Dec. 4, 1956 K. E. CAINE 2,772,871

SAFETY ROOF CONTROL APPARATUS FOR CONTINUOUS MINER

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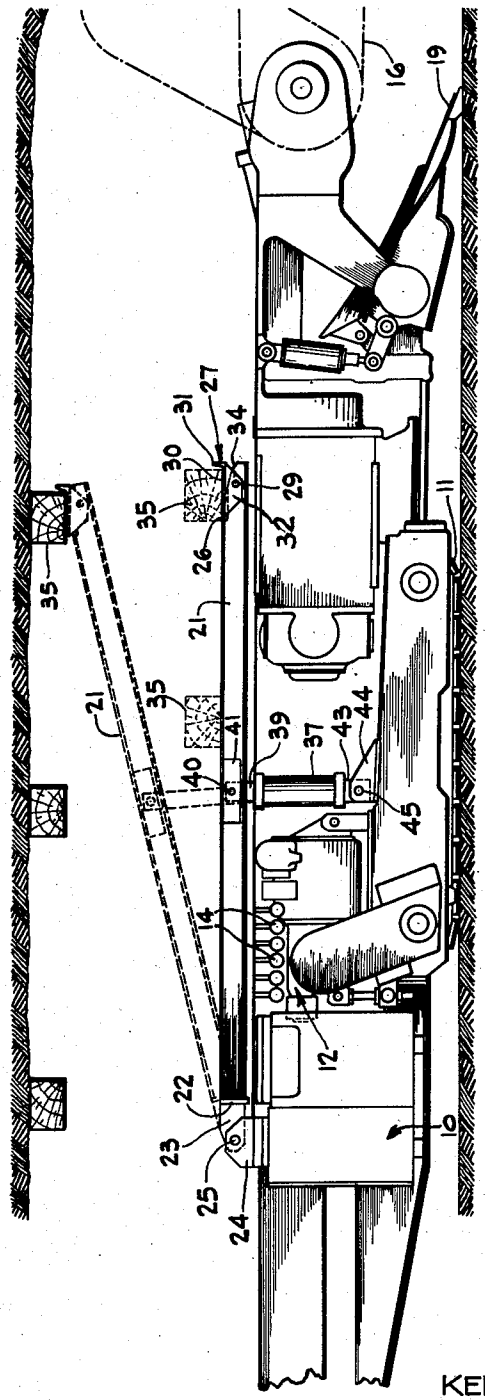


