Nov. 10, 1931. G. NORTON 1,831,683

COAL BREAKER AND THE LIKE

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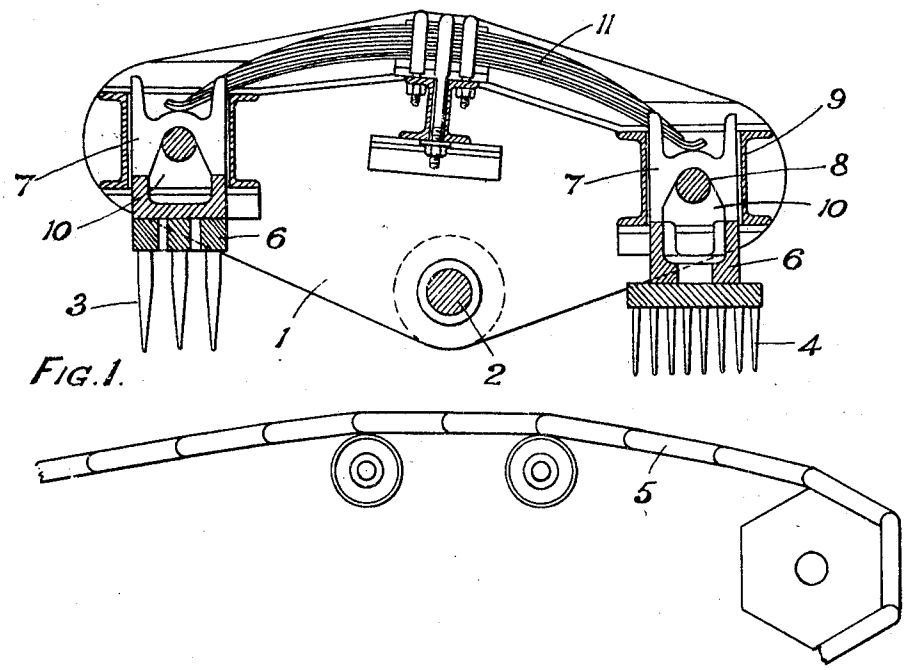
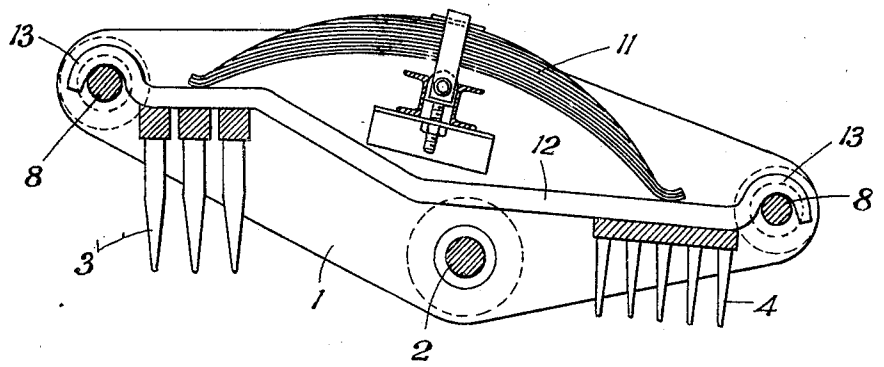


FIG. 1.

FIG. 3.



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FIG. 2.

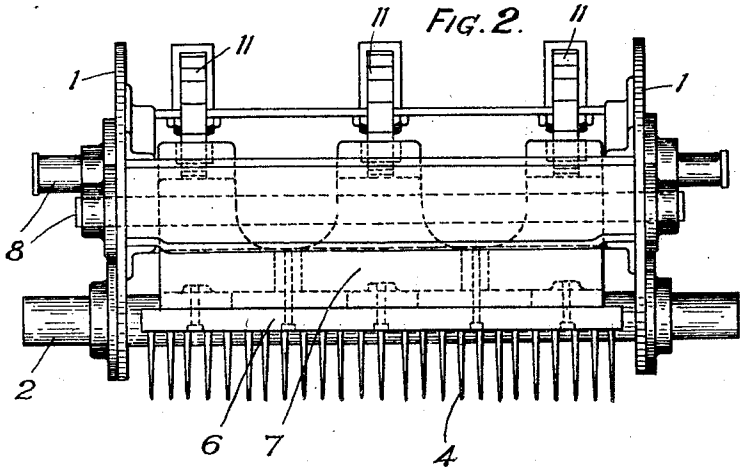


FIG. 4.

