

C. H. A. F. L. ROSS.
 MEANS FOR LUBRICATING AND DISENGAGING CUTTING TOOLS.
 APPLICATION FILED JAN. 3, 1910.

971,410.

Patented Sept. 27, 1910.

3 SHEETS—SHEET 1.

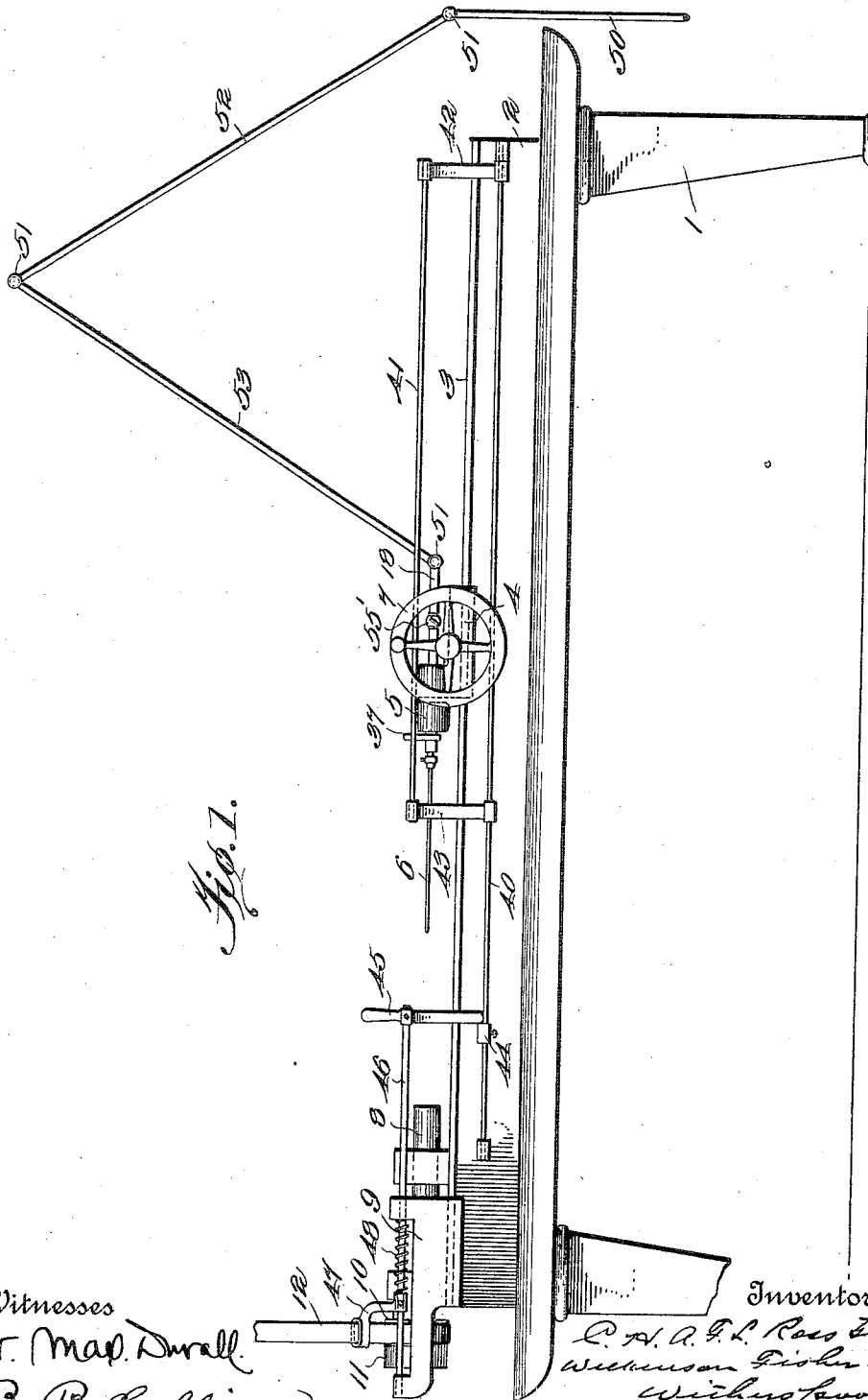


Fig. 1.

Witnesses
 W. Map. Durrall.
 B. B. Collings.

