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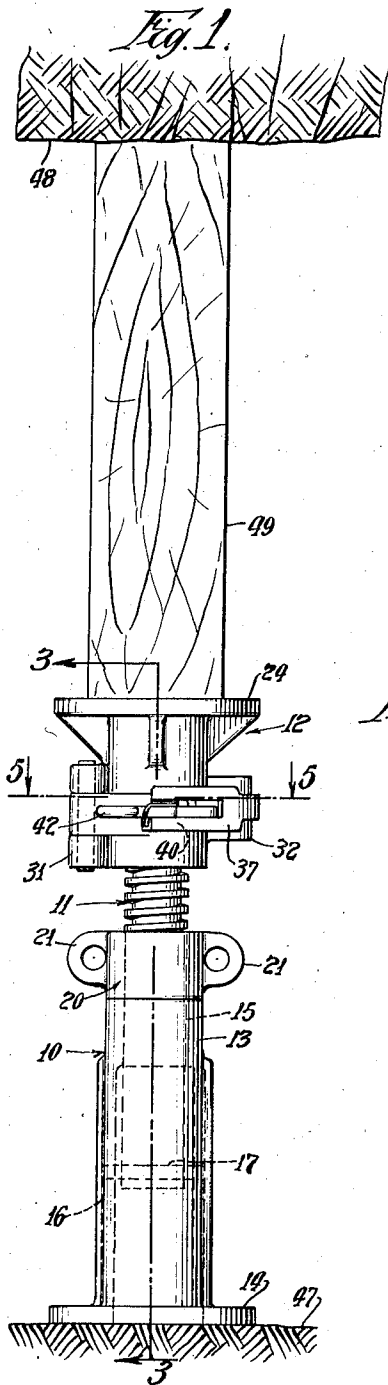
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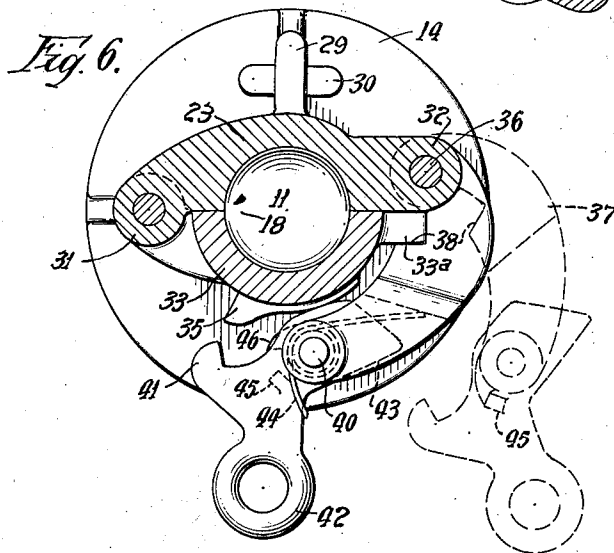
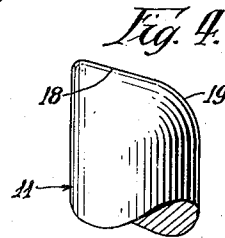
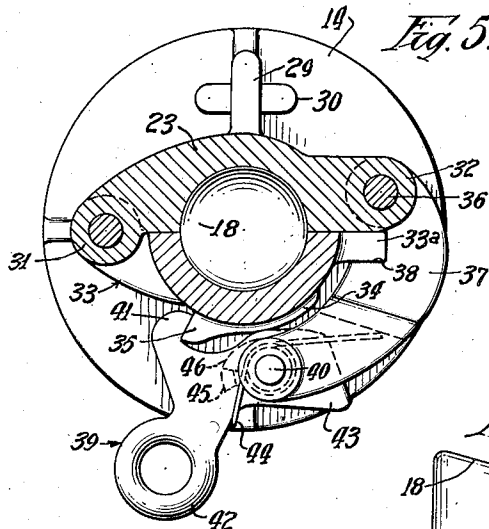
MINE ROOF JACK

