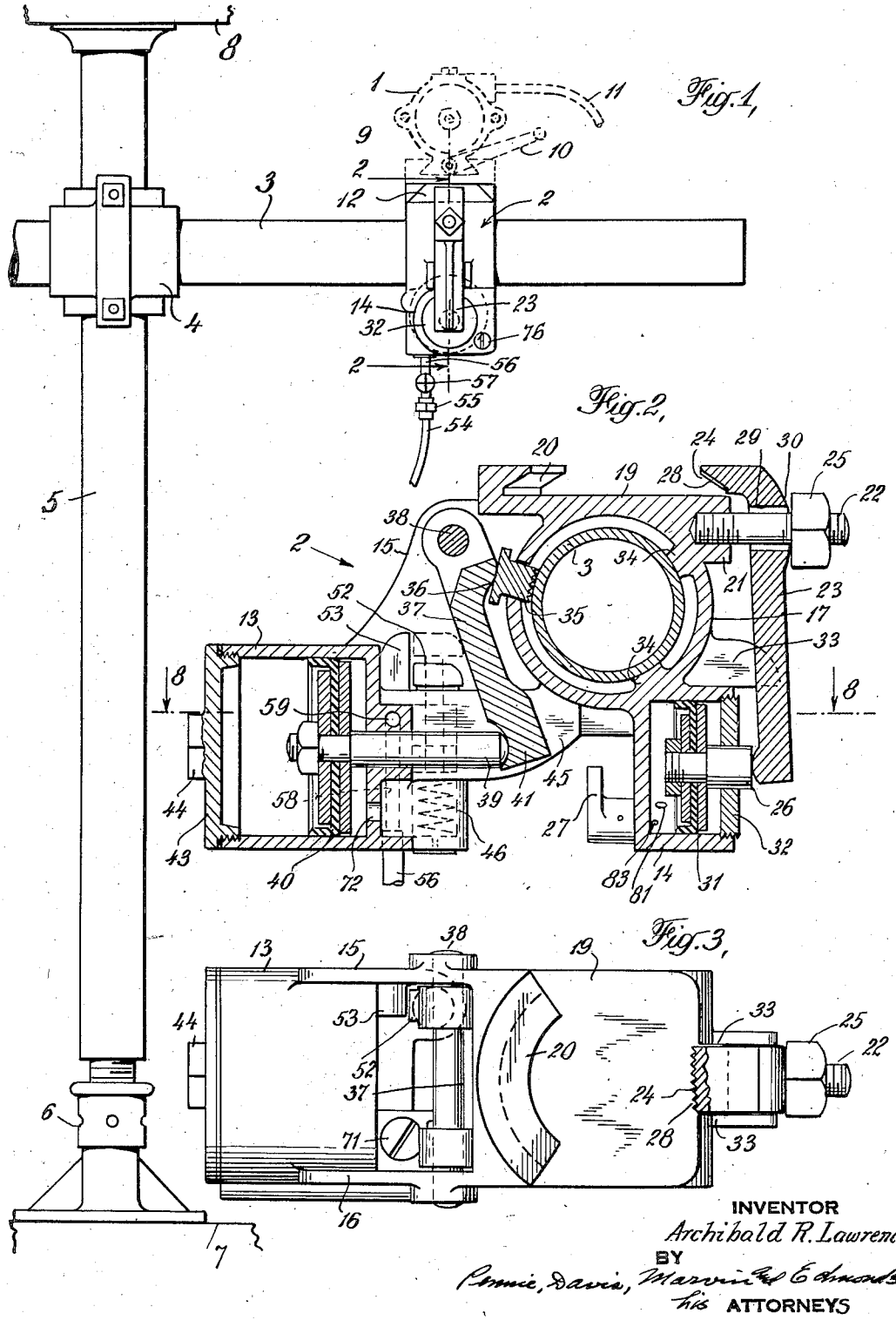
April 7, 1936. A. R. LAWRENCE 2,036,483

DRILLING MACHINE CLAMP

Filed Aug. 14, 1934 4 Sheets-Sheet 1



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DRILLING MACHINE CLAMP

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Fig. 4,

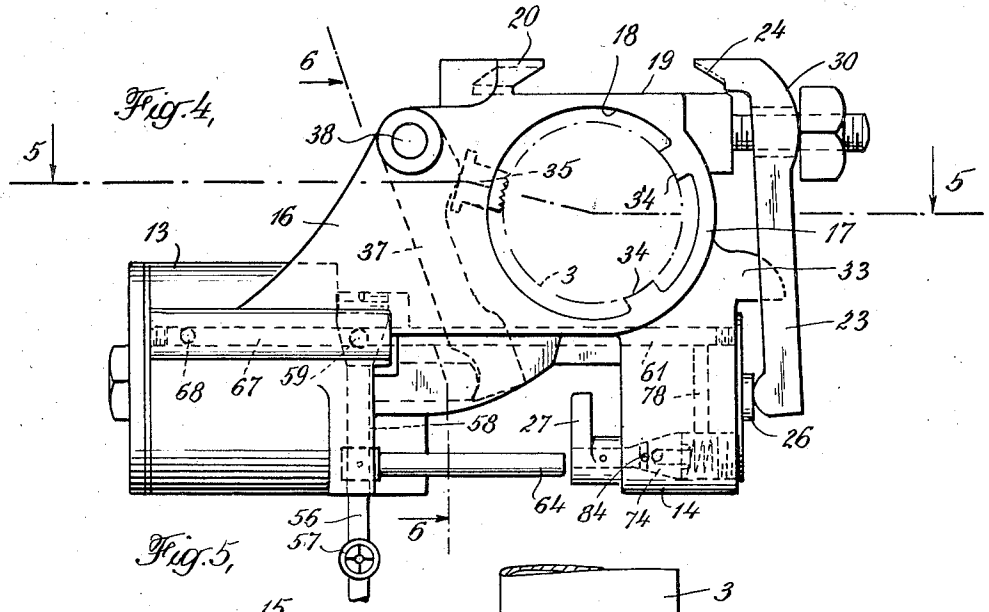


Fig. 5,

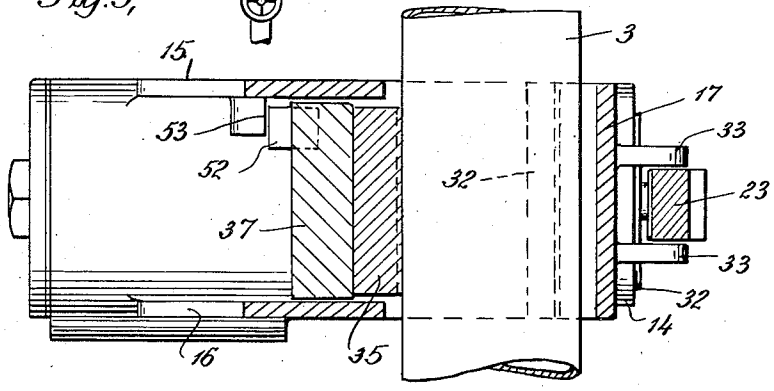
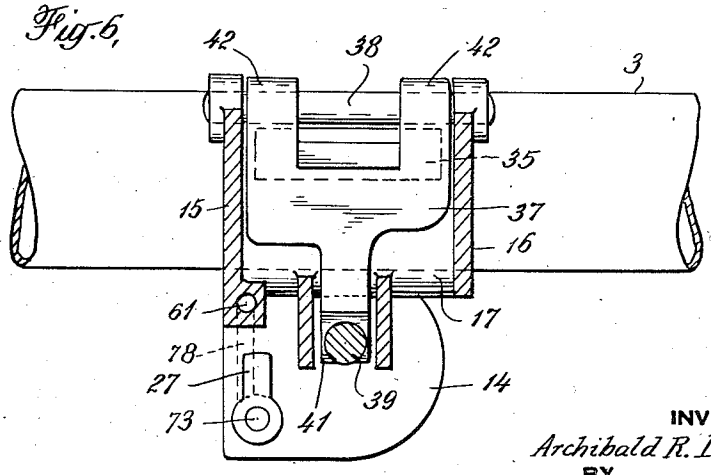