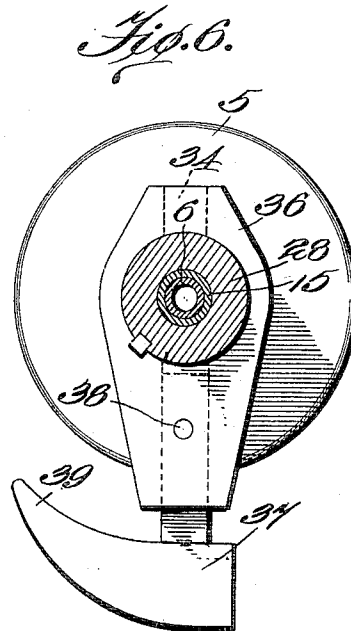
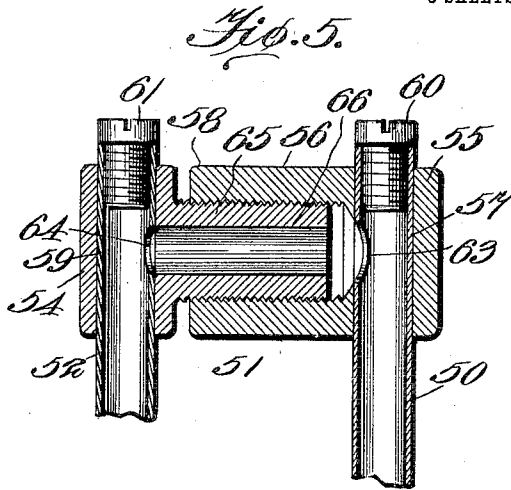
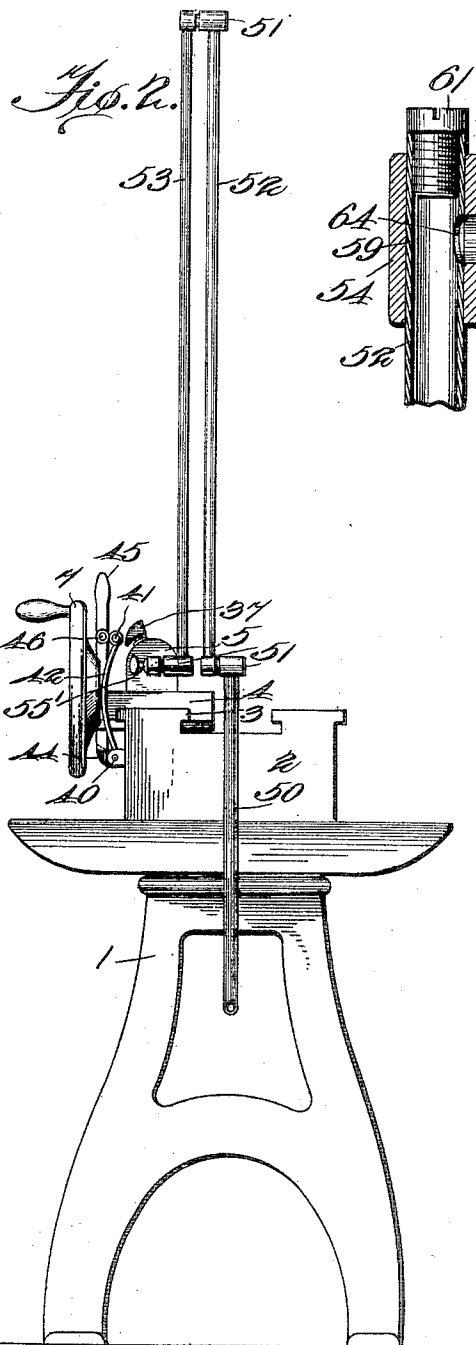
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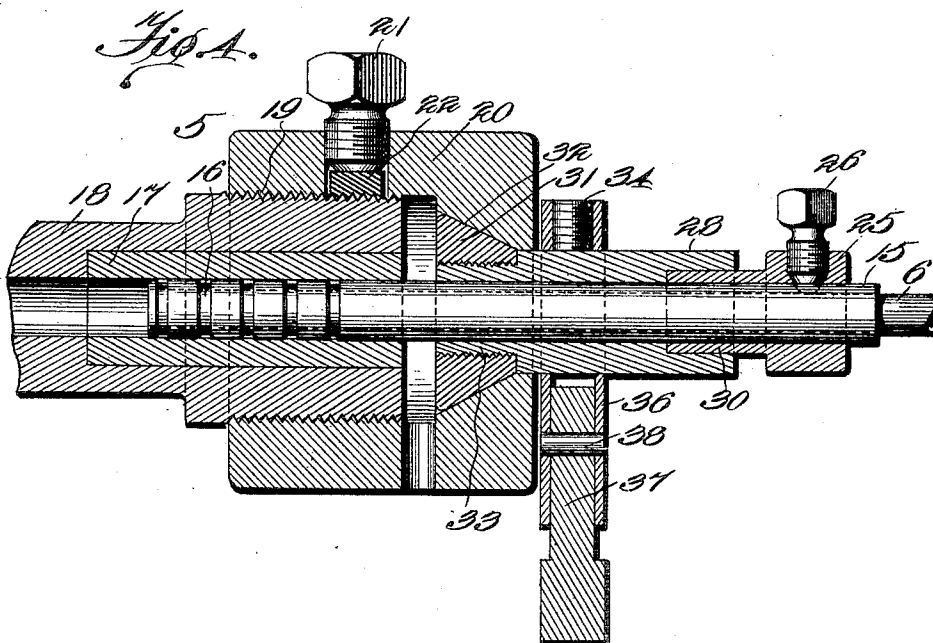
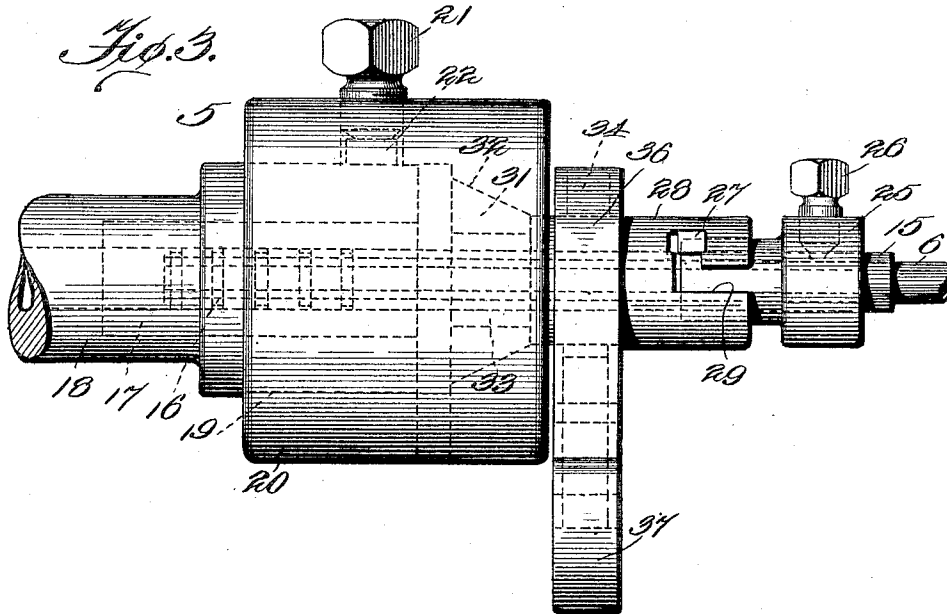
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3 SHEETS—SHEET 3.