FIG. 1

INVENTOR
KENNETH E. CAINE

BY Murray A. Gleason
ATTORNEY

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SAFETY ROOF CONTROL APPARATUS FOR CONTINUOUS MINER

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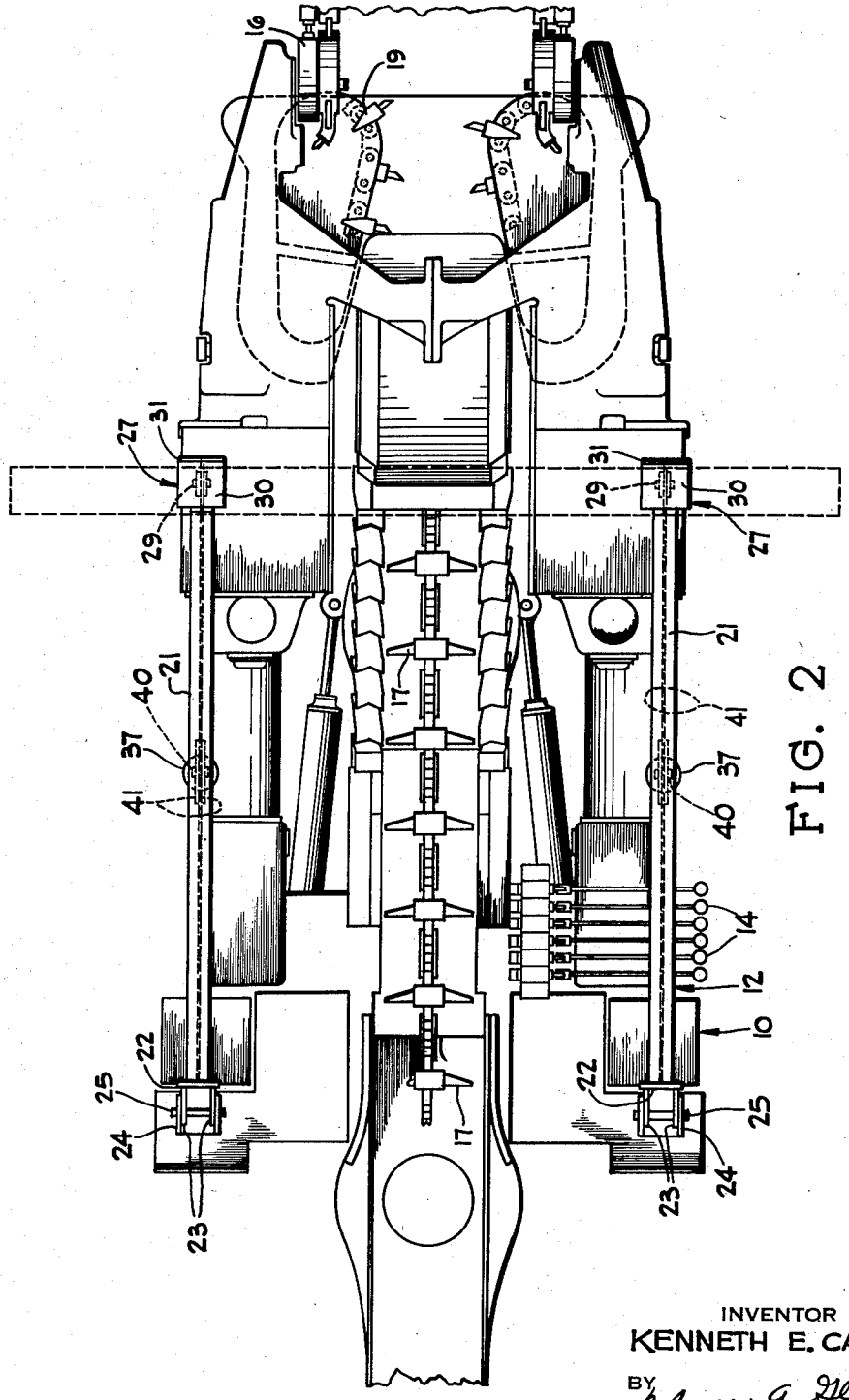


FIG. 2

INVENTOR
KENNETH E. CAINE
BY Murray A. Gleason
ATTORNEY

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SAFETY ROOF CONTROL APPARATUS FOR CONTINUOUS MINER

Kenneth E. Caine, Pittsburgh, Pa., assignor to Goodman Manufacturing Company, Chicago, Ill., a corporation of Illinois

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2 Claims. (Cl. 262—34)

This invention relates to improvements in mining machines and safety roof supports therefor, and more particularly relates to a timber erecting and roof control means forming a part of and protecting a continuous mining machine and the operator thereof.

In the continuous mining of coal by dislodging the coal from the solid by a rotary mining head, the roof is usually supported on cross timbers set by the timberman as the mining operation progresses.

Due to space limitations it has not been possible for the timberman to set the timbers along the machine a sufficient distance in advance of the operator, to protect the operator of the machine. Also, in the hand setting of timbers the timberman is working under unsupported roof and the machine operator is only protected by the first timber which is usually just above or slightly in advance of the operator.

Under such timbering, if the first timber over the operator should not be well set or should not be heavy enough, a roof fall may take the timber down onto the operator stopping usually at the second timber which is behind the operator. The operator as well as the timberman are thus subject to the danger of a roof fall when the timbers are so set.

In carrying out my invention I provide spaced pivoted timber erecting and supporting arms for elevating and supporting a timber well in advance of the operator's station and lifting the timber under control of the operator into engagement with the mine roof until supported by the usual jacks, props or the like. The timberman therefore, need never expose himself to unsupported roof and the machine is protected sufficiently in advance of the operator's station, that when the roof falls and peels back toward the operator the fall is stopped well in advance of the operator's station.

A principal object of my invention, therefore, is to provide a safety roof support particularly adapted for a continuous miner, supporting the roof sufficiently in advance of the operator's station, to check the roof fall prior to reaching the operator.

