(No Model.)

C. H. BOARDMAN.

CHAIN FOR MINING MACHINES.

No. 596,673. Patented Jan. 4, 1898.

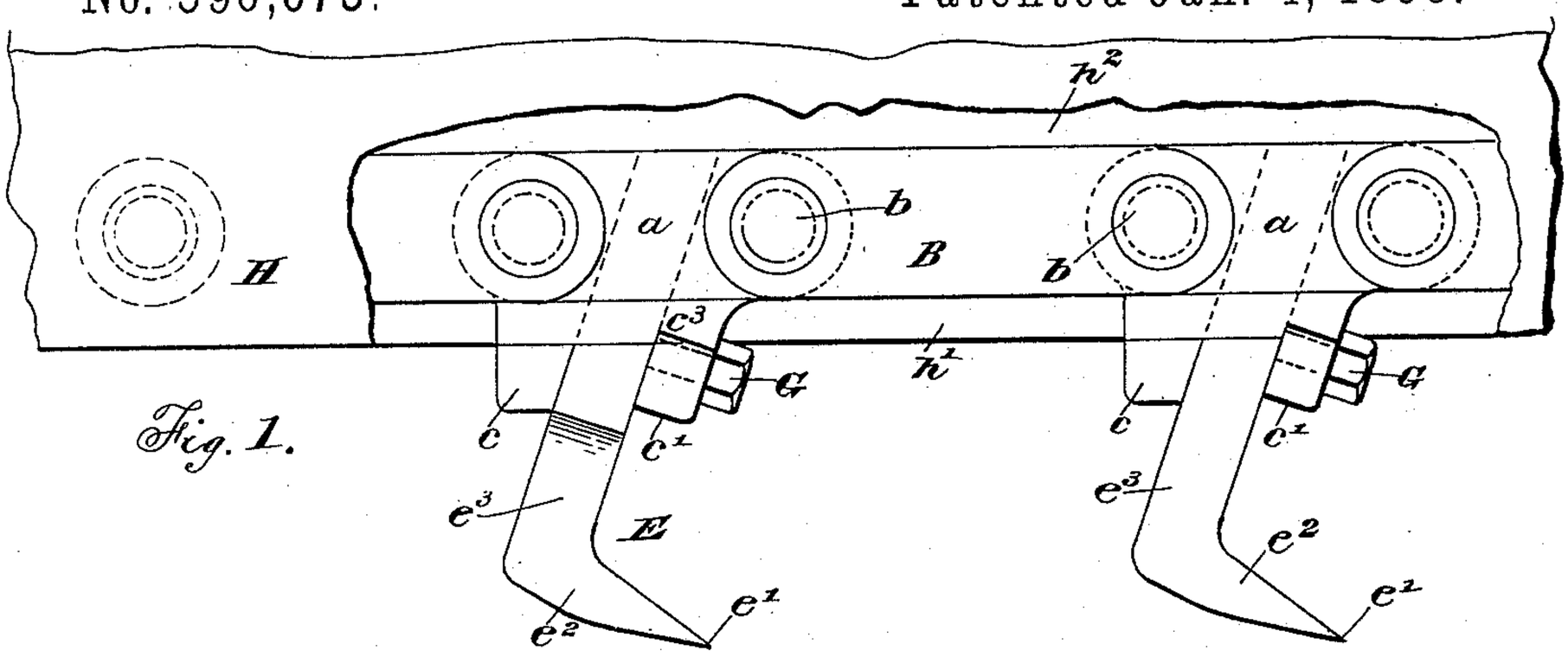

Fig. 1.