Witnesses
 (N. May Dwall.
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UNITED STATES PATENT OFFICE.

CHARLES HENRY AUGUSTUS FREDERICK LOCKHART ROSS, OF QUEBEC, QUEBEC,
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MEANS FOR LUBRICATING AND DISENGAGING CUTTING-TOOLS.

971,410.

Specification of Letters Patent. Patented Sept. 27, 1910.

Application filed January 3, 1910. Serial No. 536,242.

To all whom it may concern:

Be it known that I, CHARLES HENRY AUGUSTUS FREDERICK LOCKHART ROSS, baronet, a subject of the King of Great Britain, temporarily residing at Quebec, in the Province of Quebec, Dominion of Canada, have invented certain new and useful Improvements in Means for Lubricating and Disengaging Cutting-Tools; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improved means for lubricating cutting tools and for throwing the same out of action; and has for its object to produce a device of this nature that will be applicable to any machine employing a reciprocating tool slide. To these ends, the invention primarily consists in a novel means for conveying oil to the tool under pressure and in such a manner that the said pressure will not have any retarding or accelerating effect on the slide carrying the tool.

The invention also further consists in an improved automatic means for releasing the cutting tool from the work and operating in connection with said lubricating means all as will be more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification, in which a machine for drilling gun barrels is illustrated by way of an example of the applicability of this invention, and in which like numerals refer to like parts in all the views:—Figure 1, is a side elevational view of my invention as applied to a gun barrel drilling machine; Fig. 2, is an end view of the same; Fig. 3 is a plan view of a clutch and its cooperating parts; Fig. 4, is a sectional view of the parts shown in Fig. 3; Fig. 5, is a sectional view of a joint used in the pipe connections; and, Fig. 6, is a detail view of an automatic cam device for stopping the machine.