Fig. 6,



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Fig. 7,

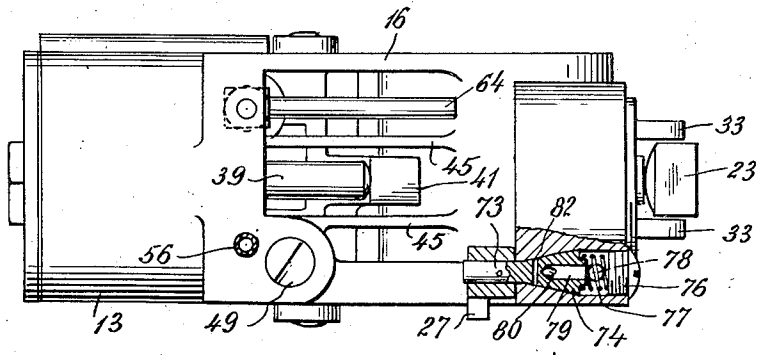


Fig. 8,

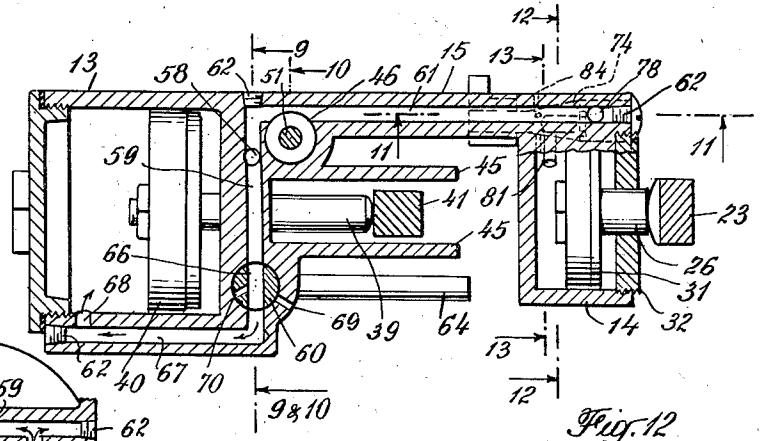


Fig. 9,

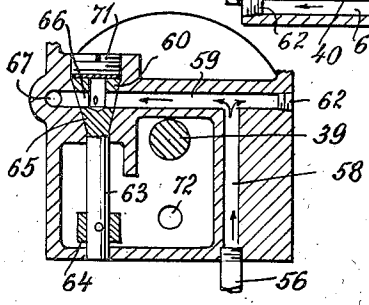


Fig. 12

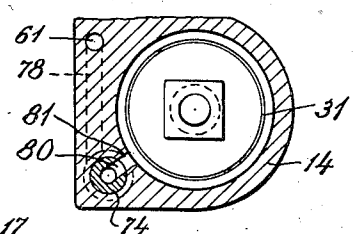


Fig. 10,

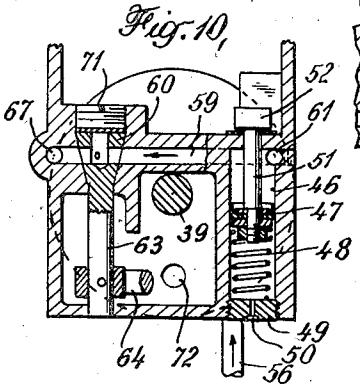


Fig. 11,

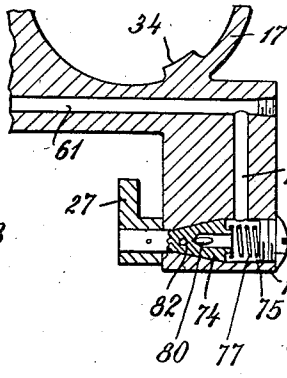
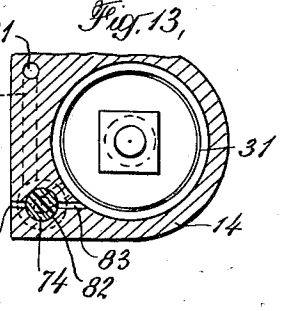