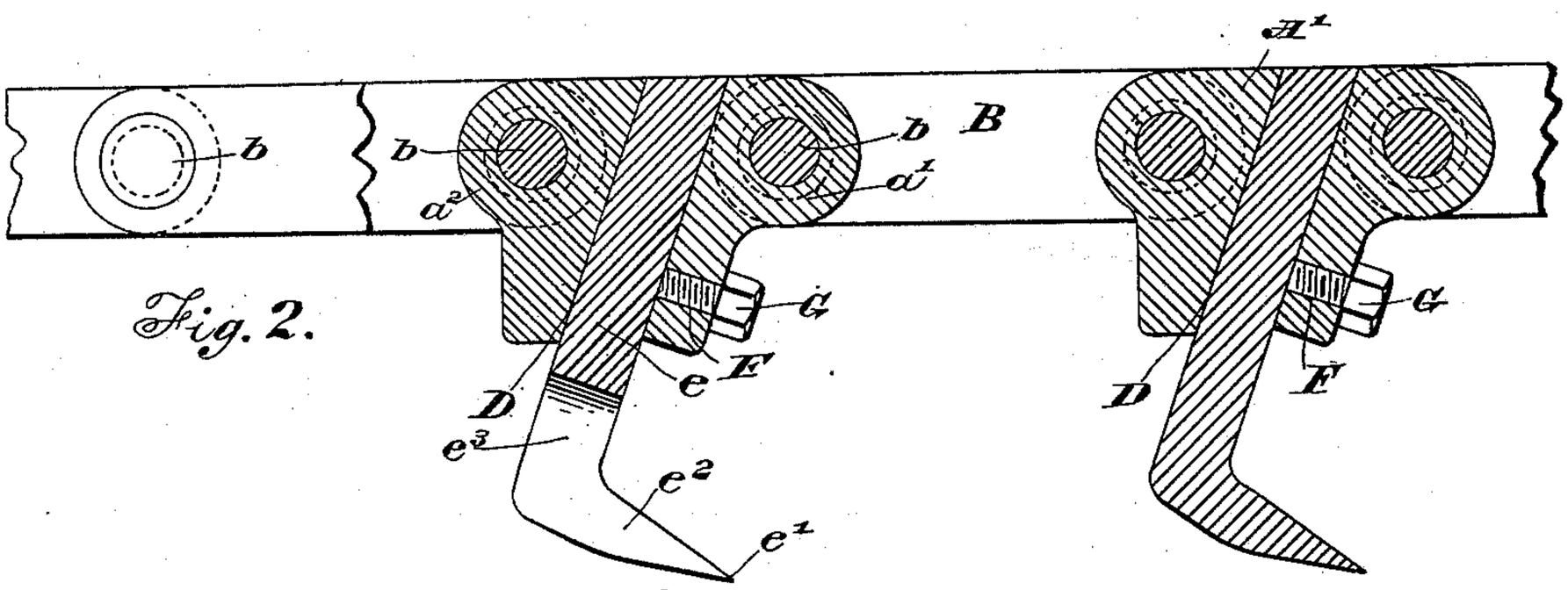

Fig. 2.