1 designates any suitable supports for the bed 2 provided with the slide ways 3, on which travels the tool slide 4, provided with the tool holding member 5, and carrying, in this instance, the drill 6, although, of course, any other suitable tool may be provided. 7 represents any suitable means, in

this instance a hand wheel, for causing the slide 4 to traverse the ways 3.

8 represents a suitable work holder, 9 a suitable support therefor, 10 a tight pulley for rotating the same, 11 a loose pulley, and 12 a power belt.

So far as now described the parts are or may be of the usual construction.

Referring now more particularly to Figs. 3 and 4, the drill 6 is preferably in the form of a tube, as shown, and is provided with a tube or sleeve 15, having the packing grooves 16, fitting the bushing 17 in the pipe or stem 18 which is held fixed in the slide 4 and which is enlarged and screw threaded at 19 to fit a corresponding screw thread in the clutch member 20, all as will be readily understood. The said clutch member is provided with a set screw taking against a soft metal shoe 22 engaging the screw threads 19, which firmly locks the parts 18 and 20 together.

25 is a coupling sleeve fitting the tubular sleeve 15, provided with the set screw 26, and having the lug or projection 27; while 28 is a clutch coupling sleeve fitting over the reduced end 30 of the sleeve 25, and having the bayonet slot 29 into which said lug 27 fits, as shown.

31 is a clutch member fitted to the reduced screw threaded end 33 of the sleeve 28 and preferably tapered as at 32 to frictionally engage a correspondingly cone shaped part of the clutch member 20, as illustrated.

Suitably secured to the clutch sleeve 28, as by the set screw 34 is a dog 36 in which is secured as at 38, the tripping cam 37, provided with the curved extending toe 39.

40 represents a rock shaft secured to the bed 2 provided with the bar 41, supported by the rocking arms 42 and 43, and with the shipper trip dog 44, adapted to control the shipper lever 45 connected with the rod 46 mounted on the work holder support 9, and carrying the belt shipper 47; while 48 is a spring for automatically returning said rod after it has been displaced.

50 represents a pipe for supplying fluid under pressure, for example oil, and 51 flexible joints connecting the pipes 50, 52, and 53, as well as the pipe 53 with the stem 18. 55' is a valve for controlling the oil. Each of the joints 51 is composed of a screw threaded sleeve 56 in one end 55 of which fits an end 57 of a supply pipe such as 50, see

Fig. 5, and in the other screw threaded end 58 of which fits a screw threaded nipple 65 provided with a bored tee 54 in which fits an end 59 of another pipe, such as 52. The ends 57 and 59 of the pipes 50 and 52 are preferably closed as by screw plugs 60 and 61, as illustrated. The end 57 of the pipe 50 is further provided with a port 63 and the end 59 of the pipe 52 is provided with a port 64, while a bore 66 in the nipple 65 connects the said ports 63 and 64.

It is evident from the construction of these joints just described, that the tool slide 4 may cause the pipes 50, 52, 53 and 18, to change their angular relation to each other, without running the risk of leaking although the fluid therein may be under a very high pressure; for as the relative movements of said pipes take place the nipple 65 merely turns in the screw threaded portion of the sleeve 56, maintaining at all times a tight joint between all the parts.

The operation of the device will be clear from the foregoing but may be briefly summarized as follows: The work, such as a gun barrel, being secured in the work holder 8, and being rotated by the pulley 10, the drill 6 is brought into operative relation therewith, by sliding the tool holder 5 along the ways 3, when the oil valve 55' is opened admitting oil under pressure to the rear end of the drill tube. This pressure will cause the clutch member 31 to be forced into frictional contact with the clutch member 20 at the engaging surfaces 32, as illustrated in Fig. 4, and thereby preventing the drill from being rotated by the work. In the event of the surfaces 32 slipping past each other, however, as will be the case when too large a chip is being taken, or from other causes, the dog 36 will revolve with the drill and cause the cam 37 to strike the rock shaft bar 41, which in turn will cause the shipper dog 44 to be angularly turned out of the path of the lower end of the shipper lever 45 and permit the spring 48 to throw the belt 12 from the tight pulley 10 onto the loose pulley 11, thereby stopping the machine.

It will be observed that the drill 6 in this instance is hollow, and that, therefore, some of the oil which is received at the rear end of the tube 15 will pass under pressure through said drill 6, and clear away the chips as fast as they are formed, thus cooling the cutting edge of the drill, and enabling a high speed to be employed. It will also be observed owing to the joints 51 in the pipes 50, 52 and 53, that the pressure of the oil against the rear of the tube 15 will have no appreciable tendency to move the tool slide 5.