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

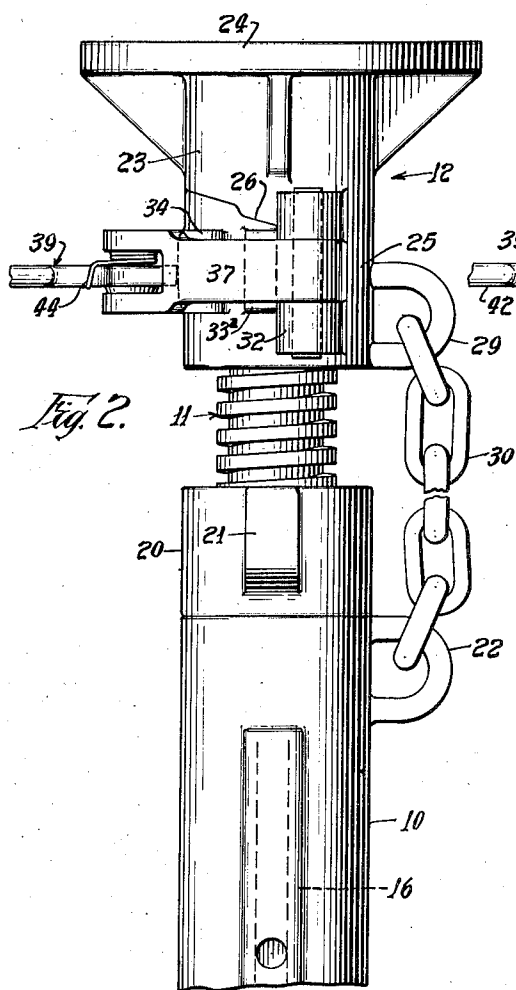


Fig. 2.

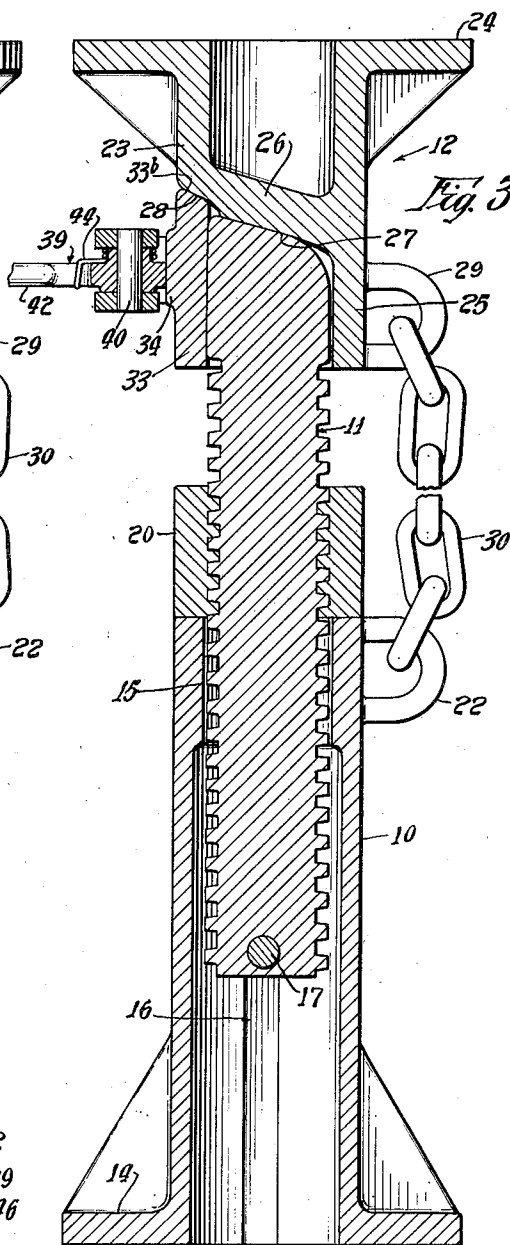


Fig. 3.