Fig. 13,



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Fig. 14,

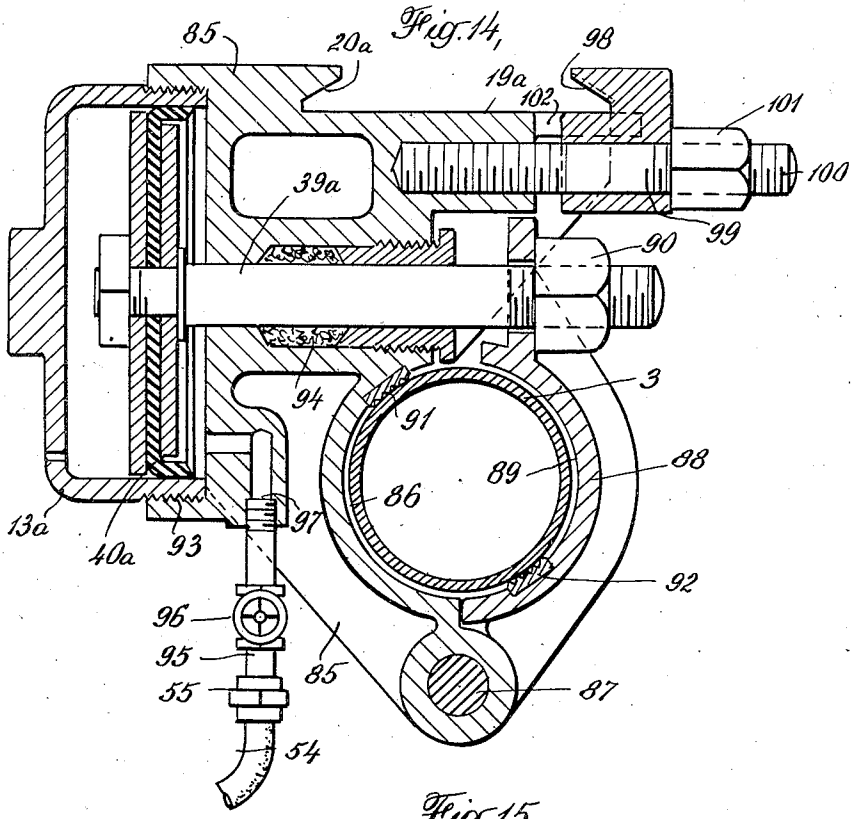
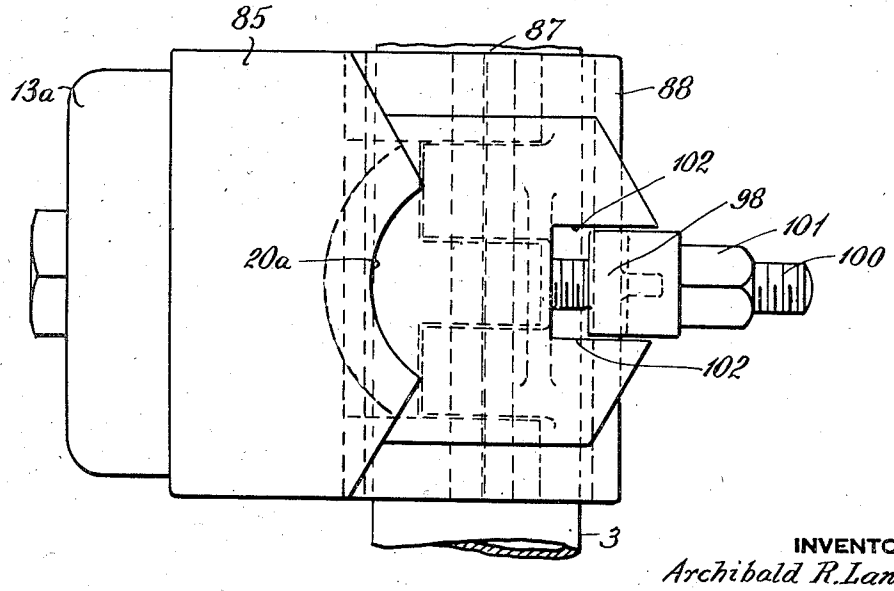


Fig. 15,



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Patented Apr. 7, 1936

2,036,483

UNITED STATES PATENT OFFICE

2,036,483

DRILLING MACHINE CLAMP

Archibald R. Lawrence, Montreal, Quebec, Canada

Application August 14, 1934, Serial No. 739,753

25 Claims. (Cl. 255—51)

This invention relates to supporting devices for supporting drilling machines, or rock drills, such as are used in mines for the purpose of drilling holes in rock or other earth formations to facilitate the employment of explosives used in breaking up such material, or otherwise.

Such drilling machines must be firmly supported while in operation to permit drilling effectively. It is customary to support drilling machines of the drifter type on a cross arm which is attached to a column, or stoping bar. The column consists usually of a pipe about 3½ inches in diameter which is set up in proximity to the face to be drilled and is generally secured in place by means of a jack screw at one end of the column which forces the opposite ends of the column respectively against the floor and ceiling adjacent the face to be drilled. The cross arm is usually a short length of pipe about the same size and is attached to the column at right angles by means of a suitable collar, or coupling. The drilling machine is mounted on this cross arm by means of a "clamp". The clamp is secured to the cross arm usually by means of two bolts, and the drilling machine is secured to the clamp by means of another bolt. A special extra long wrench is used for tightening and loosening the nuts on these bolts.

In the ordinary course of drilling, the drilling machine has to be shifted frequently in order to drive the holes at the desired locations, and the amount of labor involved in shifting the clamp horizontally on the cross arm and in changing the angular position of the drilling machine both in the vertical and the horizontal plane, is very considerable as it requires great physical strength both to loosen and tighten the nuts, and considerable time is consumed in this work. The general practice is to provide the operator with a helper whose principal work consists in handling the wrench.

Inasmuch as the direction of the resultant of the forces applied to the supporting device during the operation of the drilling machine is transverse to the longitudinal center line of the cross arm and applied to the supporting device above or below the cross arm, the supporting device must be provided with means for gripping the cross arm sufficient to prevent slipping of the supporting device which would allow it to rotate about the cross arm. The moment of forces tending to "overturn" the supporting device, that is, to turn it, about the cross arm can be tremendous in certain positions of operation, as, for instance, when the drilling machine is retracted to the rear of the carriage.

To effectively resist such tremendous overturning moment the supporting device must grip the cross arm with a pressure of the order of 10,000 pounds per square inch. To obtain such clamping pressure, utilizing the fluid pressure ordinarily available, such as the pressure of the water or compressed air used in mines in connection with rock drilling which is about 80 pounds per square inch, and at the same time to avoid the use of large, cumbersome operating cylinders, and keep the weight of the supporting device and its dimensions commensurate with the size of the drilling machine itself, presents a considerable problem, and the provision of such a supporting device is the object of the present invention.

A further object of the invention is to provide a fluid pressure operated supporting device for drilling machines which is capable of producing ample clamping pressure both for holding the device upon the cross arm, and for holding the drilling machine against swinging, without rendering the device cumbersome and difficult to handle, and also without restricting the range of drilling of the drilling machine.

