Feb. 15, 1949. J. C. CURTIS 2,461,810

SUPPORTING COLUMN

Filed Nov. 30, 1945

Fig. 1.

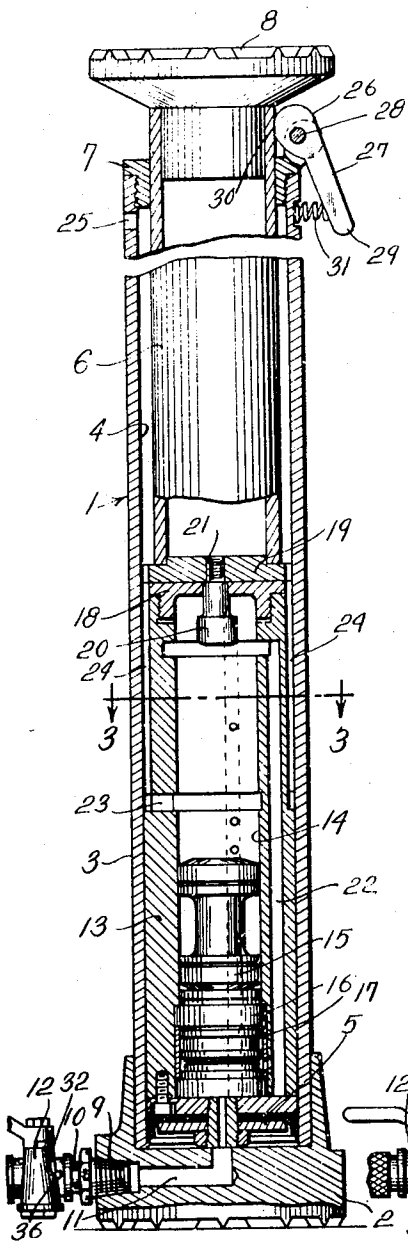


Fig. 2.

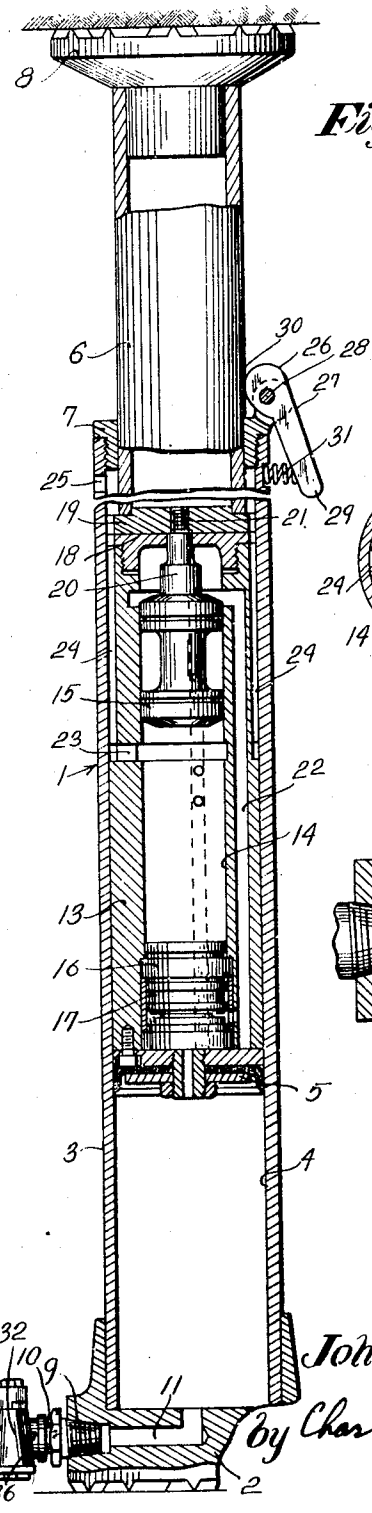


Fig. 3.

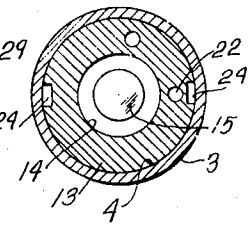
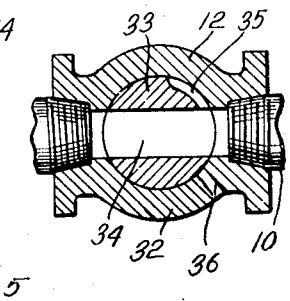


Fig. 4.



Inventor:
John C. Curtis.
by Charles F. Osgood,
Atty.

Patented Feb. 15, 1949

2,461,810

UNITED STATES PATENT OFFICE

2,461,810

SUPPORTING COLUMN

John C. Curtis, Claremont, N. H., assignor to Joy Manufacturing Company, a corporation of Pennsylvania

Application November 30, 1945, Serial No. 631,876

11 Claims. (Cl. 248—354)

1

This invention relates to supporting columns and more particularly has reference to a fluid actuated, extensible mine column embodying impact means for assuring proper setting of the column.