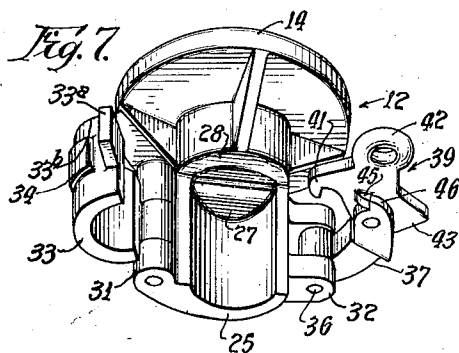


Fig. 7.

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UNITED STATES PATENT OFFICE

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MINE ROOF JACK

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Application February 7, 1936, Serial No. 62,820

6 Claims. (Cl. 248—357)

This invention relates to improvements in mine roof jacks and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

One of the objects of the invention is to provide a jack for use in supporting mine roofs and which may be tripped for quick collapse under the load it supports.

Another object of the invention is to provide a jack of this kind having an increased safety factor, that is to say one that cannot collapse unless tripped for that purpose; one which is positive in its collapse when so tripped and which tripping may be caused from a distance assuring ample safety.

A further object of the invention is to provide a jack of this kind that includes a post member and a cap member, one of which embodies a laterally opening gate to coact therewith in forming a recess to receive the end of the other member, the bottom of said recess and said end of the other member having inclined engaging surfaces, which when said gate is opened, permit a relative movement between said members to collapse the jack.

The above mentioned objects of the invention, as well as others, together with the several advantages thereof, will more fully appear as we proceed with our specification.

In the drawings:

Fig. 1 is a view in front elevation of the improved jack, in connection with an associated prop extension for supporting the roof of a mine chamber from the floor thereof.

Fig. 2 is a view in side elevation of the top end part of the jack on an enlarged scale.

Fig. 3 is a longitudinal vertical section through the jack as taken on the line 3—3 of Fig. 1.

Fig. 4 is a view in side elevation of the top end of the extensible part of the jack and which will be referred to in more detail later.

Fig. 5 is a horizontal sectional view through the cap of the jack as taken on the line 5—5 of Fig. 1.

Fig. 6 is a view similar to Fig. 5 and illustrates certain of the parts in changed position as when the latch has been actuated to release its hook.

Fig. 7 is a perspective view of the cap of the jack in its open position.

Referring now in detail to that embodiment of the invention illustrated in the accompanying drawings:

10 indicates the housing, 11 indicates the ex-

tensible member and 12 indicates the cap of the jack.

The housing 10 includes a tubular body or standard 13 having a base flange 14 at its bottom end. The top end of the body or standard is formed with an internally restricted portion 15. Below this portion, opposite internal sides of the body or standard have longitudinal grooves 16.

In this instance, the extensible member 11 is in the form of a screw, adapted for free passage through the portion 15 of the standard or body. In the bottom end of the screw is a cross pin 17 for engagement in the grooves 16. This pin prevents turning of the screw and prevents the threading of the screw outwardly beyond the top end of the standard or body. The top end of said screw has an inclined surface 18 which merges into one side of the screw as by a rounded corner 19.

Operatively engaged on the screw and having a thrust bearing upon the top end of the standard or body is the actuating nut 20. This nut includes opposite apertured ears 21 to receive a bar or other device for use in turning the nut. When the jack is under load and nut is turned in one direction or the other, the screw is projected out of or withdrawn into the housing. On one side and at the top end of the housing is an eye 22, the purpose of which will soon appear.

The cap 12 includes a hollow cylindrical body 23 having a horizontal flange 24 at the top and an arcuate flange 25 extending below the bottom 26 of the body. The arcuate flange extension 25 is substantially semi-circular and the bottom of the body has an inclined surface 27, with a step 28 therein at that side opposite the flange 25. On said flange, midway between its ends is an eye 29. A chain 30 is connected at one end to the eye 29 and at the other end to the eye 22. This chain, of course, is of such length as will permit the full extension of the screw 11 and operates to prevent complete separation between the cap and housing when the cap is off its associated end of said screw.