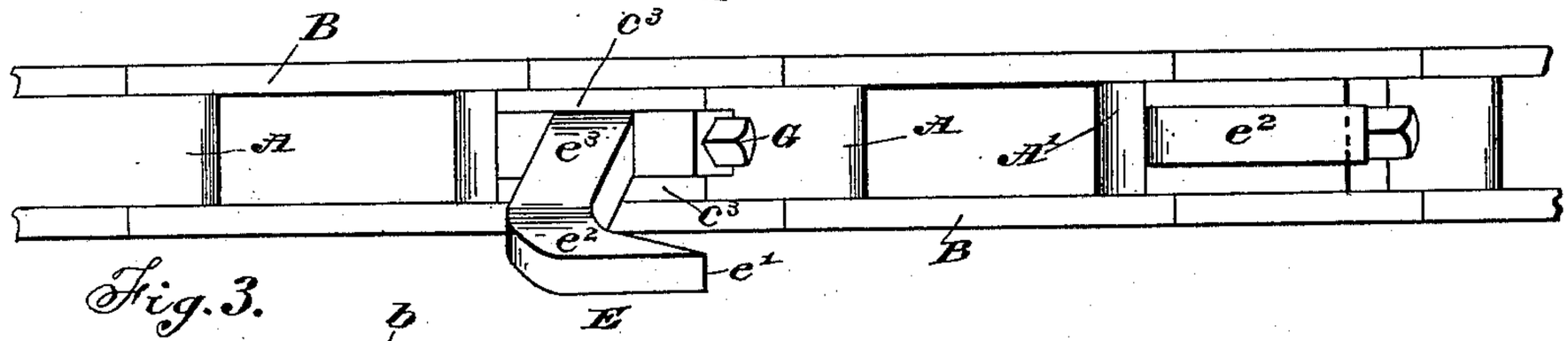

Fig. 3.

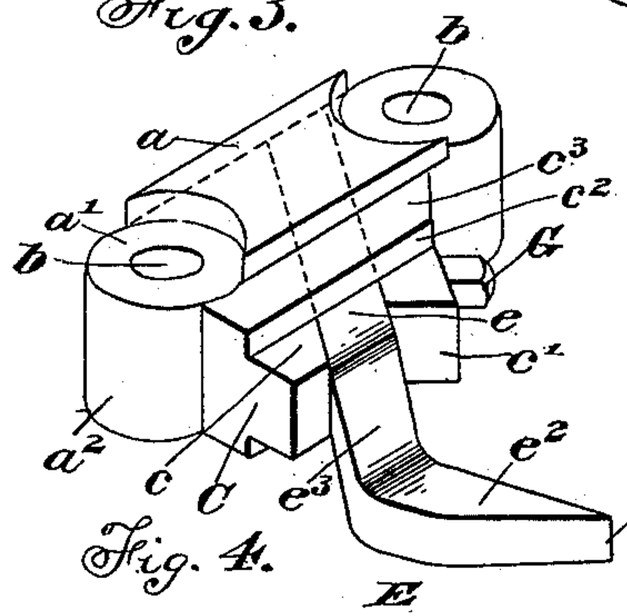

Fig. 4.

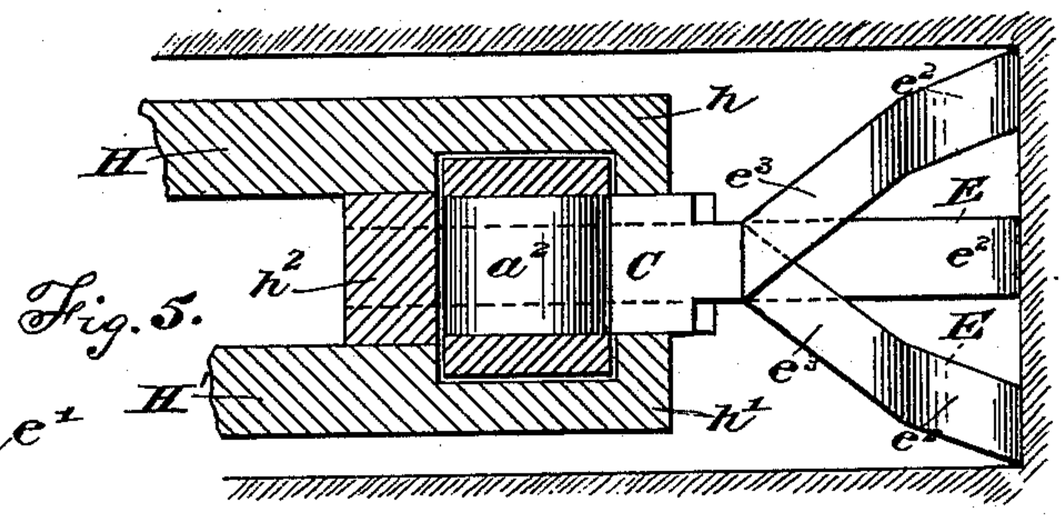

Fig. 5.

Witnesses;
Frank Blair Rives
H. H. Edwards.

