connected with a suitable supply of compressed air or other pressure fluid. Assuming the mechanism to be in the position shown in Fig. 1, the operation of the shears is as follows: The valve 16 is opened to admit air to the valve chamber 17, the air passing through the inlet ports 59 into the cylinder 6, and the air in cylinder 5 exhausting through the ports 57, 64, and 61. The piston 27 in the cylinder 6 is thereby moved forwardly, rocking the rocker 23 and moving the vibratory cutter 49 to the right-hand side of the comb 45. The movement of the rocker 23 also tilts the tappets 77, which in turn causes a rocking movement of the shaft 70 and a movement of the slide valve 63 in the direction to cover the inlet ports 59 and the exhaust ports 57 and to connect the exhaust ports 58 with the recess 64 and uncover the inlet ports 56. Pressure air is now admitted to the cylinder 5 and exhausted from the cylinder 6, the piston 27 in the cylinder 5 moved forwardly, and the cutter 49 swung to the left-hand side of the comb 45.

In the operation of the device the pressure fluid leaks into the oil chamber 18 around the periphery of the disk 10 and through the central opening in said disk, putting the oil in said chamber under pressure. Whenever the operation of the shears is suspended the lowering of the pressure in the valve chamber 17 permits oil to leak into said valve chamber around the periphery of the disk 10 and through the opening in said disk. The oil thus introduced into the valve chamber 17 is driven by the compressed air through the various inlet ports into the cylinders 5 and 6, out through the exhaust ports 57, 58, 64 and 61 and through the open forward end of the casing 1, thoroughly lubricating the cylinders 5 and 6, slide valve 63, valve-operating mechanism, and the bearings for the rocker 23 and the lever 30.

The point in the stroke of the pistons 27 at which the slide valve 63 covers the inlet ports and uncovers the exhaust ports is governed by the position of the tappets with reference to the center of oscillation of the pin 78. The further said tappets are from said center, the earlier will the exhaust be.

When the nut 86, screw 22, plate 79, and cap 4 are removed, the motor mechanism may be withdrawn as a whole through the rear end of the casing 1 for inspection, cleaning, or repair.

The exhaust of the pressure air through the forward end of the casing 1 prevents the entrance of dust and clippings into said casing.

I desire it to be understood that in the practical manufacture of this animal shears I do not regard myself as limited to the precise construction herein described, inasmuch as many departures from said construction may be made within the scope of the invention.

I claim as my invention:

1. In a motor mechanism, in combination, a cylinder; a piston; a valve; means for moving said valve comprising a tappet; means actuated by said piston for moving said tappet; and means for varying the throw of said tappet.

2. In a motor mechanism, in combination, a cylinder; a valve; a piston in said cylinder; a member arranged to be oscillated by said piston; and means for moving said valve comprising a tappet engaged by said oscillatory member, said tappet being movable toward and away from the center of oscillation of said member.

3. In a motor mechanism, in combination, a cylinder; a piston; a member arranged to be oscillated by said piston; a valve; means for moving said valve comprising a tappet arranged to be engaged by said member; movable means engaging said tappet; and means for adjustably securing said last-mentioned means against movement.

4. In a motor mechanism, in combination, a cylinder; a piston; a pin arranged to be oscillated by said piston; a valve; means for moving said valve comprising a tappet engaged by said pin; a member engaging said tappet for moving it toward and away from the center of oscillation of said pin; and means for adjustably securing said member in position.

5. In a motor mechanism, in combination, two cylinders arranged side by side; pistons in said cylinders; an inlet port and an exhaust port in one end of each of said cylinders; a slide valve adapted to uncover said inlet ports and having an exhaust recess adapted to be connected with said exhaust ports; and means for moving said slide valve.

6. In a motor mechanism, in combination, a cylinder having ports therein; a slide valve; an oscillatory arm pivotally mounted at one end and engaging said slide valve at a point between its ends; and means engaging the opposite end of said arm for oscillating it.

7. In a motor mechanism, in combination, a cylinder having a port therein; a valve; an oscillatory arm connected to said valve for moving it; and an oscillatory member engaging said arm for oscillating it.

8. In a motor mechanism, in combination, a cylinder having a port therein; a valve; an oscillatory arm connected to said valve for moving it; and a crank pin adapted to engage said arm, said arm having a portion adapted to be slidingly contacted by the side of said crank pin.

9. In a motor mechanism, in combination, a cylinder having a port therein; a valve; an oscillatory arm connected to said valve for moving it; and an elongated crank pin adapted to engage said arm, said arm having an opening therein, the walls of which are arranged to be engaged by one end of said crank pin, and a portion at each side of said opening arranged to be slidingly engaged by the sides of said crank pin.

10. In a motor mechanism, in combination, a cylinder having ports therein; a slide valve; an arm pivotally mounted at one end and having an elongated opening therein at a point between its ends; a stud fixed to said slide valve and lying in said elongated opening; a crank pin engaging the opposite end of said arm; and means for moving said crank pin.

11. In a motor mechanism, in combination, a cylinder; a piston; a valve; a rock shaft operatively connected with said valve; a member arranged to be oscillated by said piston; and a tappet slidably and non-rotatably mounted upon said rock shaft and engaged by said oscillatory member.

12. The combination, with a casing containing a pressure-fluid motor comprising a cylinder, and mechanism driven by said motor, of means for supplying pressure fluid and lubricant to said motor cylinder, the exhaust from said cylinder being directed through said casing and the mechanism driven by said motor.

13. The combination, with a pressure fluid motor, of a valve chamber and an oil chamber adapted to permit of leakage of pressure fluid from said valve chamber into said oil chamber and a leakage of oil from said oil chamber into said valve chamber.

14. An animal shears comprising a motor mechanism; and a valve chamber and an oil chamber arranged to permit the passage of fluid from one to the other.

15. An animal shears comprising a tubular casing, a motor mechanism in said casing, a cap for closing one end of said tubular casing, and two disks partitioning off a valve chamber and an oil chamber from the space in said casing occupied by the motor mechanism.

16. An animal shears comprising a tubular casing containing a pressure-fluid motor comprising a cylinder and mechanism driven by said motor, said motor being located in the rear portion of said casing; means for supplying pressure fluid and lubricant to said motor, the pressure fluid and lubricant being exhausted from the forward end of said casing.

17. An animal shears comprising a casing, two cylinders secured together, valve mechanism attached to said cylinders, pistons in said cylinders, a rocker mounted in said casing and connected with said pistons; a pivot for said rocker; and means for securing said cylinders in said casing, said cylinders, valve mechanism, pistons, and rocker being withdrawable as a whole upon the removal of said pivot and said cylinder-securing means.

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