As is well known in those machines where a lubricant is used under pressure, the output of the machine is greatly increased, because the pressure of the lubricant forces the

chips away from the cutting edge of the tool, and the increased volume of lubricant resulting from this pressure keeps the tool cool and, therefore, permits of a greatly increased cutting speed. But in machines heretofore, using a lubricant under pressure, the means usually employed were of the form of telescoping tubes, and the lubricant acted on the tool carrying slide or head, causing it to jump and thereupon break the tools and to otherwise greatly interfere with the successful operation of the machine. The present invention, it will be observed, not only permits the lubricant to be carried to and through the cutting tool, and thereby permits a greater speed to be used, but it absolutely avoids all movements of the tool carrying slide, and therefore, all tendency to interfere with the successful operation of the machine.

In other words, this invention, it will be seen, does not have any retarding or accelerating effect upon the slide which carries the tool, while, at the same time, it secures the increased speed which is so desirable when using a lubricant under pressure. In addition to this, it will be observed, that should the tool take a cut deeper than is intended, the machine is automatically stopped and the breaking of parts obviated.

It is obvious that this invention is applicable to cutting tools in any machine where the cutting tool is carried by a reciprocating slide, is especially applicable to gun barrel drilling machines, and to gun barrel rifling machines, and that it may be applied with facility to lathes, drills, automatic screw machines, screw thread milling machines, automatic gear cutting machines, and to many others.

It is further more obvious, that those skilled in the art may vary the details of construction and the arrangement of parts without departing from the spirit of the invention, and, therefore, it is not desired to limit the invention to such features, except as may be required by the claims.

What I claim is:

1. In a metal working machine, the combination of a slide provided with a tool; a clutch connection between said slide and tool; and means for supplying fluid under pressure for operating said clutch; substantially as described.

2. In a metal working machine, the combination of a slide provided with a tool; a clutch connection between said slide and tool; means for supplying fluid under pressure for operating said clutch; and means for causing a portion of said fluid to lubricate said tool; substantially as described.

3. In a metal working machine, the combination of a slide provided with a tool; a rotating work holder adapted to carry the work on which said tool operates; a clutch

connection between said slide and tool; and means for supplying fluid under pressure to operate said clutch and to lubricate said tool while operating on said work; substantially as described.

4. In a metal working machine, the combination of a slide provided with a tool; a rotating work holder adapted to carry the work on which said tool operates; a clutch connection between said slide and tool; means for supplying fluid under pressure to operate said clutch and to lubricate said tool while operating on said work; and means for stopping the rotation of said work holder when an abnormal resistance is encountered by said tool; substantially as described.

5. In a metal working machine, the combination of a movable tool support a clutch carried by said support; a tool carried by said clutch; pipe sections for conveying a lubricant under pressure to said tool and clutch whereby said tool may be lubricated and said clutch operated by said lubricant; and means permitting said sections to angularly move relatively to each other when said tool support is moved, whereby the pressure of said lubricant does not retard or accelerate the movement of said support; substantially as described.

6. In a metal working machine, the combination of a tool support; a hollow cutting tool carried thereby; a clutch connecting said tool and said support; and a plurality of pipe sections provided with angularly movable joints connected to said clutch and adapted to convey oil under pressure to said tool whereby said oil may hold the members of said clutch in engagement while lubricating said tool; substantially as described.

7. In a metal working machine, the combination of a sliding tool support; a hollow cutting tool carried thereby; a friction

clutch connecting said tool and said support; a plurality of pipe sections provided with angularly movable joints connected to said clutch and adapted to convey oil under pressure to said tool, whereby said oil may hold the members of said clutch in engagement while lubricating said tool; and means adapted to be actuated by one of said clutch members for stopping the machine when an abnormal resistance is encountered by said tool, substantially as described.

8. In a metal working machine, the combination of a sliding tool support; a hollow tool carried thereby; a friction clutch connecting said tool and said support; a plurality of pipe sections adapted to convey oil under pressure to lubricate said tool and to operate said clutch; angularly movable joints between said sections causing the said oil to neither retard nor accelerate the sliding motion of said tool; a rotating work holder; and means for stopping the motion of the same when said tool encounters an abnormal resistance; substantially as described.

9. In a metal working machine, the combination of a sliding tool holder provided with a stationary clutch member; a movable clutch member carried by said tool holder and adapted to engage said first named member; a hollow cutting tool connected with said movable member; and means to convey oil under pressure to said movable member and to said hollow tool; substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

CHARLES HENRY AUGUSTUS
FREDERICK LOCKHART ROSS.

Witnesses:

T. A. WITHERSPOON,
ERNEST WILKINSON.