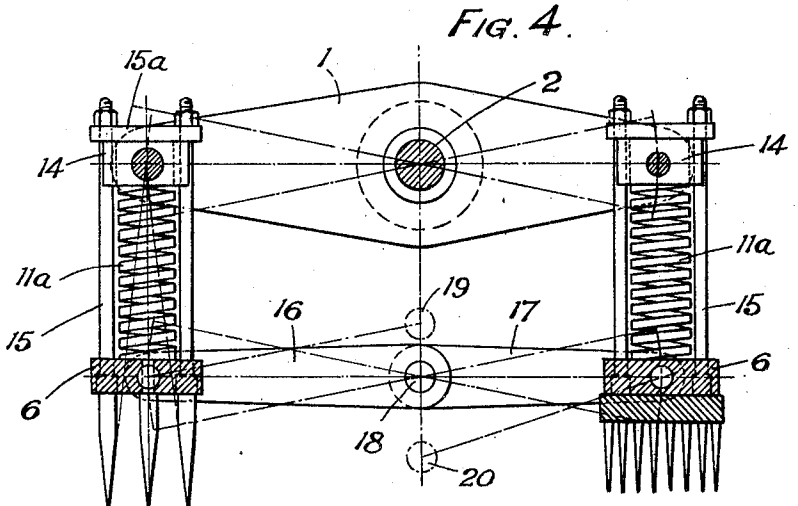


FIG. 5.

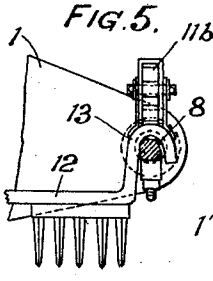
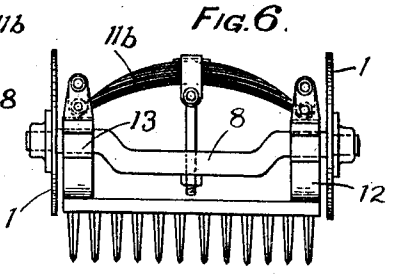


FIG. 6.



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UNITED STATES PATENT OFFICE

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COAL BREAKER AND THE LIKE

Application filed January 26, 1929, Serial No. 335,315, and in Great Britain February 7, 1928.

This invention relates to coal breakers and the like of the vertical needle type wherein the picks are carried on a swinging beam, lever or reciprocating head and the material to be broken is conveyed under groups of these picks. The object of the invention is to provide for the safety of the machine when the picks meet an abnormally hard substance.

According to this invention, the operating beam, lever or reciprocating head is provided with resiliently mounted picks so that while the motion of the beam, lever or reciprocating head is a positive one, the picks are capable of a relative receding movement and yield to the force of impact when meeting with an unbreakable body.

In one form, the beam or reciprocating head has slides in which slide members of the pick heads are adapted to move, resilient media bearing against the slide members and permitting the pick heads to yield or move back and automatically return to working position.

In another form of the invention, the picks are mounted upon a bearer arm or element which at its free ends bears upon cross shafts or the like of the beam and is acted upon by resilient media to maintain the bearer arm or element in engagement with the cross shafts but permitting same to pivot from one or the other end upon the cross shafts which serve as a fulcrum.

In another form, the pick heads are slidably mounted on the beam or cross head subject to the action of coil spring media interposed between the pick heads and the beam, said pick heads carrying the primary and secondary picks being connected to interposed radial arms in order to enable the picks to strike the material at an angle determined by the radial arms.

In another form of the invention, the bearer arms or elements carrying the picks and adapted to pivot on one or the other of the cross shafts or the like of the beam or reciprocating head are subjected to the action of elliptic or other spring media transversely disposed relatively to the bearer arms or elements.

The invention is described with reference to the accompanying drawings illustrating preferred embodiments of the invention.

Fig. 1 is a side elevation of one form of a double-acting beam carrying the picks, showing the conveyor below.

Fig. 2 is an end elevation.

Figs. 3 to 6 are modifications.

Referring to Figs. 1 and 2, the beam 1 is mounted on a trunnion shaft 2 and may be driven by connecting rods in usual manner and so cause the primary picks 3 and secondary picks 4 to rise and fall alternately and strike in turn the material passing along the conveyor 5. The pick heads 6 are provided with or connected to extension slide members 7 by which they rest on cross shafts 8 or the like carried by the beam 1, said slide members being capable of sliding in guides 9 provided on the beam. The slide members 7 have openings 10 to provide clearance for the movement of the shafts 8 when there is relative movement between these slide members and the beam 1. Semi-elliptic springs 11 shackled intermediately to machine parts straddle from the primary picks 3 to the secondary picks 4 and have their free ends bearing against or upon the slide members 7 which are consequently urged in a downward direction.