Another object of the invention is to provide a fluid pressure operated supporting device for drilling machines in which failure of the supply of fluid pressure will not cause the device to release its hold on the cross arm.

My invention is illustrated by way of example in the accompanying drawings which show two embodiments of the invention, and the invention will be understood by referring to these drawings in connection with the following detailed description. In these drawings:

Fig. 1 represents a view in elevation of a column and cross arm with a drilling machine supported thereon by my improved supporting device or clamp, the drilling machine and clamp being shown in end view;

Fig. 2 represents a view of the clamp in central vertical section taken on line 2—2 of Fig. 1;

Fig. 3 represents a top view of the clamp;

Fig. 4 represents a view of the clamp in side elevation;

Fig. 5 represents a sectional view of the clamp taken on the planes represented by the broken line 5—5 of Fig. 4.

Fig. 6 represents a sectional view of the clamp taken on the planes represented by the broken line 6—6 of Fig. 4;

Fig. 7 represents a bottom view of the clamp with a fragment broken away and shown in sec-

tion to illustrate one of the fluid control valves;

Fig. 8 represents a horizontal sectional view taken on the plane represented by line 8—8 of Fig. 2;

Figs. 9 to 13 inclusive are fragmentary sectional views taken on the several planes indicated in Fig. 8 for the purpose of showing the fluid passageways, Fig. 10, however, showing also a safety feature;

Fig. 14 represents a view in vertical central section of a modified form of my improved supporting device; and

Fig. 15 is a top view of the modification shown in Fig. 14.

Referring now to the accompanying drawings, Fig. 1 illustrates a fluid actuated percussive drill 1 mounted upon my improved supporting device 2, which, in turn, is carried upon a cross arm 3 consisting of a short length of pipe. Cross arm 3 is attached by means of a collar, or coupling 4 to a vertical column, or stoping bar 5 which is set up near the face of the formation which it is desired to drill. Column 5 is held in place by means of a jack screw 6 at its lower end, which forces the foot of the column against the floor 7 and the head of the column against the ceiling 8.

The drilling machine 1 has a carriage 9 along which it is advanced by means of the feeding handle 10 as the depth of the hole increases. These drills are usually operated either by air or water under pressure and in the present instance, drill 1 is supplied with compressed air through hose 11. The carriage 9 of the drilling machine has at its bottom a conical base 12, this being the standard way of providing for the attachment of such drilling machines to their supports.

My improved supporting device, or clamp comprises a pair of fluid pressure cylinders, 13 and 14 adapted respectively to actuate mechanism for securing the supporting device upon cross arm 3, and for securing the drilling machine to the supporting device, as will be hereinafter described in detail. These cylinders are placed approximately in line with one another, though spaced apart, as shown in Figs. 2 and 4 and are mechanically connected by means of two thin parallel plates 15 and 16. Cylinder 14 is somewhat smaller than cylinder 13, but both are of the same order of size as the diameter of the cross arm 3.

The two plates 15 and 16 extend upwardly above cylinders 13 and 14 a sufficient distance to accommodate a transverse member 17, preferably of cylindrical form, which has an aperture 18 therethrough to accommodate the supporting arm 3. Directly above member 17 is a platform 19 upon which is received the bottom of conical base 12 of the drilling machine 1. These parts, namely cylinders 13, 14 plates 15, 16, member 17 and platform 19 are preferably made integral by casting them all in one piece, but if desired, they may be made as a composite structure in whole or in part and be suitably secured to one another by means of welding, or otherwise.

Platform 19 is provided at the left as viewed in Figs. 2, 3 and 4 with a projection having a shoulder 20 sloped and curved to conform with the conical surface of conical base 12 of the drilling machine 1. Opposite shoulder 20 and threaded into a boss 21 formed on member 17 is a stud bolt 22 which carries a swing lever 23. The upper end of swing lever 23 is turned horizontally and provided with a shoulder 24 adapted to coact with shoulder 20 in securing the conical base 12 of the drilling machine to platform 19.

Swing lever 23 is arranged to pivot for a limited swinging movement in a vertical plane about stud 22, being held thereon by means of nut 25. The lower portion of swing lever 23 extends well below the cross arm 3 and is acted upon by the piston rod 26 of air cylinder 14.

The admission and release of compressed air to the cylinder 14 is controlled by means of a valve handle 27, and in operating the device to clamp the conical base 12 of the drilling machine so as to hold the machine in position for drilling, the nut 25 is first turned by the fingers so as to bring shoulder 24 lightly against the side of the conical base 12. The threads of nut 25 and bolt 22 are loosely fitted so that nut 25 can be easily turned by hand to initially place the shoulder, or jaw 24 in clamping position. The valve handle 27 is then moved to the position shown in Fig. 2 which, through connections to be later described, causes air to be admitted to cylinder 14 and forces piston rod 26 and the lower end of swing lever 23 outwardly, thereby causing the upper end of lever 23 carrying shoulder 24 to move into clamping engagement with the conical surface of conical base 12.

The movement of valve handle 27 to a position approximately at right angles to that shown in Fig. 2 cuts off the supply of air to cylinder 14 and places the cylinder in communication with the atmosphere, thereby releasing the clamping mechanism.

In view of the adjustment of shoulder 24 into initial clamping position by means of nut 25 before applying the air pressure, only a small relative motion between shoulder 24, shoulder 20 and platform 19 is required in order to firmly clamp the drilling machine in place. On account of the fact that shoulder 24 is located close to the bolt 22, and the piston rod 26 applies its force to swing lever 23 at a considerable distance from bolt 22, adequate clamping pressure against the conical base 12 is obtained with the use of a comparatively small cylinder. These are important considerations from the standpoint of lightness of weight and facility of handling.

It will be understood that the length of curved shoulder 20 is sufficient when shoulder 24 is in even loose engagement with conical base 12, to prevent sidewise movement of base 12 and to hold the drilling machine upon the supporting device 2. With the parts loose, the drill can of course be swung in a horizontal plane as desired. In order to insure that the drilling machine cannot turn upon platform 19 while the machine is in operation, the face of shoulder 24 is provided with a plurality of teeth 28 which provide a surer grip upon the surface of conical base 12 than if the shoulder 24 was smooth.

Swing lever 23 is pivoted on bolt 22 by means of the aperture 29 and the curved surfaces 30 which rock on the inner face of nut 25, thereby reducing friction and increasing the effective clamping pressure. Bolt 22 is of sufficient length to permit the device to accommodate conical bases 12 of different size.

