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A. FRANCOIS.

ROTARY DRILL.

APPLICATION FILED APR. 6, 1904.

Fig. 1.

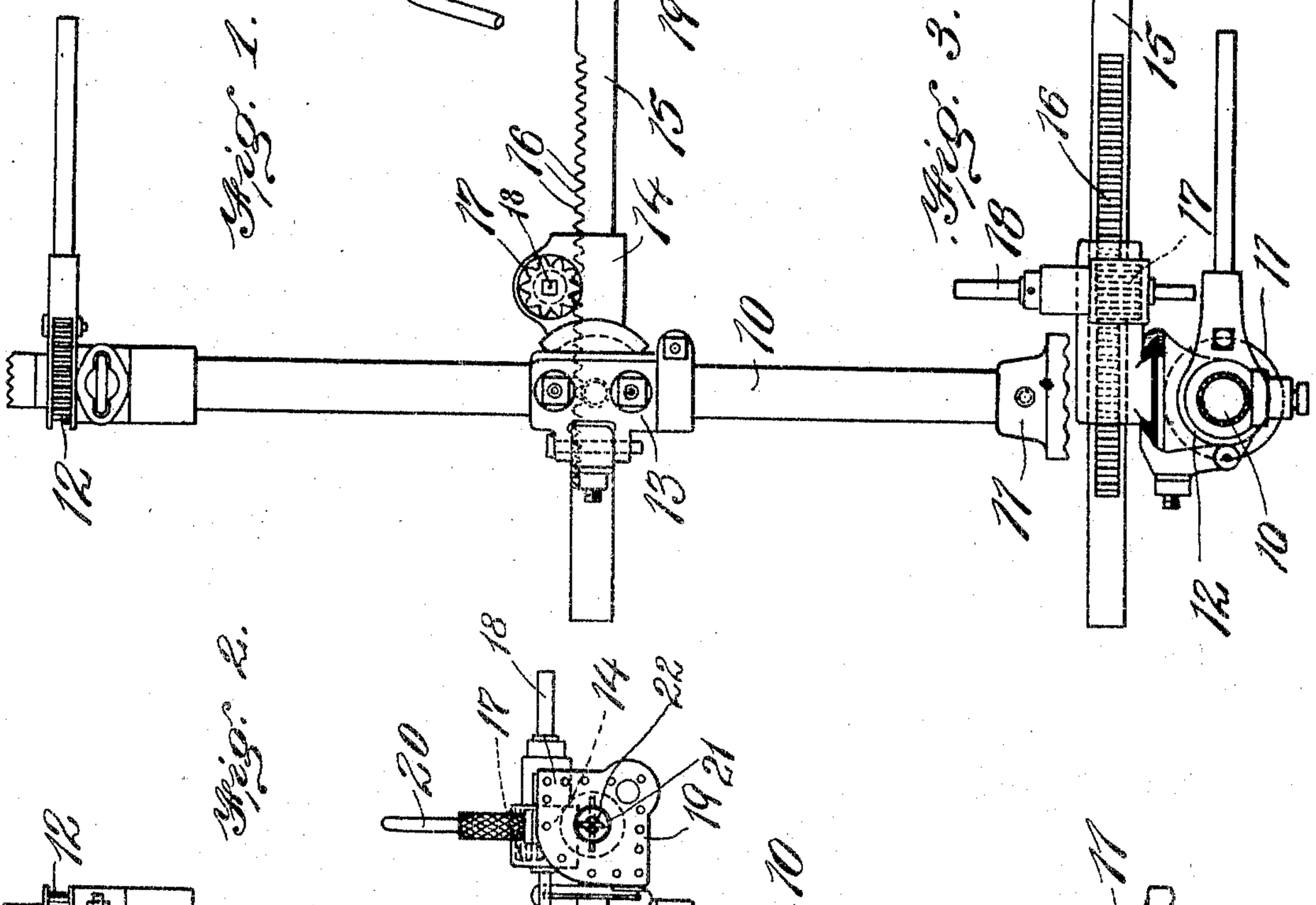

Fig. 2.

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

ALBERT FRANÇOIS, OF LIÉGE, BELGIUM.

ROTARY DRILL.

SPECIFICATION forming part of Letters Patent No. 780,277, dated January 17, 1905.

Application filed April 6, 1904. Serial No. 201,902.

To all whom it may concern:

Be it known that I, ALBERT FRANÇOIS, of Liége, Belgium, have invented certain new and useful Improvements in Rotary Drills, of which the following is a specification.

This invention relates to drills of that type commonly known as "rock-drills," the same being particularly designed for use in mining or for the removal of coal or ores where tunnels are dug. It is to be understood, however, that my invention is not limited to any special use or location, it being adapted for general use for rock-drilling or mining purposes.

One of the objects of my invention is the production of a drill of this type by means of which the drilling-tool proper and the motor which drives it may be advanced and retracted without the employment of any kind of a feed-screw.

A further object of the invention is to provide a drilling-machine of this character having means whereby the power of the motor is directly applied to the drilling-tool without the employment of any intermediate connections which are liable to become loose.

