

March 5, 1935.

J. C. CURTIS

1,993,502

TOOL RETAINER

Filed Oct. 12, 1932

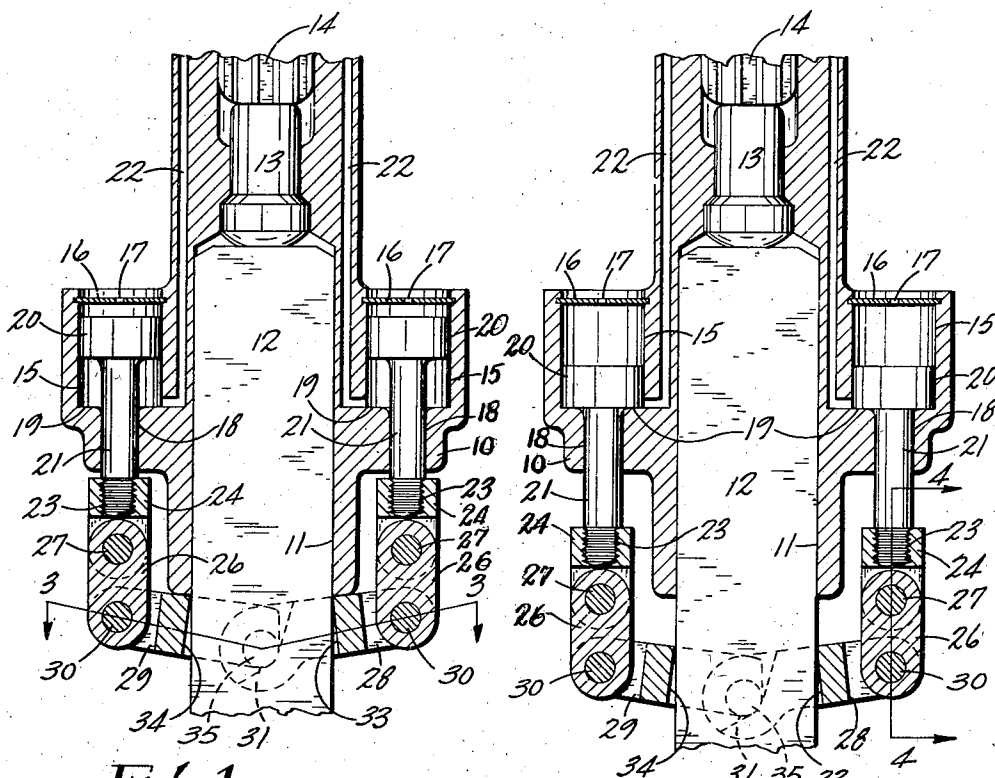


Fig. 1

Fig. 2

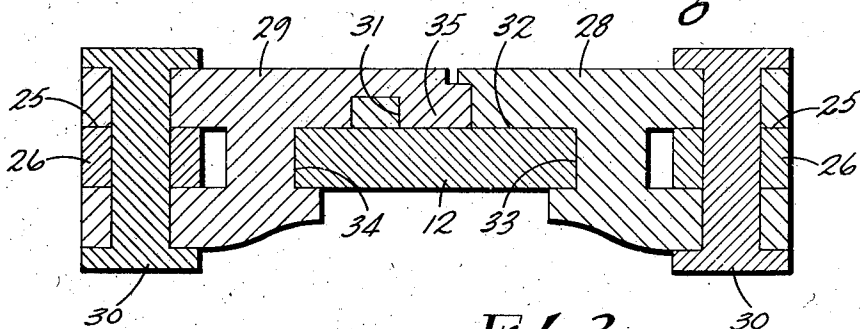


Fig. 3

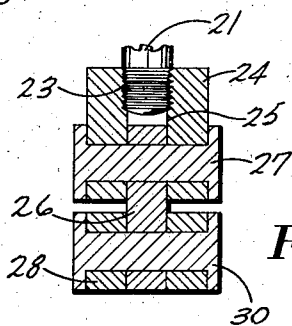


Fig. 4

JOHN C. CURTIS
INVENTOR

BY John E. Remy

ATTORNEY

UNITED STATES PATENT OFFICE

1,993,502

TOOL RETAINER

John C. Curtis, Cleveland, Ohio, assignor to The
Cleveland Rock Drill Company, Cleveland,
Ohio, a corporation of Ohio

