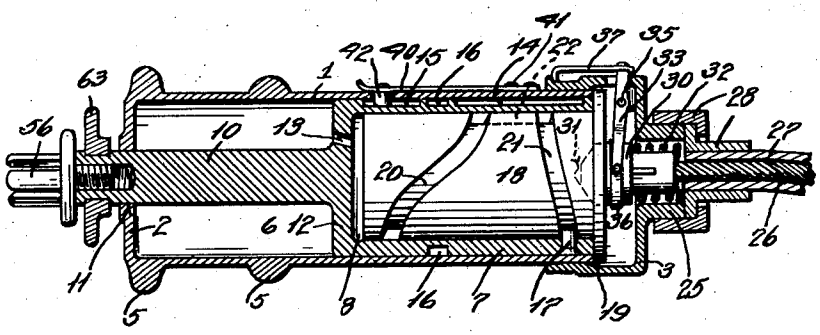
June 28, 1938. R. D. SIMMONS 2,121,831

TOOL ACTUATING APPARATUS

Filed Sept. 4, 1936 2 Sheets-Sheet 1

Fig. 1.



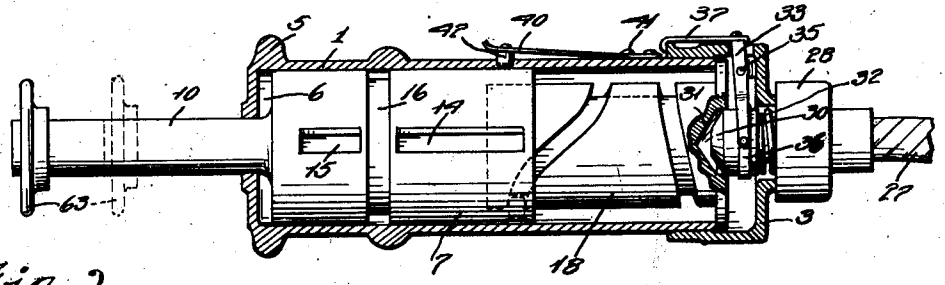


Fig. 2.

Fig. 3.

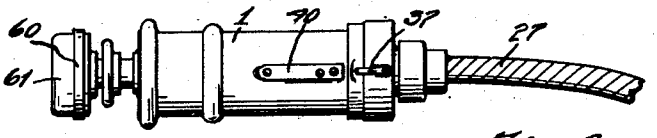
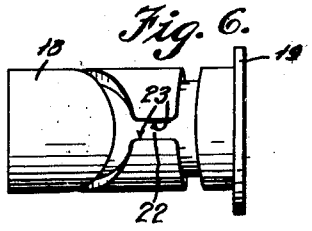


Fig. 6.



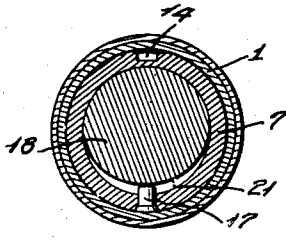


Fig. 4.

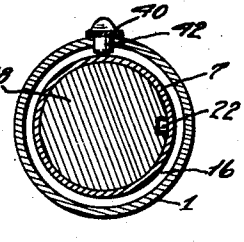


Fig. 5.

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TOOL ACTUATING APPARATUS

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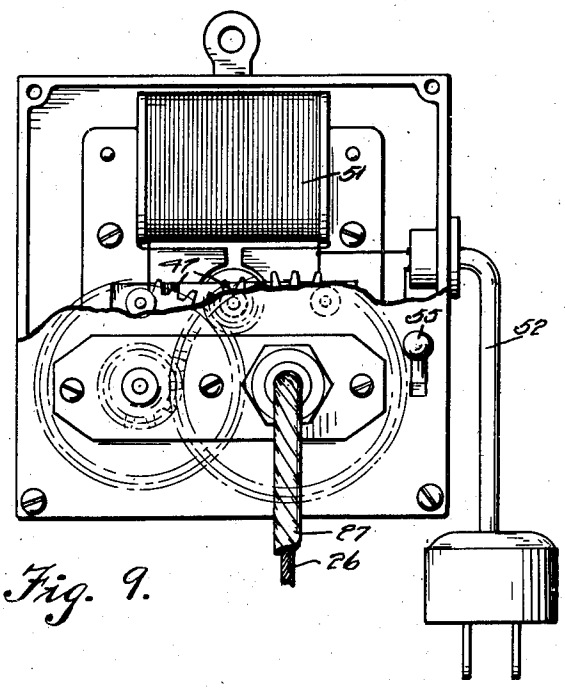


Fig. 9.