A further object of my invention is to provide a continuous mining machine having a timber erecting and supporting means incorporated therein as a part thereof, and operable under the control of the operator, to support the roof well in advance of the operator's station and removing the possibility of the timberman working under unsupported roof.

Still another object of my invention is to provide a timber erecting and supporting means particularly adapted for continuous mining machines and including spaced pivoted elevating arms having timber carrying cradles at their free ends, in which the arms and cradles are so arranged that a timber may readily be slidably moved along the top surfaces thereof from the rear of the machine on to the cradles for lifting into engagement with the mine roof.

These and other objects of my invention will appear from time to time as the following specification proceeds

and with reference to the accompanying drawings wherein;

Figure 1 is a fragmentary view in side elevation of a continuous mining machine having a timber erecting and supporting means constructed in accordance with my invention incorporated as a part thereof; and

Figure 2 is a fragmentary plan view of the machine shown in Figure 1.

In the embodiment of my invention illustrated in Figures 1 and 2 of the drawings, I have shown a continuous mining machine of a well known form, having a main frame **10**, supported on laterally spaced continuous traction devices **11**, with an operator's station **12**, adjacent the rear end of said main frame and having hydraulic controls **14** at the operator's station for controlling operation of the machine.

The continuous mining machine may be of a well known form including a mining element partially shown by broken lines and indicated generally by reference character **16**. The mining element is usually fed downwardly from the mine floor to the mine roof, to cut and dislodge a vertical swath coal for loading onto a conveyor **17** by a gathering element **19** in the usual manner. The mining element is likewise advanced and retractibly moved with respect to the main frame **10** during the mining operation to feed the mining element into the coal face and to withdraw it therefrom.

The timber erecting and supporting means as shown in the drawings comprises two parallel spaced timber elevating beams or arms **21, 21** extending along the top of the machine adjacent each side thereof from the rear end portion of the main frame **10** to a position well ahead of the operator's station **12**.

Each arm or beam **21** is shown as being in the form of an I beam and as having a transverse plate **22** abutting its rear end and welded or otherwise secured thereto. Parallel spaced plates **23, 23** extend rearwardly from the plate **22** between opposite upright side walls of a yoke **24**, extending upwardly from the rear upper portion of the main frame **10**. A pivot pin **25** is provided to pivotally connect the arm **21** to the yoke **24**.

The free end of each arm **21** is shown as having the top flange of the beam cut away to form a recessed portion **26** for a cradle **27**, pivotally connected to said arm as by a transverse pivot pin **29**. The cradle **27** is shown as being in the form of a plate **30** having an upright flange **31** extending across the advance end thereof and having spaced plates **32** extending downwardly therefrom along opposite sides of the web of the beam or arm **21**. The outer end portion of the web of each arm **21** is shown as being beveled toward its outer end, as indicated by reference character **34** to accommodate said cradle to support a timber **35** thereon in a generally horizontal position in all positions of elevation of said arm. The recessed portion **26** also enables the top surface of the plate **30** to be in alignment with the top surface of the arm **21** when the arm **21** is in the lowered position shown. An uninterrupted surface is thus provided along which the timber **35** may readily slidably move onto the cradles **27, 27**. The pivot pin **29** is eccentric of the center of the cradle **27** so that the weight of the cradle will bias the cradle into the position shown in Figure 1, when the arms **21, 21** are in a horizontal position.

Each arm **21** and cradle **27** is raised and lowered by a separate double acting cylinder and piston **37** having a piston rod **39** extensible therefrom and extending within the arm **21** and pivotally connected thereto as by a pivot pin **40**. As herein shown, the web of each beam is cut away to receive the piston rod **39**. Plates **41, 41** are then welded or otherwise secured to the web of the beam on opposite sides of the cut away portion thereof to form a support for the ends of the pivot pin **40**.

An ear 43 is shown as depending from the head end of cylinder 37 and as extending between opposite side walls of the yoke 44, and as being pivotally connected thereto as by a pivot pin 45.