The flange extension 25 is provided at opposite ends with pairs of ears 31 and 32 respectively. One end of a semi-circular gate 33 is pivoted between the ears 31 for a laterally opening and closing movement and the other end of said gate is provided with a lug 33a adapted to close up against the ears 32. The gate is provided at the top of its midportion with an extension 33b having an inclined surface for engagement with the inclined step surface 28 of the cap body as

best appears in Fig. 3. When said gate is in its closed position as shown in Fig. 5, it coacts with the body of the cap in forming a recess bottomed by the inclined surface 27 so as to receive the top end of screw 11. On the exterior surface of the gate about midway of its ends is an arcuate boss 34 that terminates as a radial shoulder 35 at that end approaching the ears 31. Means is provided to releasably lock the gate in its closed position and such means is as follows:

Pivoted between the ears 32 as by means of a pin 36 is one end of a substantially arcuate lever 37 which approximates about 90° in extent. This end of the lever is formed with recess 38 to receive the lug or extension 33a of the gate when the parts are in the closed position shown in Fig. 5. The other end of said lever is bifurcated to receive a locking latch 39 therefor and which latch is pivoted to the lever by a pin 40. The latch is generally formed as a three armed bell-crank and includes a hook arm 41, an actuating arm 42 made as an eye, and a cam arm 43. The latter arm is disposed in the bifurcation of the lever 37. A spring 44 associated with the pin 40 operates to swing the latch 39 clockwise and stops 45—46 on the latch and lever respectively, limit the movement of the latch in one direction. The eye 42 is adapted to receive the hooked end of an operating rod (not shown) whereby the latch may be actuated from a distance to release the lever so that the gate 33 may swing into an open position.

The jack is particularly adapted for use in supporting mine roofs and is of a height less than the distance between the floor and roof 47—48 respectively appearing in Fig. 1. In the use of the jack, the gate 33 is closed against the cap body and is locked in this position by reason of the confinement of its lug 33a in the recess 38 of the lever 37. It is to be noted from Fig. 5, that the lug 33a extends slightly beyond the plane of the axis of the pin 36 so that internal pressure against the gate, cannot tend to swing the same into open position. However, as a caution against accidental opening of the lever when the jack is supporting a load, the latch 39 is provided as a safety factor.

When the parts are in the position shown in Fig. 1, the cap may be applied to the top end of the member or screw 11, with the surfaces 27 and 18 engaging each other as shown in Fig. 3. A roof post or prop 49 is placed in position between the mine roof 48 and the cap flange 24 after which the nut 20 is turned to cause an upward movement of the member or screw 11. When the post 49 is under compression, said post and the jack coact as a whole to support the adjacent roof area of the mine.

After the side wall mining has progressed the desired distance, the jack is collapsed so that the roof sags and falls. The collapsing of the jack is produced as follows:

The hooked end of the trip rod is engaged with the eye 42, from the lever side of the jack so that the rod extends somewhat parallel to a plane passing through the axis of the screw and the axis of the ears 31. At this time the operator is at a safe distance from the lever side of the jack. After the rod has thus been hooked to the latch, the operator pulls the rod. This swings the latch 39 in a counter-clockwise direction so that the hook 41 slips off the shoulder 35. About the time this occurs, the cam 43 engages the boss 34 the parts being in the position

shown in full lines in Fig. 6. It is to be noted from this figure that the lever arm as afforded by the eye 42 is longer than the arm afforded by the cam 43.