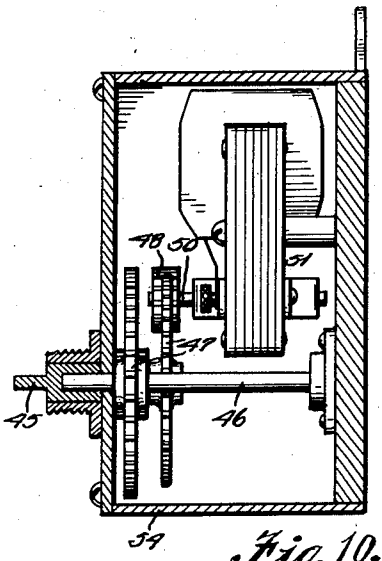


Fig. 10.

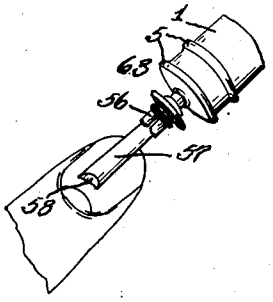


Fig. 8.

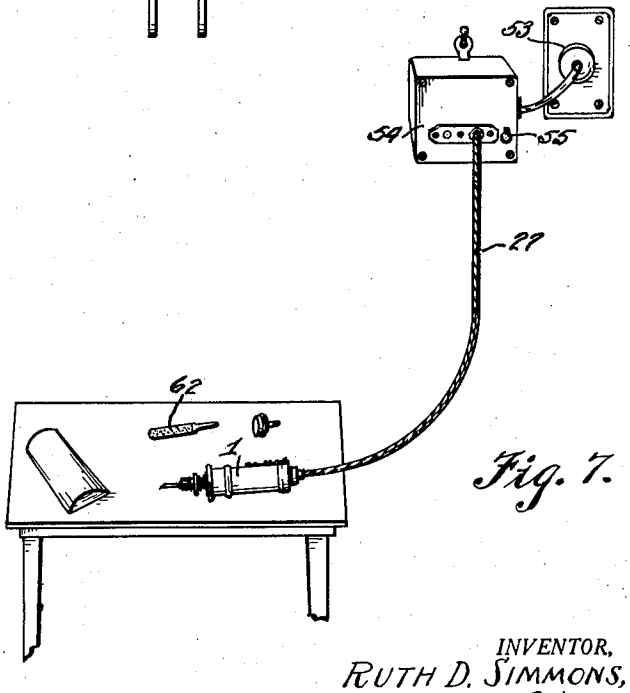


Fig. 7.

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UNITED STATES PATENT OFFICE

2,121,831

TOOL-ACTUATING APPARATUS

Ruth D. Simmons, Los Angeles, Calif.

Application September 4, 1936, Serial No. 99,343

9 Claims. (Cl. 74—57)

This invention relates to improvements in power-actuated tool-holders, and the principal object of the invention is to provide simple and practicable apparatus of said class and in compact form for convenient manipulation by an operator.

The invention is intended to be especially useful when employed for manicuring operations. These operations usually consist in shoving back the cuticle around the edge of the nail, shaping the nails by filing their edges. This is usually followed by the application of a paste of some kind to the nails, after which the nails are usually burnished. These operations when performed by hand are laborious, and consume considerable time. The pushing of the cuticle back around the edge of the nail is usually accomplished with a small chisel-shaped piece of wood, which is usually called an "orange stick". One of the objects of this invention is to provide a tool-holding device particularly adapted for performing these functions. A special object of the invention is to provide the device with means for giving the tool a relatively short reciprocating travel to be used when the orange stick or similar device is being employed for pushing back the cuticle, and to construct the device so that when desired, the device can readily be set in another relation to enable relatively long travel to be given to the holding stem of the tool, which should be used in filing the nails; also, to construct the device so that at will it can be readily set for imparting rotary movement to the holding stem of the tool when it is desired to polish the nails.

Other objects and advantages residing in my invention, and objects relating to details of construction thereof, will be readily apparent in the course of the detailed description to follow.

The accompanying drawings illustrate by way of example a representative form of my invention, in which:

Figure 1 is a view in longitudinal section of an embodiment of my invention.

Fig. 2 is a similar view with the casing shown in section, and with parts broken away.