During the normal operation of coal breaking, the picks will move solidly with the beam, the springs being sufficiently strong to maintain them rigidly in position. In the event of a piece of hard foreign substance getting under one set of the picks on their downward stroke, they will yield and their movement will be stopped, but the end of the beam carrying the picks will continue to move downward and will merely cause a depression or elongation of the acting part of the springs 11, the other part of the springs still maintaining the remote slide members 7 firmly upon the cross shafts 8 or the like and keeping the adjacent picks in normal working position. No damage will thus be caused to the picks by contact with unbreakable bodies. Upon the obstruction passing from beneath the receded picks, the latter will automatically be projected into working position by the action of the springs.

Referring to the modification shown in Fig. 3, the beam 1 swings on a trunnion shaft 2, as previously described, and bearing upon the cross shafts 8 or the like fitted in the beam are bearer arms or elements 12 which engage therewith at opposite ends by means of hook-like parts 13 are equivalent. These bearer arms 12 carrying the primary picks 3 and secondary picks 4 are each subjected to the action of a semi-elliptic spring 11 having its free ends abutting thereagainst, whereby they are normally maintained in engagement with the cross shafts 8. Upon one set of picks meeting with any hard substance, the ends of the bearer arms or elements 12 carrying these picks are arrested, while the adjacent end of the beam continues its downward motion, resulting in the said arms pivoting about the remote cross shaft 8 subject to the action of the springs 11, the acting halves of which are compressed between their central connections and the bearer arms 12. The other series of picks which are not in action are held in position by the adjacent halves of the springs maintaining the bearer arms against the supporting cross shaft.

Referring to the modification shown in Fig. 4, the beam or lever 1 is mounted on a trunnion 2 and operates through coil springs 11*a* interposed between the pick heads 6 and slide abutments 14, the pick heads being fixed to guide rods 15, the upper ends of which are secured to cross pieces 15*a*. Pairs of radial arms 16 and 17 to which the pick heads 6 are attached may be pivotally connected to a common fulcrum pin 18 journalled in the machine frame. Or alternatively, these radial arms may be connected to independent fixed centres 19 and 20 vertically offset, that is, the lever 16 to the higher centre 19 and the lever 17 to the lower centre 20. This improves the angle at which the picks strike the material passing along the conveyor.

Referring to the modifications shown in Figs. 5 and 6, the primary and secondary picks are carried by bearer arms or elements 12 as in the construction shown in Fig. 3, and have hook-like parts 13 or equivalent engaging cross shafts 8 or the like. Semi-elliptic springs 11*b* are arranged transversely to the bearer arms or elements 12 and at their free ends bear on the latter.

It is obvious that instead of a swinging beam, there may be employed a reciprocating head, in or on which the picks are resiliently mounted.

What I claim is:—

1. In a coal breaker, a reciprocating part, a head interposed between said part and the coal to be broken, picks mounted in said head and presented toward the coal, and resilient means interposed between said head and part and acting in the line of said reciproca ory movement of said part and normally forcing the head away from said part and toward the coal, and means limiting the movement of said head relative to, and away from, said part, said reciprocatory part completing its reciprocatory movements under all operative conditions and independently of said head when the picks carried by the latter strike an abnormally hard substance.

2. Coal breakers and the like comprising a beam pivoted on a trunnion shaft, guiding means respectively connected with the respective remote end portions of the beam, primary and secondary picks respectively carried and guided by said guiding means in spaced relation to, and for movement toward and from, their said respective end portions of the said beam and substantially at right angles thereto, and resilient means interposed between said picks and said beam end portions respectively and normally acting to force said picks away from their respective beam end portions.

3. Coal breakers and the like comprising a horizontally disposed beam mounted on a trunnion for rocking movement to cause reciprocatory thrusting movements of its end portions respectively, guiding means respectively connected to the respective end portions of said beam, each said guiding means depending from said beam toward the coal and extending in a vertical direction, heads respectively disposed between said beam end portions and the coal and connected by said guiding means to their respective end portions of said beam and guided under abnormal conditions by their respective guiding means during relative movement between said heads and said beam end portions respectively, picks mounted in said heads and presented toward the coal, and resilient means interposed between said beam and said heads to force the latter away from said beam end portions respectively, said resilient means acting on said heads respectively to force them toward the coal in the line of thrust of the respective beam end portions.

4. Coal breakers and the like comprising a part movable toward and from the coal, a head interposed between said part and the coal and spaced from said part, picks carried by said head and presented toward the coal, said part and head having sliding movement with relation to each other under abnormal conditions, guiding connecting means between said head and part, and resilient means exerting pressure upon said part and directly upon said head in a direction lengthwise of said guiding connecting means to normally force and hold them in their greatest spaced relation.

In testimony whereof, I have signed my name to this specification at Birmingham, England, this 2nd. day of January, 1929.

GEORGE NORTON.