Inventor;
Charles H. Boardman
by
H. C. Fox Bros
Attorney.

UNITED STATES PATENT OFFICE.

CHARLES H. BOARDMAN, OF COLUMBUS, OHIO.

CHAIN FOR MINING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 596,673, dated January 4, 1898.

Application filed August 30, 1894. Serial No. 521,735. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. BOARDMAN, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Chains for Mining-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

Figure 1 is a plan view of a sufficient portion of a chain to illustrate the manner of applying my improvement. Fig. 2 is a horizontal section. Fig. 3 is a front view. Fig. 4 is a sectional view through the chain and showing a portion of the kerf cut thereby. Fig. 5 is a detail view of one of the chain-links.

In the drawings the chain is shown as made up of the main links A A' A^2 and the connecting-bars B B. The links, so far as their details are concerned, may be of several forms. As shown, the links A A' A^2 are each constructed with a central thicker part *a* with end lugs or ears *a'* a^2. The connecting-bars B are pivoted to these ears, as shown at *b*.

C indicates a projection or enlargement extending forward from the parts *a a'*, it being formed with the portion *c*, having an inclined face *c'* and the lug or shoulder at c^2.

D represents a socket or aperture formed in the link at an angle to its central longitudinal line. Its lines are substantially perpendicular to the face *c'* and parallel to the face c^3.

E indicates a cutter, it having a shank *e*, the cutting edge *e'*, a finger e^2, extending backward somewhat from the edge *e'*, and a connecting portion e^3. This latter part e^3 is bent down or upward or projects more or less straight forward, according as it is desired to have the cutting edge in one horizontal plane or another. In link A it is bent downward. In link A' it extends out horizontally, and in link A^2 it is bent upward.

At F there is a threaded aperture formed on lines at right angles to the shank *e* of the cutter.

G is a set-screw engaging with the wall of the aperture F and having its end adapted to impinge upon the said shank or stem *e*.

I am aware that longitudinally-stationary cutters—that is, cutters not adjustable longitudinally—have been employed, together with set-screws impinging on the backs of the cutters. The advantages incident to my construction over those just referred to will be readily appreciated. To be effective, the clamping-screw must project more or less beyond the inner end of its aperture in order to press against the shank of the cutter. If it bears against it on its rear side with any effect, the screw at once takes necessarily all of the back pressure, which is enormous and which is at once transmitted to the screw-threads. Actual experience has shown that this pressure is sufficient to back or force out the screw in some cases and in others to mar the threads. I relieve the screw-threads entirely of pressure and strain by inclining the sockets backward relatively to the line of travel, placing a thick strong metallic abutment behind the cutters and clamping them by a screw in front, so that when the cutter is engaging with the coal the screw not only has no increase of back pressure, but is, if anything, relieved of its normal pressure.

It is the matter of longitudinal adjustability of the cutter-shank at which I aim in having the set-screws at right angles to the opposing surface of the cutter. Even when the set-screws are placed in front of the cutter-shanks in these chains they are constantly liable to become loosened by the severe vibration and jolting experienced by the chain when tearing through the coal, and when they are placed vertically (as they have been in another class of machines) they must be very short or there is liability for the screws when they get loose to engage with the top or bottom of the kerf; but by arranging them horizontally, as I place them, they can be seated in thick strong metallic holders and can themselves be as long and as heavy as is necessary without the above liability, for they can loosen entirely from their apertures without danger of engagement with the kerf.

Another advantage incident to inclining the socket backward relatively to the longitudinal lines of the link is that I can preserve the longitudinal adjustability of the cutter-shank and have the metallic holder C short, for the set-screw being correspondingly short can be brought to bear at a point close to the draft-lines of the link-bars and so that the head of the screw when rotating will not interfere with the brace-flanges *h h'*.