Fig. 3 is a view in side elevation of the invention, on a smaller scale than in the above named views.

Fig. 4 is a view in cross section on line 4—4 of Fig. 1.

Fig. 5 is a similar view on line 5—5 of Fig. 1.

Fig. 6 is a detached view in side elevation of the impeller element of my invention.

Fig. 7 is a pictorial view of my invention and actuating devices therefor.

Fig. 8 is a fragmentary perspective view of the tool-holder of my invention including a manicuring tool and illustrating its use upon the fingers of the subject.

Fig. 9 is a view in front elevation of the actuating devices utilized with my invention, the faceplate thereof being broken away.

Fig. 10 is a view in cross section of the same.

Before proceeding to a more detailed description of the invention, it should be stated that in its preferred construction it involves the use of a rotatably driven driving member, and a driven member. Between these two members a driving connection is provided, including a cam slot in one of the members, and a projection or pin on the other member. The device is provided with means for holding the driven member against rotation when the reciprocating drive connection is in use through the agency of the cam slot, and for holding the driven member against longitudinal movement when a direct rotary drive connection is effected between the driving member and driven member. Furthermore, the driven member carries a stem that projects from the forward end of the device, and the device is so constructed that when the driven member is shifted longitudinally through the medium of its projecting stem, the cam drive can be disconnected and the direct rotary drive connection effected. In order to accomplish this, I prefer to provide the cam slot or slots with a lateral groove; that is to say, a groove that extends laterally from the side wall of the cam slot. By a longitudinal shifting of the driven member relative to the driving member, the pin that would normally run in the cam slot, would move into this lateral groove or notch, thereby locking the driving member and driven member together for direct rotary movement in unison. Although the device can be constructed, if desired, with a single cam slot, I prefer to provide two cam slots, one of which has relatively small pitch so that the tool will reciprocate with a very small amount of travel. This is the slot which should be employed when the device is carrying the orange stick, or other means for pushing back the cuticle around the edge of the nail.

A second slot can be employed, having relatively great pitch to give the operating head or stem of the tool a relatively great reciprocating movement, and this is the slot that would be employed when the tool head is carrying a nail file

or emery board for filing the nails and shaping them.

When the device is being used for polishing the nails, of course, the rotary drive is employed. At this time the driving head at the end of the stem of the tool carries a small burnishing or polishing wheel, which wheel can be any desired shape to facilitate its application to the nails; and, of course, this wheel can be made of any desired material suitable for its purpose.

Referring to the parts illustrated in the drawings 1 indicates a generally cylindrical casing of my improved apparatus, having a centrally apertured head or wall 2 at its outer end and closed at its inner end by a frictionally or otherwise secured cap 3. The casing is of a diameter adapting it to be conveniently held in the hand of the operator and may be provided with a knurled exterior surface, not shown; or, as shown, with circumferential ridges 5, enabling the casing to be held securely in the operator's hand.

Within the cylindrical chamber 6 of said casing a driven member 7 is provided preferably in the form of a cylindrical barrel-piston held therein for rotary and longitudinal reciprocatory movements, and this member may have a cylindrical chamber 8 open at its inner end, and an axially directed stem 10 at its opposite end slidably and rotatably extending through the aperture 11 of the wall 2. The end wall 12 of the barrel is provided with an aperture 13 connecting the chambers 6 and 8 to permit free passage of air and thereby relieve the barrel in its reciprocation from air resistance.

If the device is constructed so as to enable it to be set to give a long stroke and also a short stroke to the tool, the barrel 7 is formed on its exterior with a pair of longitudinally directed aligned slots 14 and 15 of unequal lengths spaced apart, and intermediate said slots is formed with a circumferential groove 16 for a purpose to be described hereinafter. Preferably adjacent the inner end of the barrel a driving projection or key-stud 17 extends inwardly and runs in either one of the cam slots to reciprocate the tool carried by the stem 10.

An impeller element, 18 that is to say, a driving member is rotatably received within the chamber 8 of said barrel. This driving member may have a circumferential flange 19 at its inner end extending to bear upon the inner end of the casing. In the present instance, the driving member is formed with a pair of cam-slots 20 and 21 extending circumferentially thereabout, said cam-slots being described on pitch-lines of different lengths approximately corresponding in longitudinal distance along said impeller with the respective barrel-slots 14 and 15. At a convenient point, preferably as shown, where the cam-slots most nearly approach each other, said slots are joined by a longitudinally directed channel 22 having shoulders 23 on its opposite sides. The key-stud 17 is received in either of the cam-slots 20 or 21 to reciprocate the barrel 7 through the agency of this driving connection and is movable at will from either one slot to the other through the channel 22.