In mine columns of the fluid actuated extensible type, there is usually provided a cylinder containing a reciprocable piston actuated by fluid under pressure admitted to the cylinder, for moving the extensible element into engagement with its support and for holding it there. In such columns, some difficulty has been encountered in effecting proper setting of the column so that firm engagement of the extensible element with its support is attained. By delivering impact blows to the extensible element of the column, the latter may be set firmly in place. In such columns, the cylinder base usually has a foot engaging the mine floor and the extensible piston actuated element has a member engageable with the mine roof.

It is accordingly an object of the present invention to provide an improved supporting column having embodied therein improved means for imparting impact blows to the extensible element of the column to set firmly the column in its supported position. Another object is to provide an improved mine column of the pressure fluid actuated type having a hammer motor embodied therein for delivering impact blows to the extensible element of the column to set the latter firmly in place. A further object is to provide an improved fluid actuated mine column having a cylinder base resting against the mine floor and containing a reciprocable piston for moving the extensible part of the column against the mine roof and having a fluid operated hammer motor carried by the extensible element for driving the latter firmly into engagement with the mine roof. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawing there is shown for purposes of illustration one form which the invention may assume in practice.

In this drawing:

Fig. 1 is a view in central longitudinal section taken through a mine column constructed in accordance with an illustrative embodiment of the invention, and showing the column in collapsed position.

Fig. 2 is a sectional view similar to Fig. 1, showing the column in extended position.

Fig. 3 is a cross-sectional view taken on line 3—3 of Fig. 1.

2

Fig. 4 is a detail sectional view taken through the manual control valve.

In this illustrative embodiment of the invention, there is shown a supporting column of the type designed for use in mines, although it will be evident that the invention may be associated with other types of extensible supports.

The mine column is generally designated 1 and comprises a base 2 formed to engage an abutment such as the floor of a mine. Suitably rigidly secured to the base is a cylinder 3 having a bore 4 containing a reciprocable piston 5, the latter being suitably elongated and having a tubular piston rod 6 extending upwardly through the top head 7 of the base cylinder. Carried at the upper end of the piston rod is a member 8 formed for engagement with an abutment such as the mine roof. Attached at 9 to the base 2 is a fluid supply pipe 10 communicating through a passage 11 in the base with the cylinder bore 4 beneath the piston 5, and a conventional manual control valve 12 is provided in the supply pipe for controlling the admission of pressure fluid to the cylinder and for venting the fluid from the cylinder.

In this improved construction the elongated piston 5 carries a hammer motor 13 of a conventional design for imparting impact blows to the lower end of the piston rod for driving the the member 8 into firm engagment with the mine roof, thereby firmly to set the column in place. This hammer motor may be generally similar to those disclosed in my Patent No. 2,224,859, patented December 17, 1940, and the patent to E. G. Gartin, No. 2,252,711, patented August 19, 1941 and herein comprises a cylinder having a bore 14 containing a reciprocable hammer piston 15. Closing the lower end of the cylinder bore 14 is a head plate 16 and arranged in the motor cylinder beneath the head plate is an automatic fluid distributing valve mechanism 17 herein preferably of the dual valve type similar to those fully described in the above mentioned patents for controlling the admission of fluid to the motor cylinder. The upper end of the bore 14 of the motor cylinder is closed by a head 18, and suitably rigidly secured between this head and the lower end of the piston rod 6 is a plate 19. The hammer piston 15, as it reciprocates in the cylinder bore delivers impact blows to a tappet 20 secured at 21 to the plate 19. The hammer motor has suitable fluid passage means including a supply passage 22 for conducting pressure fluid from the valve mechanism to the upper end of the cylinder bore to retract the

piston, and intermediate the ends of the cylinder bore is an exhaust passage 23. Longitudinal grooves 24 on the exterior of the piston 5 connect the exhaust passage 23 with the bore 4 of the base cylinder 3, and vent ports 25 connect the upper end of the bore 4 to atmosphere. The automatic fluid distributing valve mechanism is so designed that when the hammer motor is stopped by closing the valve 12, the valve mechanism cuts off communication of the supply passage 22 with the cylinder bore 4 beneath the piston 5 so that fluid is trapped in the cylinder bore 4.

The upper head 7 of the base cylinder carries a gripping device 26 comprising a lever 27 pivoted at 28 and having a handle portion 29. A cam-shaped gripping surface 30 is formed on the lever and is yieldingly held by a spring 31 in frictional contact with the exterior surface of the piston rod 6. When the piston rod moves upwardly, the cam automatically releases so that the rod slides freely, but when the piston rod tends to move downwardly, the cam automatically grips the piston rod to lock the latter against downward movement. The cam may be released at will simply by pressing inwardly on the handle portion 29 of the lever. The manual control valve 12 comprises a casing 32 having a bore containing a rotary valve element 33 provided with a suitable operating handle. The valve element is traversed by a passage 34 for admitting fluid through the supply pipe to the passage 11 when the valve is open, as shown in Fig. 4. When the valve is closed, the fluid is trapped within the bore 4 of the base cylinder beneath the piston 5. When it is desired to effect collapse of the mine column, a groove or notch 35 in the valve element 33 may be positioned to connect the passage 11 with a vent port 36.