Further objects of the invention are the production of a drilling-machine which is capable of drilling in any direction without changing the standard and having means whereby the advancement of the motor and drill is easily controlled by the operator in a manner which will enable the hand which he uses for controlling the advancement to readily feel the character of the rock or ore which is being operated upon and to vary the feed accordingly.

To these ends the invention consists in the construction and the combination of parts substantially as hereinafter described and claimed.

Of the accompanying drawings, forming a part of this specification, Figure 1 is a side elevation representing my invention in a preferred form of its embodiment. Fig. 2 represents an end elevation looking from the right of Fig. 1. Fig. 3 represents a plan view of the machine.

The same reference characters indicate the same parts in all the figures.

A standard of an ordinary type is represented at 10, said standard having a foot 11 and a ratchet mechanism for adjusting the length of the standard when the same is to be employed in a tunnel or mine-shaft. Said ratchet mechanism is represented as a whole at 12 and being of an ordinary type is not illustrated in detail.

A sleeve 13 is mounted upon the standard 10 and provided with means, such as set-screws, whereby it may be vertically adjusted on said standard. Pivotally connected with one side of the sleeve 13 is a bearing 14, through which bearing the combined motor and drill support and feed-bar 15 extends. The said combined support and bar is provided with rack-teeth 16, engaged by a pinion 17, supported in ears of the bearing 14. The shaft 18 of said pinion has one or both ends squared, whereby a wrench or lever may be connected with either end of the shaft to rotate the pinion and cause the bar 15 to be advanced or retracted. Such wrench or lever will of course be operated by hand.

Mounted upon the forward end of the bar 15 is the casing of a motor 19, to which power is supplied at 20. The power-supply connection 20 is flexible, and in the case of the motor being designed to be run by compressed air said connection 20 will be an air-pipe. If the motor be an electric one, the connection 20 will be a cable for the feed-wires. To the shaft 21 of the motor the drill 22 is directly connected by any suitable means commonly employed for securing a rotary tool rigidly to its driving-shaft. Whether the motor be actuated by steam, electricity, or compressed air the connection between it and the drill is direct and without the aid of any intermediary. If the motor be electric, the shaft 21 would be the armature-shaft. With such rigid connection it is particularly advantageous to employ a feed which shall be elastic or yielding to the highest degree and which will enable the operator to so quickly determine the nature of the rock that he can regulate or control the feed to cause the drill-tool to advance just as fast as the nature of the rock will permit. The rack and pinion described and the means whereby the pinion

is operated by hand not only renders the machine a sensitive one—that is, one which enables the operator to practically feel the character of the rock—but the said type of feed device provides ample strength for operativeness, and yet enables the highest possible speed of drilling to be obtained. In fact, with this feed device and the motor carried by the feed-bar a much higher speed can be obtained than by a screw motion. Moreover, the arrangement is simpler and more direct acting than a screw motion or a system of levers, and the drilling-tool may be withdrawn from the finished hole in the quickest possible time.

A further advantage possessed by this machine is that when any adjustment is to be made relatively to the standard, either as to the height or the inclination of the drilling-tool, no separate adjustment need be made regarding the motor, for the motor itself is mounted on and carried by the feed-bar and necessarily changes its position when the height or angle of inclination of the feed-bar and drill are varied. The direct connection of the drilling-tool with its driving-shaft results in economy in the consumption of power. For example, it is a well-known fact that one-half of the power used in operating a percussive drill is lost, as it is employed solely for the purpose of withdrawing the drill from the hole after the stroke, whereas with the rotary motor all of the power is employed in turning the drill and continually cutting the material. A further advantage in the structure resides in the extremely simple arrangement of the parts and the absence of all intermediaries and the total independence of the feed-motion relatively to the motive force employed in boring.

A further and particular advantage in the use of this drilling-machine is that a high speed of boring can be obtained, for the reason that whenever the drill reaches comparatively soft material the operator knows it at once through the feeling imparted to his hand bearing on the wrench or lever which controls the rotation of the pinion to advance the tool, and he can therefore immediately accelerate the feed. On the other hand, if relatively hard material is reached the operator knows it by the resistance felt, and he can then ease up on the feed, so as to run no risk of breaking the drilling-tool.

I claim—

1. A machine of the character described, comprising a motor, and a rotary drill directly connected to the shaft of the motor, a supporting-bar for said motor and drill, a standard for said supporting-bar, said bar having rack-teeth, and a manually-operable pinion engaging said rack-teeth for controlling the movements of said bar, motor, and drill, relatively to said standard.

2. A machine of the character described, comprising a standard, a sleeve adjustable thereon, a bearing pivotally connected with said sleeve, a bar fitted to said bearing and having rack-teeth, a pinion engaging said rack-teeth and means for manually operating the pinion, a motor supported by said bar, and a drill directly connected with the shaft of the motor.

In testimony whereof I have affixed my signature in presence of two witnesses.

ALBERT FRANÇOIS.

Witnesses:
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