Application October 12, 1932, Serial No. 637,417

5 Claims. (Cl. 121—32)

This invention pertains broadly to rock drills, but is more particularly concerned with tool retaining device for fluid actuated rock broaching machine of the drifter type.

In quarrying certain types of rock, it has been found desirable to drill a line of holes, leaving a narrow wall of material between the adjacent holes. Subsequently the narrow walls left between the drilled holes are cut away with a broach. As a matter of economy this broach is generally made of flat stock steel of different lengths, with one end thereof introduced into the front housing of the machine. That end of the broach is properly heat treated to resist the impact of the working piston, while the other end of the broach is shaped with a curved cutting edge capable of engagement with the narrow walls of the rock. This broach being manufactured out of flat bar stock and consequently formed with smooth parallel surfaces, it has been difficult to provide any devices which would successfully prevent the accidental removal of the broach from the machine.

One of the objects of this invention is therefore to provide a broaching machine with a tool retainer capable of engagement with the smooth surfaces of the broach for preventing its accidental disengagement from the machine.

Another object of this invention is to construct a tool retainer for rock drill with pressure fluid actuating means effecting a powerful clamping action of the retainer on the tool, thus preventing the accidental removal of the latter from the machine under the most adverse conditions.

Another object of this invention is to provide a fluid actuated broaching machine with a tool or broach retainer of simple construction and economic of manufacture.

Other objects of this invention will be apparent from the following detailed description wherein similar characters of reference designate corresponding parts and wherein:

In the drawing which illustrates a preferred embodiment of the invention.

Fig. 1 is an elevational sectional view of the front end of a rock drill illustrating the retainer in one operative position.

Fig. 2 is a view similar to Fig. 1 illustrating the retainer in another operative position.

Fig. 3 is a cross sectional view taken in a plane indicated by line 3—3 in Fig. 1.

Fig. 4 is a cross sectional view taken in a plane indicated by line 4—4 in Fig. 1.

Referring to the drawing in which like symbols designate corresponding parts throughout

the several views, 10 represents the front housing of a rock drill. This housing is formed with a rectangular bore 11, within which there is slidably mounted the end or shank of a corresponding rectangular broach 12. The penetration of the broach within its housing is limited by a tappet 13, located within the housing 10 in such a manner as to transmit the blows of the working piston 14 of the machine to the broach 12.

The housing 10 is formed with diametrically opposed restricted cylinders 15, being terminated in one direction by a plug 16 provided with a restricted aperture 17. The other ends of the cylinders are provided with a restricted bore 18 forming at the intersection with the main cylinder bore 15, a shoulder 19. Reciprocably mounted within each of the cylinders 15 in fluid tight engagement therewith, there is a piston 20 formed with a stem 21 extending to the outside through the bore 18. Opening into each of the cylinders 15 adjacent the shoulder 19, there is a small pressure fluid passage 22, in communication with a pressure fluid source of supply.

The end of the stems 18 are threaded as at 23 to receive, in screw tight engagement therewith, the nuts 24. These nuts are formed with a slot 25 having pivotally therein, one end of the links 26, secured to the nut by means of pins 27. The other end of the links 26 are properly machined to pivotally receive one end of a yoke 28 and 29, secured thereto by means of pins 30. The other end of the yoke 28 is provided with a transversally disposed aperture 31 capable of pivotally receive the corresponding end of the yoke 29 which is formed with a trunnion-like portion 35. These two yokes are properly machined to constitute a rectangular slot 32 of a length somewhat greater than the width of the broach 12. The two yokes 28 and 29 being pivotally attached to each other permit the narrow sides 33 and 34, of the slot 32, to move toward or away from each other.