The piston 31 of cylinder 14 may be made in any suitable manner, but preferably consists of a cup shaped leather washer clamped between two metal plates on piston rod 26 as shown. Cylinder 14 is closed at its outer end by means of a head, or cap 32 which is threaded internally into cylinder 14 so as to reduce the number of projecting parts tending to catch on various objects during the use of the device. The lower

end of swing bar 23 is preferably provided with a rounded lug as shown for coacting with the end of piston rod 26, the lower portion of the swing lever being guided between two ears 33 projecting outwardly from member 17 as shown in Figs. 2, 4 and 5.

The supporting device 2 is held in position on the arm 3 by means of a pair of narrow fixed lugs 34 extending inwardly from the inner surface of member 17 and by means of a radially movable narrow toothed jaw, or gripper 35 preferably of hardened steel, which is moved inwardly by means of a cam 36 on a lever 37 which is pivoted by means of a rod 38 between the plates 15 and 16. The lever 37 is moved by means of a piston rod 39 and its coacting piston 40 located within fluid pressure cylinder 13. Lugs 34 and toothed jaw 35 extend laterally parallel with the axis of cross arm 3 for a distance equal to the spacing between plates 15 and 16 as shown in Fig. 5.

In the embodiment of the invention here illustrated, the clamping, or gripping action on cross arm 3 is, therefore, provided at three points spaced about 120° apart, the faces of lugs 34 and toothed jaw 35 being relatively narrow so as to increase the pressure per square inch exerted by them against the surface of cross arm 3.

Cam 36 extends the full length of toothed jaw 35 so as to support the jaw throughout its entire length, and the piston rod 39 engages the center of lever 37, an extension 41 being provided for this purpose as shown in Fig. 6. Lever 37 pivots on rod 38 by means of ears 42 one at each side. Toothed jaw 35 slides loosely in a rectangular aperture extending through the wall of member 17 and the jaw is provided with a head as indicated, to retain it within this aperture.

The extremely large clamping pressure required to hold the supporting device upon arm 3 during the operation of the drilling machine is provided without using a working cylinder of prohibitive diameter and weight by multiplying the force exerted by piston 40 of cylinder 13 by means of lever 37 and cam 36. The multiplication of pressure is caused not only by the fact that the cam 36 is closer to pivot rod 38 than piston rod 39, but also because of the wedging or cam action of cam 36 as it moves over the surface of the head of toothed jaw 35. That is to say, the extremely small radial movement of toothed jaw 35 necessary for clamping is produced by means of a cam, or wedge operating upon the outer surface of the toothed jaw, this wedge, or cam being actuated by means of a comparatively long lever 37. In this way, there is enormous multiplication of the force exerted by piston rod 39 as will be readily appreciated by considering the small movement of toothed jaw 35 in comparison with the length of stroke of piston 40.

Piston 40, like the piston of cylinder 14, may be of any suitable construction, but preferably consists of a cup shaped flexible washer held between two metal discs by means of a nut on the end of piston rod 39 as shown in the drawings. The outer end of cylinder 13 is closed by means of a head, or cap, 43 which is threaded into the interior of the cylinder and preferably made flush with the outside diameter of the cylinder. Head 43 is provided with a square projection 44 for the application of a wrench for placing and removing the head.

In order to take the reaction of the thrust of piston rod 39, a pair of thin, narrow struts 45 are cast integrally with the inner end of cylinder 13, one on each side of the piston rod 39, and these struts extend inwardly and join the central portion of the lower wall of member 17. These struts also serve to protect the operator's fingers from being jammed in the mechanism while manipulating the valve handles 27 and 64.

As the weight of the drilling machine 1 is usually unbalanced on the axis of supporting arm 3, it is important to provide means for maintaining the supporting device 2 in clamped relation to arm 3 should the supply of pressure fluid fail. This is accomplished by mechanism which is shown in Figs. 2 and 10. Referring first to Fig. 10, a third fluid pressure cylinder 46 of small diameter is provided having a piston 47 which is urged downwardly by the pressure fluid against helical spring 48 placed beneath the piston and bearing at its lower end on a closing cap 49 for the cylinder. A vent 50 is provided in this cap to permit the ready egress and ingress of air out of and into the space below piston 47.

A piston rod 51 extends upwardly from the piston 47 and terminates in an enlarged head 52 which moves vertically in the space between the straight or left hand side of lever 37 as viewed in Fig. 2 and a vertical shoulder 53 formed by a lug on the inner side of plate 15. Under normal conditions, that is to say, when fluid pressure is supplied to the supporting device, it is admitted above piston 47, thereby compressing spring 48 and holding head 52 in its lowermost position as shown in Fig. 10, and in full lines in Fig. 2. In this position, lever 37 is free to move by the application or release of fluid pressure from cylinder 13. Should the fluid pressure supply fail, however, spring 48 will force piston 47 and head 52 upwardly into the dotted position shown in Fig. 2, and assuming that the toothed jaw 35 was in engagement with cross arm 3, when the pressure supply failed, the toothed jaw will be held in this position by the wedging action of head 52 between shoulder 53 and lever 37.

The fluid passageways and valves of the supporting device will now be described. All these passageways are preferably cored, or drilled in the body or frame of the device so that there are no external pipes to be damaged by mechanical injury. These passages are shown more particularly in Figs. 8 to 13 inclusive and Fig. 4. In the present embodiment, air under pressure is supplied through a hose 54 (see Fig. 1) which is connected to the same supply line as hose 11 for the rock drill 1. Hose 54 is connected by means of union 55 to a short length of pipe 56 in which there may be placed a cut off valve 57 if desired, pipe 56 being threaded into the lower end of a vertical passageway 58 shown in Figs. 4, 8 and 9.

Passageway 58 communicates at its upper end as shown in Fig. 9 with a horizontal passageway 59 extending crosswise of the supporting device as shown in Fig. 8. This passageway communicates at one end with an operating valve 60 which controls the admission and discharge of fluid to air cylinder 13 for operating the mechanism which clamps the device to cross arm 3. The opposite end of passageway 59 communicates with a passageway 61 which extends to the right hand end of the device and supplies fluid to the cylinder 14 for operating the mechanism which clamps conical base 12 of the drilling machine, as will be more fully described below. Side plate 15 is thickened at the bottom to accommodate

passageway 61 as shown in Fig. 8, and in the embodiment illustrated all of these various passageways are shown as having been drilled in the body of the device and consequently the ends of these passageways where the drill entered are closed by means of plugs 62.