Any suitable means may be provided for effecting a flexible driving connection to the driving member. In the present instance, the cap 3 is formed with a neck 25 through which extends a flexible power-shaft 26 rotatable in a sheath 27 and secured to said neck by gland-members 28. A frustro-conical clutch-member 30 is secured to the end of said shaft and is urged into engagement with the conical clutch-socket 31 formed axially at the inner end of the impeller 18 by a coil-spring 32 received in the neck 25 for imparting rotary movement to said impeller through the frictional resistance thus established.

A clutch-lever 33 is pivoted at 35 and is connected to the clutch-member 30 through a ring 36. Said lever extends through the cap 3 and is connected to a dog 37 that may be hooked over the edge of said cap to disengage the clutch member and hold the clutch open, and in opposition to the spring 32.

A flat spring 40 is rigidly connected at 41 to the exterior of the casing and is provided with a spline-stud 42 extending through the casing and into either of the slots 14 or 15 or into the groove 16.

For driving the device, if desired, the power-shaft 26 may be operatively connected to a driving head or coupling member 45 keyed to a shaft 46 which is rotatively actuated at a relatively reduced speed through speed-reduction gearing 47 actuated through a pinion 48 keyed to an armature-shaft 50 of an electric-motor 51 energized through current received over a cable 52 from a source of electric-current supply represented by the socket 53. All of said actuating devices may be retained within a housing 54 secured to a wall or other convenient location within easy reach of the operator and the electric circuit supplying said motor may include a switch, not shown, having an actuating lever 55 through which said circuit may be completed or broken at the convenience of the operator.

The stem 10 of the barrel is provided at its outer end protruding from the casing 1 with a jaw-chuck 56 of any suitable type to detachably retain suitable tools for the various purposes for which the apparatus is adapted. In Fig. 8 I have shown a tool 57 having an extremity 58 formed somewhat as a blunt-edged chisel and which when made of orange wood or the like and reciprocated in the apparatus provides a valuable aid in pressing back the cuticle about the nails. In Fig. 6 I have shown a buffer attachment 60 having a pad 61 adapted to be rotated with obvious advantages in polishing the nails. Fig. 7 shows somewhat similar tools, and a file or sandpaper appliance 62 admirably adapted to be used for filing and shaping nails.

The operation of the above described apparatus will be briefly described as follows: The barrel 7 is operatively connected to the impeller or driving member 18 through the key-stud 17 running in either of the cam-slots 20 or 21. With the clutch-member 30 frictionally engaged to rotate the impeller, reciprocating motions are given to said barrel of various lengths of stroke according to the selected slot in which the stud 17 is engaged. Such straightline motion results from the engagement of the spline-stud 42 in the barrel-slots 14 or 15 and the travel of the tool will correspond to the pitch-lengths of the cam-slots, respectively.

The rotary motion of the impeller is utilized to reciprocate the barrel and the tool connected therewith, the length of stroke being determined by the cam-slot 20 or 21 with which the key-stud 17 is engaged. The channel 22 is provided to admit of the passage of the key-stud to the selected slot, and a flanged ring 63 is provided on the stem 10 to aid in the manipulation of the barrel.

The channel 22 is also utilized to effect a rotary driving connection with the key-stud 17 when it

is desired to rotate the barrel and tool carried by the stem. In this case the spline-stud 42 is engaged in the annular groove 16 which holds the barrel against shifting longitudinally on the driving member and positions the driving stud 17 in its new position in the channel 22 to bear against one of the walls 23 thereof and thus rotate the impeller and barrel in unison.

It is understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take, and I do not wish to be limited in the practice of the invention, nor in the claims, to the particular embodiment set forth.

Having described my invention, what I claim, is:

1. Apparatus of the class described, consisting of a casing having a cylindrical chamber, a barrel rotatively and reciprocatively mounted in said chamber formed with a tool-holding stem extending from said casing, said barrel being formed with a plurality of longitudinally directed aligned slots of unequal lengths and an annular groove, a spline-stud connected to said casing and selectively engageable in said slots or in said groove, a rotatively mounted cylindrical impeller formed with a plurality of circumferential cam-slots of unequal pitch-lengths corresponding to said barrel-slots, respectively, and a communicating channel connecting said cam-slots, a key-stud connected to said barrel and engageable in said cam-slots or said channel selectively, a power-actuated shaft, and clutch-devices between said shaft and said impeller to impart reciprocatory or rotory motion to said barrel.