Suitable fluid connections may be provided to the head and piston rod ends of the two cylinders 37, and suitable valve means under the control of certain of the controls 14 at the operator's station may be provided to control the supply of fluid under pressure to the cylinder 37 to lift the arms 21, 21 together and simultaneously lower said arms and also hold fluid under pressure in said cylinders to hold a timber 35 in supporting engagement with the mine roof until jacks or posts have been set at the opposite ends of the timber 35. The valves, fluid pressure connections, and the pump and storage tank for supplying fluid under pressure may all be a part of the continuous mining machine and may be of a conventional form and are no part of my present invention, so need not herein be shown or described further.

During operation of the machine, a timber 35 may be placed on the arms 21, 21 adjacent the rear end thereof and may be slidably moved along said arms onto the cradles 27, 27. Fluid under pressure may then be admitted to the head ends of the cylinders 37, for elevating the arms 21, 21 and lifting the timber 35 into supporting engagement with the mine roof. The timber may then be held in supporting engagement with the mine roof by the holding of pressure in the head ends of the cylinders 37, the arms 21, 21 being sufficiently rigid to hold the timber 35 to support the roof until the jacks or posts have been set at opposite ends of the timber.

Fluid under pressure may then be admitted to the piston rod ends of the cylinders 37, 37 to lower the arms 21, 21 into the position shown in Figure 1 until the machine has advanced a sufficient distance to make it necessary to erect a next succeeding timber. When the arms are in the position shown in Figure 1, another timber may be placed thereon adjacent the rear end thereof and may be slidably moved therealong onto the cradles 27, 27 in position to be elevated into supporting engagement with the roof.

It may be seen from the foregoing that a novel and improved form of safety roof control or support means has been provided, forming a part of a continuous mining machine and elevating and engaging roof supporting timbers with the roof a sufficient distance in advance of the operator's station of the machine to fully protect the operator.

It may further be seen that the arms 21, 21 may elevate the timber 35 and hold it in engagement with the mine roof and that since said arms are sufficiently strong to support the timber in engagement with the roof and support the roof in case of a fall that said arms form a protection for the timberman and make it unnecessary for the timberman to expose himself to unsupported roof during the timber setting operation.

It will be understood that modifications and variations in this invention may be effected without departing from the scope of the novel concept thereof.

I claim as my invention:

1. In a continuous mining machine having a mobile main frame and a mining head at the forward end thereof for mining coal in a continuous operation without shooting and having an operator's station spaced rearwardly of said mining head, the improvements comprising safety means protecting the operator's station from falling roof comprising a pivoted roof supporting arm pivoted to said main frame adjacent the rear end thereof and extending along the top of said main frame a substantial distance in advance of said operator's station and having an uninterrupted plain top surface accommodating a timber to be slidably moved therealong, cylinder and piston means connected between said main frame and arm intermediate the ends thereof for elevating said arm, and a timber carrying cradle freely pivoted to the free end of said arm eccentric of the center of said cradle, said cradle having a plate forming a continuation of the top surface of said arm and movable by gravity into position flush with the top surface of said arm when the arm is in a horizontal position and having a flange at the outer end thereof forming a stop for a timber, the eccentricity of said cradle mounting accommodating said cradle to engage a timber with a mine roof in generally parallel relation with respect thereto and to conform to the plane of the roof when holding a timber in engagement therewith.

2. In a continuous mining machine having a mobile main frame and a mining head at the forward end thereof for mining coal in a continuous operation without shooting and having an operator's station spaced rearwardly of said mining head, the improvement comprising safety means protecting the operator's station from falling roof comprising two laterally spaced timber supporting arms extending along opposite sides of said main frame from the rear end thereof to a position well in advance of said operator's station, means pivotally mounting said arms on said main frame adjacent the rear end thereof, individual cylinder and piston means pivotally connected between said main frame and arms intermediate the ends thereof for elevating and lowering said arms, said arms having recessed portions at the forward ends thereof, and timber carrying cradles recessed within said recessed portions with their top surfaces flush with the top surfaces of said arms and pivotally connected to said arms for supporting a timber in generally parallel relation with respect to the mine roof during movement of said arms in a roof engaging direction, the pivot for said cradles being eccentric of the center thereof to effect the positioning of said cradles parallel with the top surface of said associated arms by gravity, when said arms are in a lowered position.

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