Operating valve 60 for cylinder 13 is a conical member (Fig. 9) mounted upon the end of a rotary valve stem 63 and rotated by means of a handle 64 secured near the outer end of stem 63. Valve 60 is seated in a conical seat 65 provided in the body of the supporting device adjacent the inner end of cylinder 13. Valve 60 is provided with a through port 66 which in the open position of the valve is in alinement with passageway 59 and a similar passageway 67 on the opposite side of the valve member which is provided in the wall of cylinder 13 and which communicates by means of an opening 68 with the interior of cylinder 13 adjacent its outer end.

Valve 60 and valve handle 64 are shown in the drawings in the open position in which air is being supplied to cylinder 13 to clamp the device upon cross arm 3. When it is desired to release the device from cross arm 3, valve handle 64 is turned inwardly in the direction of the arrow shown in Fig. 8 by an angle of about 60°. This cuts off through-port 66 from supply passageway 59, brings the opposite end of through-port 66 into communication with a small exhaust port 69, and also moves a small port 70 in valve 60 to a position opposite passageway 67 so that the air within cylinder 13 can discharge therefrom through passageway 67, small port 70, the outer end of through-port 66 and exhaust port 69 to the atmosphere.

Valve 60 and its stem 63 are inserted and removed by removing a plug 71 which is threaded into a cylindrical opening at the outer end of conical valve seat 65. A passageway 72 to the atmosphere is provided in the front wall of cylinder 13 so that the movement of piston 40 will not be affected by air trapped on the right hand side of it.

The valve handle 27 for controlling the operation of air cylinder 14 which clamps the conical base 12 of the drilling machine, is attached to the stem 73 of a second conical valve 74 shown particularly in Figs. 7, 11 and 4 and located alongside of cylinder 14 near the bottom of the cylinder. The conical seat for valve 74 has a cylindrical base 75 at its right hand end which is closed by means of a screw plug 76, and a helical spring 77 is interposed between plug 76 and the end of valve 74 to maintain the valve against its seat. Air for operating cylinder 14 is admitted to valve 74 through passageway 78 from passageway 61, passageway 78 communicating with bore 75 beyond the end of valve 74. Valve 74 has an axial passage 79 which communicates at its end with a lateral passage 80 adapted, when the valve is in its open position as shown in Figs. 2, 4, 6, 8, 11, 12 and 13, to communicate with a port 81 opening into cylinder 14 as shown particularly in Fig. 12.

When valve 74 is moved to the position shown in Fig. 7 the air supply is cut off from cylinder 14 and the cylinder is exhausted to atmosphere so as to release the clamping action of swing lever 23. In order to accomplish this, the valve handle is swung through an angle of approximately 45° and this first of all cuts off lateral valve passage 80 from port 81, thereby cutting off the supply of air to cylinder 14. Then a small through lateral passage 82 in valve 74 is brought into alinement with similar small passageways 83 and 84, shown in Fig. 13, which places the interior of cylinder 14 in communication with the atmosphere.

Inasmuch as the valves 60 and 74 are so arranged that their operating handles 64 and 27, respectively, are within the space between the inner end of cylinders 13 and 14, these handles are projected to a large degree against mechanical injury during the operation or moving about of the drilling machine and clamp from place to place in the mine and elsewhere. Their location is also readily accessible to the operator in every position in which the clamp may be used.

Referring now to Figs. 14 and 15 of the accompanying drawings, there is here illustrated a modified form of my improved supporting device. In this form the frame 85 is provided at the top with a platform 19a for the conical base 12 of the drilling machine, and at the left hand side with a fluid pressure operated cylinder 13a provided with a piston 40a and a piston rod 39a. Directly beneath the piston rod 39a is a semicircular opening 86 and below this opening is a pivot pin 87 by means of which a swingable clamping member 88 is attached to frame 85. Member 88 is also provided with a semicircular opening 89 complementary to opening 86 on frame 85, these two openings adapting the supporting device to receive the cross arm 3.

The upper end of member 88 is apertured to loosely receive the outer end of piston rod 39a upon which a nut 90 is threaded and by means of which piston 40a is enabled to draw member 88 tightly about cross arm 3 to clamp the supporting device thereon.

A hardened steel toothed insert 91 is mounted in the upper portion of semicircular opening 86, this insert extending in length throughout the width of the supporting device and having its teeth projecting inwardly beyond the surface of opening 86. Diametrically opposite insert 91 is a second hardened steel insert 92 which preferably is placed near the bottom of swingable member 88 close to the pivot pin 87. Lug 92 has teeth projecting inwardly beyond the surface of semicircular opening 89 and this insert also extends in length throughout the width of the supporting device.

In operation, this form of supporting device is somewhat different from the supporting device shown and previously described in connection with Figs. 1 to 13 inclusive, the principal difference being that the nut 90 which turns readily on the end of piston rod 39a is screwed up by hand to bring inserts 92 and 91 into approximate contact with the surface of cross arm 3 to place the parts in initial clamping position. Then air is admitted to cylinder 13a to force inserts 92 and 91 into clamping relation with cross arm 3 so as to hold the drilling machine in operative position. This permits cylinder 13a to be constructed for a considerably shorter stroke than cylinder 13. As in the case of the device previously described, the pressure produced by piston 40a through the use of pivoted clamping member 88 is multiplied by placing insert 92 relatively close to pivot pin 87 and the pressure per square inch exerted by inserts 92 and 91 against the surface of cross arm 3 is increased by making the inserts 91 and 92 of relatively small area.

The details of construction of cylinder 13a are somewhat different from that of the cylinder 13. For example cylinder 13a, instead of being cast as a part of the frame 83 is a separate cup-

shaped stamping or casting and is threaded as indicated at 93 into a recess formed in frame 85. Inasmuch also as the fluid pressure is admitted to the inner or piston rod side of piston 40a, a gland, or stuffing box 94 is provided for piston rod 39a. The hose 54 from the air supply is connected through a union 55 to a short length of pipe 95 in which is a two way valve 96, and which at its upper end is screwed into the lower end of a cored passageway 97 which communicates with the interior of cylinder 13a.

Valve 96, it will be understood, is so constructed that in one position it permits air to flow from hose 84 into cylinder 13a, and in another position it cuts off this air supply and opens cylinder 13a to the atmosphere so as to release the air pressure from piston 40a.