As the parts move into and through this position, by the pull on the trip rod, the cam 43 by its increasing engagement with the boss 34 will cause the lever 37 to swing outwardly about its pin 36. It is apparent that the supported load due to the engagement of the surfaces 27 and 18 tend to cause an opening of the gate but the gate is locked closed by the lever. Thus the movement of the lever to open position is resisted by the frictional pressure of the lug 33a against its associated surface in the lever recess 38. This resistance is such that considerable force would be required to open the lever. However, with the differential in lever arms in the latch arranged as described, the resistance before mentioned is readily overcome. Thus as the end of the cam 43 engages on the boss 34, the lever 37 has been swung open to an amount such that the tendency of the lug 33a of the gate, as the gate opens, is to throw the lever 37 into the wide open position shown in dotted lines in Fig. 6. It is apparent that as the locking effort of the lever 37 is released, the supported load through the inclined surfaces 27 and 18 causes the cap to slip downwardly and laterally in the plane of said surfaces. This imposes a heavy lateral pressure against the midportion of the gate which flies open with a quick snap action to permit the cap to slide off the screw 11 so that the jack collapses. When the jack collapses the roof breaks and falls, in most instances, burying the jack as a whole as well as its post 49. As the cap is connected to the post by the chain 30 as before described it is ultimately recovered without a loss in parts and may again be reused.

It is pointed out that as the cap slides off the screw, the rounded corner 19 of the surface 18 engages the step 28. However, due to the presence of this rounded corner, no burring of the screw can occur, as would obtain with a relatively sharp corner at this point. Therefore, neither said corner nor the step 28 are damaged.

The jack is strong and rugged in construction, is positive in its action and is indeed safe for operation as it can be easily released from a safe distance.

While in describing the invention, we have referred in detail to the form, arrangement and construction of the various parts thereof, the same is to be considered only in the illustrative sense so that we do not wish to be limited thereto except as may be specifically set forth in the appended claims.

We claim as our invention:

1. A mine roof jack embodying therein a post member and a cap member, one of said members having a laterally opening part swingable about a vertical axis, and means for releasably locking said part to its associated member to coact therewith in providing a recess to receive an end part of the other member, the extremity of said end part and the bottom surface of said recess being substantially complementally inclined for engagement with each other.

2. A mine roof jack embodying therein a post member and a cap member, a part hinged at one end to the cap member about a vertical axis for a laterally swinging movement, means for

releasably locking the other end of said part to the cap member to coact therewith in providing a recess to receive an end portion of the post member, the extremity of said post member and the bottom of said recess being formed with substantially complementally inclined surfaces for engagement with each other.

3. In a jack, a post and a cap therefor, said cap including an arcuate flange and an arcuate part hinged at one end thereto for a laterally swinging movement, to coact therewith in providing a recess to receive one end of the post, a lever pivoted to said arcuate flange and adapted to engage a portion of said arcuate part to lock it in position with respect to said arcuate flange, and means for locking the lever against movement.

4. In a jack, a post and a cap therefor, said cap including an arcuate flange, and an arcuate part hinged at one end thereto for a laterally swinging movement and to coact therewith in providing a recess to receive one end of said post, means for locking said arcuate part in closed position with respect to said flange and including a lever pivoted to said flange part and engaging a portion of said arcuate part, and a latch pivoted to said lever and including a part for engaging a second portion of said arcuate part when said latch is actuated in one direction for imparting a movement to said lever tending to release the first mentioned portion of said arcuate part.

5. In a jack, a cap including an arcuate flange,

an arcuate part hinged to said flange and adapted to close thereagainst to form a recess, a lever pivoted at one end to said flange to engage a portion of said arcuate part to lock it closed against said flange, a latch pivoted to the other end of said lever and including an operating arm, a second arm forming a latch hook to engage a shoulder on said arcuate part and a third arm forming a cam to engage against portion of said arcuate member and to assist in releasing the lever when a force is applied to said operating arm in one direction.

6. In a jack, a cap including an arcuate flange, an arcuate part hinged to said flange and adapted to close thereagainst to form a recess, a lever pivoted at one end to said flange to engage a portion of said arcuate part to lock it closed against said flange, a latch pivoted to the other end of said lever and including an operating arm, a second arm forming a latch hook to engage a shoulder on said arcuate part and a third arm forming a cam to engage another portion of said arcuate member and to assist in releasing the lever when a force is applied to said operating arm in one direction, a spring interposed between the lever and the latch for moving the latch with respect to the lever and coacting stop shoulders on the lever and latch respectively, for limiting the movement of said latch in one direction.

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