2. Apparatus of the class described, consisting of a casing having a cylindrical chamber, a barrel rotatively and reciprocatively mounted in said chamber formed with a tool-holding stem extending from said casing, said barrel being formed with a longitudinally directed slot and an annular groove, a spline-stud connected to said casing and engageable in said slot and in said groove, a rotatively mounted cylindrical impeller formed with a circumferential cam-slot and a longitudinally directed channel, a key-stud connected to said barrel and engageable in said cam-slot or in said channel, a power-actuated shaft, and clutch-devices between said shaft and said impeller to impart reciprocatory or rotary motion to said barrel.

3. Apparatus of the class described, comprising a casing, a barrel mounted in said casing for rotative and reciprocative motions provided with a tool-holding device, an impeller rotatably mounted in a chambered recess of said barrel formed with a pair of circumferential cam-slots of unequal pitch-lengths and a channel connecting said cam-slots, a key-stud extending from said barrel into said cam-slots to operatively connect the barrel with said impeller, and means to guide said barrel in longitudinal or rotary directions.

4. In apparatus of the kind described, the combination of a casing, a driven member guided to slide and rotate in the said casing, and having a tool-carrying stem projecting at one end of the casing, a driving member rotatably mounted in the casing, a drive connection between the driving member and the driven member including a cam slot on one of said members, said projecting stem affording means for shifting the driven member longitudinally within the casing, and means for disconnecting the drive through said cam slot and for effecting a rotary driving connection between the driving member and the driven member by shifting the driven member longitudinally within the casing.

5. In apparatus of the kind described, the combination of a casing, a driven member guided to slide and rotate in the said casing, and having a tool-carrying stem projecting at one end of the casing, a driving member rotatably mounted in the casing, a drive connection between the driving member and the driven member including a cam slot on one of said members, said projecting stem affording means for shifting the driven member longitudinally within the casing, means for disconnecting the drive through said cam slot and for effecting a rotary driving connection between the driving member and the driven member by shifting the driven member longitudinally within the casing, and means for holding the driven member against rotation when the first-named drive connection is operating, and for holding the driven member against longitudinal movement when the rotary drive connection is in operation.

6. In apparatus of the kind described, the combination of a casing, a driving member rotatably mounted in the casing and having a circumferential cam slot, a driven member guided to slide and rotate in the casing, and having a driving projection running in the cam slot, means operatable at will for holding the driven member against rotation to enable the driving projection to reciprocate the driven member, and means associated with the cam slot capable of engaging with said driving projection when the driven member is held in a longitudinally shifted position with respect to the driving member, to enable the driving member to rotate the driven member.

7. In apparatus of the kind described, the combination of a rotatable driving member having a circumferential cam slot, a longitudinally shiftable driven member concentric with said driving member, a driving projection carried thereby running in the cam slot to reciprocate the driven member when the driver rotates, hand-operated means operatable at will to hold said driven member against rotation, said driving member having means for engaging the driven member when the driven member is shifted longitudinally, to enable the driving member to rotate the driven member.

8. In apparatus of the kind described, the combination of a rotatable driving member having a circumferential cam slot, a longitudinally shiftable driven member concentric with said driving member, a driving projection carried thereby running in the cam slot to reciprocate the driven member when the driver rotates, hand-operated means operatable at will to hold said driven member against rotation, said driver having a channel extending laterally from said cam slot, capable of receiving said driving projection when the driven member is shifted longitudinally into a new position with respect to the driving member, said driven member having a circumferential groove to align with said hand-operated means in said new position and cooperating with the same to maintain the driven member for rotation in said new position.

9. In apparatus of the kind described, the combination of a casing, a driven member guided to slide and rotate in the said casing, a driving member mounted to rotate in said casing, said driving member and said driven member having a driving connection therebetween for reciprocating the driven member and including a pin

on one of said members and a cam slot on the other member, said driven member having a stem projecting from the end of the casing with means for carrying a tool attached thereto, said cam slot having a laterally extending channel capable of receiving said pin to effect a rotary driving connection between the driving member and the driven member; and means for holding the driven member against rotation when the pin is running in the slot, and for holding the driven member against longitudinal movement when the pin is in engagement with the said lateral groove.

RUTH D. SIMMONS.