The mode of use of the improved supporting column will be clearly apparent from the description given. When the column is suitably placed in position between the floor and roof of the mine, the valve 12 may be opened to admit fluid under pressure to the bore 4 of the base cylinder beneath the piston 5, moving the latter upwardly to bring the abutment engaging member 8 into engagement with the mine roof, as shown in Fig. 2. When the piston 5 is held stationary by engagement of the member 8 with the roof of the mine, the pressure of the fluid in the cylinder 4 in the bore beneath the piston 5 builds up, thereby causing the hammer motor to operate so that the hammer piston 15 delivers a rapid series of blows to the tappet 20 to drive the piston rod 6 upwardly to force the element 8 into firm engagement with the roof. As the piston rod moves upwardly, the cam 30 of the gripping device automatically releases to permit free upward movement of the piston rod. When the column is properly set firmly in position, the valve 12 may be closed to trap the fluid in the base cylinder beneath the piston 5 and to stop the hammer motor, and the cam of the gripping device automatically locks the piston rod against downward movement. When it is desired to collapse the column, the valve 12 may be turned to connect the passage 11 with the vent port 36 to exhaust the fluid from the base cylinder beneath the piston 5 and concurrently the cam grip may be manually held in released position to permit the piston rod to drop freely down to the position shown in Fig. 1.

As a result of this invention, it will be noted that an improved extensible supporting column is provided, having impact means embodied therein for imparting impact blows to the extensible element of the column to effect firm setting of the column in its supporting position. By the provision of the hammer motor embodied in the column, impact blows are transmitted to the upper abutment member so that the latter is driven firmly into engagement with the mine roof. The improved piston rod grip and the manual control valve enable locking of the column in extended position and enable ready control of the column to effect extension or collapse thereof as desired. Other uses and advantages of the invention will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration, and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a supporting column, cooperating column elements having relative axial movement when subjected to the action of fluid under pressure, and means associated with one of said elements for imparting impact blows thereto firmly to set the column in place.

2. In a supporting column, cooperating cylinder and piston elements having relative axial movement, means for supplying fluid under pressure to said cylinder element to move said elements into engagement with their supports, and a fluid actuated hammer motor carried by said piston element for driving the latter firmly in position against its support.

3. In a supporting column, cooperating cylinder and piston elements having relative axial movement, means for supplying fluid under pressure to said cylinder element to move said elements into engagement with their respective supports, and a fluid actuated hammer motor carried by said piston element for driving the latter firmly in position against its support, said hammer motor receiving its supply of pressure fluid from the bore of said cylinder element and rendered automatically operative to effect hammering when said piston element is stationary and the pressure of the fluid has built up in the bore of said cylinder element.

4. In a supporting column, cooperating relatively extensible elements engageable with extraneous abutments, and a hammer arranged within the column for imparting a rapid series of impact blows to one of said elements to effect firm setting of the column.

5. In a supporting column, cooperating relatively extensible elements engageable with extraneous abutments, means embodied in the column for imparting impact blows to one of said elements to effect firm setting of the column, and locking means for preventing unintended collapse of said elements when the column is firmly set in place.

6. In a supporting column, cooperating relatively extensible fluid actuated cylinder and piston elements, fluid actuated hammering means embodied in the column for imparting impact blows to one of said elements, and valve means for admitting fluid under pressure to and for exhausting fluid from said cylinder element and for starting and stopping said hammering means.

7. In a supporting column, cooperating relatively extensible fluid actuated cylinder and piston elements, fluid actuated hammering means embodied in the column for imparting impact blows to one of said elements, and valve means for admitting fluid under pressure to and for exhausting fluid from said cylinder element and for starting and stopping said hammering means, said valve means when closed serving to trap the fluid in said cylinder element and to maintain said hammering means inoperative.

8. In a supporting column, a cylinder, a piston reciprocable in said cylinder and having a piston rod extending outwardly from said cylinder, abutment engaging members carried by said cylinder and piston rod respectively and engageable with extraneous abutments when the column is extended, and a hammer motor carried by said piston for imparting impact blows to said piston rod to drive its abutment engaging member firmly against its abutment.

9. In a supporting column, a cylinder, a piston reciprocable in said cylinder and having a piston rod extending outwardly from said cylinder, abutment engaging members carried by said cylinder and piston rod respectively and engageable with extraneous abutments when the column is extended, a hammer motor carried by said piston and including a reciprocable motor piston, and an impact element secured to said piston rod and

arranged to be struck by said motor piston for driving said abutment engaging member of said piston rod firmly against its abutment.

10. In a supporting column, cooperating column elements having relative axial movement and engageable with extraneous abutments, and means embodied in the column for imparting blows in a direction lengthwise of the column to assure firm setting of the column.

11. In a supporting column, cooperating telescopically arranged column elements having relative axial movement when subjected to the action of fluid under pressure, and impact motor means enclosed within said column elements and associated with one of said elements for imparting a rapid series of impact blows thereto firmly to set the column in place while said elements are subjected to the action of fluid under pressure.

JOHN C. CURTIS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,418,336	Stage	June 6, 1922
2,252,711	Gartin	Aug. 29, 1941
2,256,620	Markham	Sept. 23, 1941