In this modified form of supporting device, the conical base 12 of the drilling machine 1 is clamped upon platform 19a by hand instead of by automatic means. The drilling machine base 12 is held on platform 19a by means of a curved shoulder 20a similar to shoulder 20 shown in Figs. 2 and 3, and by means of a second shoulder 98 which is similar to shoulder 24 except that its lower portion is apertured at 99 to slide upon stud bolt 100, and it is moved into clamping position entirely by means of a nut 101 which is manipulated by a hand wrench in the usual manner. To prevent the part carrying shoulder 98 from falling out of position when it is loosened from the drilling machine base 12, this part is arranged to slide within a recess 102 formed in the edge of platform 19a.

In the form of construction shown in Fig. 2, the supporting arm 3 is gripped at three spaced points, whereas in the modification shown in Fig. 14 the arm is gripped at only two points. It will be understood that two point gripping may be employed in connection with the supporting device as shown in Fig. 3 and, vice versa, that three point gripping may be used with the device of Fig. 14.

These additional gripping points, lugs, or toothed inserts, may be placed either on the body or frame of the device of Fig. 14 or upon the pivoted clamping member 88. It is preferable, however, to place them on the body and provide only a single gripping point on member 88 located close to the pivot. For certain classes of work more than three gripping points may be employed, or the lugs 34, for example, of the device shown in Fig. 2 may be omitted and the clamping done by means of the toothed jaw 35 and the inner surface of member 17. Also for certain classes of work the teeth may be omitted from the gripper and/or the gripper may be comparatively wide. It will be understood that other changes, also, may be made within the scope of the appended claims.

Supporting devices constructed in accordance with my present invention have been successfully used in mines under actual drilling conditions. They are appreciated by the drilling machine operators because of the fact that they weigh substantially no more than the ordinary type of hand operated clamp, because they hold the drilling machine securely in place so that it is immovable during operation, because the clamping and unclamping operations are easily and quickly accomplished, and because they enable the drilling machine operators to drill a greater hole footage in a day than it is possible to drill with the hand-operated type of clamp.

I claim:

1. In a drilling machine supporting device, a frame, means for removably securing a drilling machine thereto, said device having an aperture adapting it to be received upon a supporting arm, clamping means associated with said aperture, a fluid pressure device, and force-multiplying mechanical means connecting the fluid pressure device and said clamping means thereby causing said clamping means to secure said supporting device upon the supporting arm.

2. In a drilling machine supporting device, a frame, means for removably securing a drilling machine thereto, said device having an aperture adapting it to be received upon a supporting arm, a single narrow faced gripping member arranged for radial movement to clamp said arm in said aperture, a fluid pressure device and force-multiplying mechanism connecting the fluid pressure device and said gripping member to actuate the same.

3. In a drilling machine supporting device, a frame, means for removably securing a drilling machine thereto, said frame having an aperture adapting the frame to be received upon a supporting arm, a pair of lugs projecting inwardly from the wall of said aperture, a single narrow faced movable gripping member opposite said lugs, a fluid pressure cylinder having a movable element, and a force-multiplying mechanism connecting said element and said gripping member to move the same toward said lugs and exert clamping pressure sufficient to secure said supporting device upon said arm.

4. In a drilling machine supporting device, a frame, means for removably securing a drilling machine thereto, said frame having an aperture adapting the frame to be received upon a supporting arm, a movable gripping member, guides for said member permitting radial motion thereof with respect to said aperture, a cam coacting with said gripping member to move the same in said guides, a fluid pressure cylinder having a movable element, and force-multiplying mechanism connecting said element and said cam to cause said gripping member to clampingly engage said supporting arm.

5. In a drilling machine supporting device, a frame, means for removably securing a drilling machine thereto, said frame having an aperture adapting the frame to be received upon a supporting arm, a movable gripping member, guides for said member permitting radial motion thereof with respect to said aperture, a lever pivoted adjacent said guides having a cam coacting with said gripping member, and a fluid pressure cylinder actuating said lever so that the force applied to said lever by said cylinder is multiplied sufficiently to cause the gripping member to secure said supporting device to said arm.

6. In a drilling machine supporting device, a frame having an aperture for receiving a cylindrical supporting arm, means for removably securing a drilling machine to said frame, a fluid pressure cylinder having a piston whose axis is at right angles to the axis of said aperture and spaced therefrom, a lever actuated by said piston and pivoted on the frame of the supporting device, a movable jaw projecting into said aperture, guiding means for permitting said jaw to move radially with respect to said aperture, and a cam on said lever close to the pivot thereof coacting with said jaw to force the same into clamping engagement with said arm.

7. In a drilling machine supporting device, a

frame for securing a drilling machine thereto, said frame having a curved recess adapted to partially surround a supporting arm, a member pivoted on said frame close to said recess and adapted to coact therewith in surrounding said supporting arm, said member having a single narrow toothed gripping portion, said gripping portion being the only part of said pivoted member to engage said arm, and a fluid pressure cylinder having a piston rod connected with said member on the opposite side of the supporting arm from said pivot whereby the force applied by said piston rod is multiplied sufficiently to cause said toothed portion to engage the supporting arm with sufficient pressure to hold the drilling machine in operative position.

8. In a drilling machine supporting device, fluid pressure operated mechanism for clamping said device in operative position upon a supporting arm, and fluid pressure responsive means for preventing the release of said clamping means in the event of failure of the pressure fluid supply.

9. In a drilling machine supporting device, clamping means for securing said device in operative position upon a supporting arm, a member movable by fluid pressure for actuating said clamping means, a locking device for locking said member in clamping position, means for urging said member toward locking position, and fluid pressure actuated means for holding said locking device out of locking position, whereby failure of the supply of fluid pressure is prevented from causing the clamping means to release its hold on the supporting arm.

10. A drilling machine supporting device having a platform for receiving the base of a drilling machine, fixed and movable jaws coacting with said base to clamp the base on said platform, a manually adjustable nut for placing said movable jaw in initial clamping position, and fluid pressure operated means for moving said jaw to final clamping position.

11. In a drilling machine supporting device having a platform for receiving the base of the drilling machine, a fixed jaw coacting with said base, a threaded projection at the side of said platform, an apertured lever loosely fitting upon said threaded projection, said lever having at its upper end a shoulder adapted to coact with the conical surface of said base, a nut on said threaded projection adapted to bring said shoulder into contact with said base, said lever having an extension on the opposite side of said threaded projection from said shoulder, and a fluid pressure cylinder having a piston coacting with said extension to force said shoulder into clamping engagement with said conical base.