When the yokes 28 and 29 are attached to the links 26, the slot 32 is located in axial alignment with the central axis of the machine, thus the broach 12 is free to slide through the slot 32 when the yokes 28 and 29 are positioned to permit the maximum length of the slot 32.

In the operation of the mechanism, assuming the parts to be positioned as illustrated in Fig. 2, the weight of the portion of the yokes 28 and 29 extending inwardly from the point where they are pivotally affixed to the links 26, will be suffi-

cient to effect the engagement of the jaws 33 and 34 with the broach 12. During the longitudinal movement of the broach away from the front housing 10, the frictional engagement of the jaws 33 and 34 with the broach will be sufficient to impart a downward motion to the yokes 28 and 29 and afford the clamping of these jaws on the broach, thus preventing, during the normal operation of the machine, the accidental disengagement of the broach from the front housing.

When it is desired to increase such clamping action, the pressure fluid may be admitted into the cylinders 15 through the passages 22 to actuate the pistons 20 away from the shoulders 19. Any pressure fluid leaking into the upper ends of the cylinders 15, will immediately exhaust to the atmosphere through the restricted orifices 17. The upward strokes of the pistons 20 are limited by the engagement of the upper faces of the yokes 28 and 29 with the extreme front end of the front housing 10. The outside ends of these yokes being moved upwardly by the pistons 20 will cause the jaws or side walls 33 and 34 of the slot 32 to move inwardly, affording thereby an effective clamping action of these jaws on the broach 12.

When it is desired to withdraw the broach 12 from the front housing 10, the pressure fluid admitted into the cylinders 15 may be shut off. Subsequently manual pressure may be applied to the yokes 28 and 29 at the point of attachment with each other, thus elevating the yokes toward the front housing and consequently affording the movement of the jaws 33 and 34 away from the broach 12, permitting thereby the removal of the latter from its housing.

I claim:

1. In a fluid actuated machine, the combination of a front housing having a tool slidable therein, a tool retainer comprising a yoke supported by said housing and capable of clamping engagement with said tool, and a fluid actuated member reciprocally mounted within said front housing and connected to said yoke, the stroke in one direction of said member being limited by the engagement of said yoke with said front housing, effecting thereby the clamping engagement of said yoke with said tool.

2. In a fluid actuated machine, the combina-

tion of a front housing having a tool slidable therein, a duality of diametrically opposed cylinders within said front housing, a piston within each of said cylinders, a yoke formed with two members pivotally attached to each other and connected to said pistons, an opening within said yoke through which said tool may slide, the edge of said opening being capable of clamping engagement with said tool, said members being engageable with said front housing to limit the stroke of said pistons in one direction, and means for admitting pressure fluid into said cylinders to actuate said pistons and effect the clamping action of said edges on said tool responsive to the engagement of said members with said housing.

3. In a fluid actuated machine, the combination of a front housing having a tool slidable therein, a tool retainer supported by said front housing being formed with an opening through which said tool may slide, said opening forming diametrically opposed edges movable away from or toward each other, and fluid operated connecting means from said retainer to said housing adapted to actuate said retainer toward said housing for engagement therewith, effecting thereby the movement of said diametrically opposed edges toward each other for clamping said tool.

4. In a fluid actuated machine, the combination of a front housing having a tool slidable therein, a tool retainer comprising two members pivotally connected to each other and capable of clamping engagement with said tool, the free end of said members extending laterally from said tool, a connection from said free end to said housing, and fluid actuated means included in said connection movable toward said housing to effect the clamping engagement of said members.

5. In a fluid actuated machine, the combination of a front housing, a tool slidable therein, a retainer for said tool comprising a pair of jaws depending from said housing, said jaws being movable in clamping engagement with said tool, a connection between said retainer and said housing, and power actuated means included in said connection for actuating said jaws in clamping engagement with said tool.

JOHN C. CURTIS.