SHAFT-SINKING BAR
André Ginocchio, Limoges, France, assignor to Commissariat a l’Energie Atomique, Paris, France
Filed May 24, 1960, Ser. No. 31,292
Claims priority, application France May 27, 1959
9 Claims. (Cl. 172—49)

The installation of a mine usually begins by the sinking of a vertical shaft deep enough to reach the deposits which have previously been detected, for instance, by borings, for a deposit can very seldom be exploited by open-pit working—i.e., by uncovering all the useful surface of the deposit. Conventionally, shafts are sunk by means of pneumatic hammers which are used to pierce apertures in which explosives are placed. After each shot, which dislodges the rocks, the waste is carried away and drilling proceeds again. Unfortunately, since the pneumatic hammers are operated by miners, their penetration depths are not more than 1.60 meters at the most, nor can holes be drilled absolutely parallel with one another by means of hand-held tools. During the waste clearance phase, for instance, any miners at the bottom of the shaft have to stand by without working.

Mechanized drilling has been proposed to increase the speed of work; an axial bar resting on the shaft base and maintained by appropriate crosspieces can be provided with a number of hammers which are operative in positions disposed around the bar axis. The disadvantage of the system is that holes cannot be bored axially of the shaft and that handling is very complicated.

This invention has as its subject matter a shaft-sinking bar providing very readily deeper bores at any inclinations with a reduced number of miners. In the shaft-sinking bar according to the invention, a rigid frame which can be suspended on the hoisting rope or which can be made fast to the shaft facings by appropriate gripping means or which can be engaged with the shaft cribings by automatic grippers comprises a carriage movable in a first horizontal direction and provided with at least two other carriages movable in a second horizontal direction perpendicular to the first horizontal direction, each of the last-mentioned two carriages bearing a frame rotatable around a horizontal axis parallel with the second direction, the last-mentioned frame comprising a shaft which parallel with said axis and around which slideways in which the drilling machines are moved by chains or the like can pivot.

In a preferred embodiment of the invention, the carriages are moved by waterproof and gas-proof electric motors which are rigidly secured to the associated carriage and which drive a pneumatic wheel engaging with the bearing rails or with rails parallel therewith.

All the movements of the frames and of the slideways are performed by hydraulic rams supplied by a single pressure oil circuit operated by a compressed air pump disposed on the chassis. The various inlets are controlled by distribution systems completely accessible by the miners even in the working position.

The chains for moving the hammers are moved by small compressed air motors.

These supply arrangements are completely compatible with stringent safety requirements involving 24 volt electric systems, sealed motors etc., nor do they lead to any additional complication of a conventional installation since the same has connections for electricity, compressed air and water in addition to ventilation.

The shaft-sinking bar according to the invention reduces the number of miners, for three men are adequate to supervise the substantially automatic operation, for instance, of a six-hammer apparatus, as compared with the at least six men required at present to operate six hammers. Since the hammers are supported and are advanced mechanically, longer tools and bits can be used and greater tool penetration depths of up to about 3 meters are possible. The speed of drilling is increased considerably by the invention, and it has been found that daily advances of 3 meters are readily possible in granite ground as compared with the previous absolute maximum of 2 meters daily. Approximate calculations by the applicant have shown that a six-hammer shaft-sinking bar according to the invention covers its costs after 200 meters drilling.

An exemplary non-limitative embodiment of a shaft-sinking bar according to the invention will be described hereinafter with reference to the accompanying diagrammatic drawings wherein:

FIGURE 1 is a partial view in elevation of a shaft-sinking bar according to the invention;
FIGURE 2 is a partial view in profile of the same shaft-sinking bar, whilst
FIGURE 3 is a view to an enlarged scale of a part shown in FIGURE 1.