12. A drilling machine supporting device comprising a pair of axially spaced fluid pressure cylinders arranged substantially in line with one another and connected by a structure comprising two spaced parallel plates and a member joining said plates having an aperture for receiving a cylindrical supporting arm, a platform above said member adapted to receive the base of a drilling machine, clamping means actuated by one of said fluid pressure cylinders for clampingly engaging said base, and clamping means actuated by the other of said fluid pressure cylinders for clampingly engaging said supporting arm.

13. A drilling machine supporting device comprising a pair of axially spaced fluid pressure cylinders arranged substantially in line with one another and connected by a structure comprising two spaced parallel plates and a member joining said plates having an aperture for receiving a cylindrical supporting arm, a platform above said member adapted to receive the base of a drilling machine, clamping means actuated by one of said fluid pressure cylinders for clampingly engaging said base, and clamping means actuated by the other of said fluid pressure cylinders for clampingly engaging said supporting arm, and valves for controlling said fluid pressure cylinders having handles operable within the space between said cylinders.

14. A drilling machine supporting device comprising a pair of axially spaced fluid pressure cylinders arranged substantially in line with one another and connected by a structure comprising two thin parallel plates adjacent the sides of said cylinders and a member joining said plates having an aperture for receiving a cylindrical supporting arm, means for clamping a drilling machine to the device, one of said cylinders having a piston rod adapted to exert clamping force in the direction of said member to clamp said device on the supporting arm, and a thin strut joining said member and the cylinder for said piston rod intermediate said side plates to take the reaction of said clamping force.

15. A driving machine supporting device comprising a member having an aperture for receiving a cylindrical supporting arm, a pair of axially spaced fluid pressure cylinders arranged substantially in line with one another and connected to said member, a platform above said member adapted to receive the base of a drilling machine, clamping means actuated by one of said fluid pressure cylinders for clampingly engaging said base, clamping means actuated by the other of said fluid pressure cylinders for clampingly engaging said supporting arm, and valves for controlling said fluid pressure cylinders having handles operable within the space between said cylinders.

16. A drilling machine supporting device having a platform for receiving the base of a drilling machine, fixed and movable jaws coacting with said base to clamp the base on said platform, manually adjustable means for placing said movable jaw in initial clamping position, and fluid pressure operated means for moving said jaw to final clamping position.

17. In a drilling machine supporting device, a frame, means for removably securing a drilling machine thereto, said frame having an aperture adapting the frame to be received upon a supporting arm, a gripping member movable to clamp said arm within said aperture, guides for said member, a lever pivoted on said frame adjacent said guides and adapted to actuate said gripping member, and a fluid pressure cylinder actuating said lever so that the force applied to said lever by said cylinder is multiplied sufficiently to cause the gripping member to secure said supporting device to said arm.

18. In a drilling machine supporting device, a frame, means for removably securing a drilling machine thereto, said frame having an aperture adapting the frame to be received upon a supporting arm, a lever pivoted on said frame, a gripping member movable to clamp said arm within said aperture, said member being actuated by said lever adjacent its pivot, and a fluid pressure cylinder coacting with the outer portion of said lever to actuate the same so that the force applied to said lever by said cylinder is multiplied sufficiently to cause the gripping member to secure said supporting device to said arm.

19. In a drilling machine supporting device, a frame having an aperture for receiving a cylindrical supporting arm, means for removably securing a drilling machine to said frame, a fluid pressure cylinder having a piston whose axis is at right angles to the axis of said aperture and spaced therefrom, a lever actuated by said piston and pivoted on the frame of the supporting device, a movable jaw projecting into said aperture to clamp said arm in said aperture, said lever coacting with said movable jaw close to the pivot of said lever to move said jaw into clamping engagement with said arm.

20. In a drilling machine supporting device, a frame having an aperture for receiving a cylindrical supporting arm, means for removably securing a drilling machine to said frame, a fluid pressure cylinder having a piston whose axis is at right angles to the axis of said aperture and spaced therefrom, a lever actuated by said piston and pivoted on said frame, a movable toothed jaw having the teeth thereof projecting into said aperture, a pair of lugs projecting inwardly from the wall of said aperture opposite said movable jaw, guiding means for permitting said jaw to move radially with respect to said aperture, and a cam on said lever close to the pivot thereof coacting with said movable jaw to move the same toward said lugs and exert clamping pressure sufficient to secure said supporting device upon said arm.

21. In a drilling machine supporting device, a frame structure, means for removably securing a drilling machine thereto, said frame structure including a member having an aperture for receiving a cylindrical supporting arm, a gripping member operable to clamp said arm within said aperture, a fluid pressure cylinder on said frame having a movable element, and force-multiplying mechanism connecting said element and said gripping member to move said gripping member into clamping engagement with the supporting arm.

22. In a drilling machine supporting device, a frame, means for removably securing a drilling machine thereto, said frame having an aperture adapting the frame to be received upon a supporting arm, a gripping member operable to clamp said arm within said aperture, a fluid pressure cylinder carried by the frame and having a movable element, and a lever pivoted on the frame connecting said element and said gripping member to cause the gripping member to clampingly engage the supporting arm.

23. In a drilling machine supporting device, a frame structure comprising two spaced plates and a member joining said plates having an aperture for receiving a cylindrical supporting arm, a platform above said member adapted to receive the base of a drilling machine, a fluid pressure cylinder carried by said spaced plates, a gripping member operable to clamp said arm within said aperture, a piston for the fluid pressure cylinder, and a lever pivoted between said plates for operatively connecting the piston with the gripping member to cause the same to clampingly engage the supporting arm.

24. A drilling machine supporting device having a frame comprising a pair of spaced parallel plates joined by a member having an aperture therein for receiving a cylindrical supporting arm, a platform above said member adapted to receive the base of a drilling machine, clamping means associated with said platform for securing the drilling machine thereto, a fluid pressure cylinder mounted between said plates and having its axis at right angles to the axis of the supporting arm aperture, a gripping member carried by the apertured member and arranged to be radially movable with respect to the supporting arm, and force-multiplying mechanism carried by said frame for causing the gripping member to be moved by the fluid pressure cylinder into clamping engagement with the supporting arm.

25. A drilling machine supporting device having a frame comprising a pair of spaced parallel plates joined by a member having an aperture therein for receiving a cylindrical supporting arm, a platform above said member adapted to receive the case of a drilling machine, means for clamping the drilling machine to the platform, said member having a slot-like opening therein parallel with the axis of the aperture, a gripping member mounted to slide radially in said slot-like opening, a fluid pressure cylinder mounted between said parallel plates, and force-multiplying mechanism for causing said cylinder to actuate the gripping member to clampingly engage the supporting arm.

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