Referring to FIGURES 1 and 2, the shaft-sinking bar according to the invention comprises a substantially rectangular metal chassis 1 comprising means 2 receiving the hoisting cable for suspending chassis 1 in the mine shaft and separate means for securing the chassis to the shaft cribbing 8 and members 3 for guiding the chassis 1 against the cribbing 8. Two such guide members, as 3, are provided; both can be seen in FIGURE 1 and only one can be seen in FIGURE 2. The guide members each consist of two metal wheels 4, 5 (FIGURE 2) and, disposed therebetween on the same shaft 6, a pneumatic wheel 7 which engages with the cribbing 8. Pipe 76, manifold 77 (FIG. 1) and chamber 78 supply compressed air to the hammers of the drilling machines in known manner. With these means, the apparatus can be lowered down a shaft at rates, for instance, of about 5 meters/sec. and be maintained in correct equilibrium. Four gripper heads, as 9, are articulated to the corners of the chassis 1 and borne by parallelogram linkages 10. Hydraulic rams, as 11, can extend the linkages 10 and urge the gripper heads 9 into forcible engagement with the shaft facings (not shown). If required, additional parallelograms (not shown) can be fitted to the existing parallelograms so that the apparatus can be used in out-of-profile parts of as much as 70 centimeters.

The chassis 1 comprises two horizontal hollow guide rails 12, 13 which extend parallel with one side of the chassis 1. Rollers 14, 15 rigidly secured to a carriage 16 can be moved inside the rails 12, 13 by means of an electric motor 17 driving two pneumatic wheels 18, 19 bearing against two rails 20, 21 parallel with the rails 12, 13. The carriage 16 comprises two pairs of hollow guide rails 22, 23 and 24, 25 (FIGURES 1 and 3) which are perpendicular to the preceding ones. Two rollers 26, 27 rigidly secured to a carriage 28 can be moved inside the rails 22, 23 by means of a motor 29 driving a wheel 30 bearing against the rail 23. The movement of the motor 29 is transmitted to the wheel 30 by way of a spur gear box 31. Two rollers 32, 33 rigidly secured to a carriage 34 identical with the carriage 28 can be moved inside the rails 24, 25 by a motor 35 driving a wheel 36 bearing against the rail 24. The movement of the motor 35 is transmitted to the wheel 36 by a spur gear box 37. The rails 23 and 24 therefore have two functions—they enable the rollers 27, 32 to be moved, and they enable the wheels 36, 32 to bear against the rails 23, 24. The motors 17, 29, 35 are operated, for instance, on a 380 volt supply, but the control gear and the lighting (by
I claim:

1. In a shaft-sinking bar, a rigid chassis suspended by a hoisting cable in a mine shaft; means for securing and for guiding said chassis on the walls of the mine shaft; a first carriage suspended on said chassis and movable relatively thereto in a first horizontal direction; two second carriages carried by said first carriage and movable in a second horizontal direction perpendicular to the first horizontal direction; a frame mounted on each of said two second carriages rotatable on a horizontal axis parallel to the second horizontal direction; sidewalks mounted on said frames and rotating on an axis parallel to the second horizontal direction; means mounted on each of said carriages for moving said carriages; and means carried by said frames for rotating said sidewalks.

3. A shaft-sinking bar as described in claim 1 including pneumatic wheels mounted on said chassis guiding said bar in the mine shaft.

4. A shaft-sinking bar as described in claim 1 including pneumatic wheels extending between said second carriages and said sidewalks for moving said carriages and an auxiliary frame thereon.

5. A shaft-sinking bar as described in claim 4 including a compressed air pump mounted on said chassis supplying pressure to said hydraulic circuit.

6. A shaft-sinking bar as described in claim 1 including a seamed electric motor rigidly secured to each of said carriages, a pneumatic wheel driven by each of said motors and support rails for said carriages engaged by said wheels for moving said carriages.

7. A shaft-sinking bar as described in claim 1 wherein each of said frames includes two spaced longitudinal members receiving the corresponding one of said sidewalks therebetween.

8. In a shaft-sinking bar as described in claim 1, a chain for moving each of said drilling machines on the corresponding one of said sidewalks and a compressed air motor for driving each of said chains.

9. In a shaft-sinking bar as described in claim 1, a spindle between each of said sidewalks and the corresponding one of said frames and a ram on said frame connected to said sidewalks for rotating each of said sidewalks about the corresponding one of said spindles.

References Cited in the file of this patent

UNITED STATES PATENTS

2,143,848 Gilman Jan. 17, 1939
2,731,235 Dellner Jan. 17, 1956
2,823,899 Bain Feb. 18, 1958