It must be understood that every small frac-

tion of an inch outward from the line of the hinges or pivots of the chain-links is when considering the location of the cutter and the set-screw a matter of great importance, as the leverage on the chain-hinges increases enormously with such fraction of an inch, a fact whose importance will be appreciated when it is remembered that at any instant a strain of ten-horse power is liable to be experienced by any cutter-point—that is, the entire power of the machine.

The socket-links not only permit longitudinal adjustment of the cutters, but permit the application in this adjustable way of any one of these three styles of cutters—that is to say, the cutter-links are all duplicates of each other and the chain therefore differs from the earlier ones, each of which had not one series of duplicate links, but comprised a number of series with three or more differing links in each of the several series. One link had a socket inclined outward and downward in a plane at right angles to the link, the next having a socket extending centrally in said plane, and the next a socket extending upward from the link outwardly in the said plane. Consequently it was necessary to keep on hand links of two or more sorts for supplies and to provide for breakage, &c. This is avoided in the present case, as any link can be applied anywhere in the chain and is capable of receiving any one of the three cutters.

I herein mention that the cutter-sockets, the cutter-shanks, the projections C *c c'*, and the set-screws lie in or are extended along horizontal planes or in the planes of travel, meaning thereby planes which are transverse to the pintles of the chain-links. I also describe the cutter-sockets and the cutter-shanks as being backwardly inclined, meaning that their lines extend backward as to the direction of the chain.

The parts C *c c'* and the set-screws lie outside of the draft-lines of the links—that is, the lines between the front plane and the rear plane of the bars B B.

I am also aware that prior to my invention it has been proposed to provide a chain-driving sprocket-wheel with sockets adapted to receive cutters and to hold the cutters in position by set-screws working through passages connecting the cutter-sockets and the sprocket depressions in the wheel; but such a construction is undesirable and differs in important particulars from my present improvements. In the construction referred to the set-screws lie wholly within the perimeter of the wheel and their heads are covered by the chain when in line therewith. Therefore it is impossible to readily adjust the cutters in the wheel accurately with relation to the chain, as in order to effect an adjustment the chain must be either removed from the wheel or the latter turned to such position that the cutter which it is desired to adjust is out of the path of the chain.

I am also aware that it has been proposed to place cutters in sockets formed in the links of a chain and to hold them in place by set-screws arranged behind the cutters. This has been found undesirable, as the entire pressure exerted upon the cutters is taken by the threads of the set-screws. Again, in this last construction the cutters were not adjustable longitudinally as are those shown and described in the present case. It is necessary in using chain-cutting machines to frequently adjust the cutters in order that all may have their points or cutting edges in the same operative lines, and therefore this feature of longitudinal adjustment is a most important one. By my construction it will be seen that I provide beyond the draft-lines of the chain an abutment both in front and in rear of the cutter-shank, and that the set-screws are arranged beyond the said draft-lines, so as to be accessible at all times, although the body of the links are between guides, preventing access thereto.

It will be seen that by my invention the draft part of the chain is housed within the guide on the carriage, the chain being made of flat strap-links with interposed cutter-links. These are so arranged that they may slide smoothly through the guideway without obstruction or interference and at the same time shall be prevented by the flanges *h h'* from getting out of proper line; also, it will be seen that a prolonged support is given the cutters by means of the projections C, which extend outward between the flanges *h h'*, and also that I provide for lessening the distance between the cutter-points and the center lines of the chain by bringing the set-screw into the line of the flanges *h h'*.

What I claim is—

In chain-cutter mining-machine, the combination with the carriage having the chain bracing and guiding plates H H' formed with the inwardly-projecting flanges *h*, *h'* at their front edges of the cutter-carrying chain having the flat strap-link bars B, B, traveling in the chain-guide behind the flanges *h h'*, and the cutter-links pivoted to the adjacent strap-links each cutter-link having a portion C that extends outward from the chain-guide on lines between the flanges *h*, *h'* said projections C each having a cutter-socket which extends through the projection and through the body of the cutter-link, cutters having their shanks seated respectively in the said sockets and longitudinally adjustable therein, and set-screws respectively mounted in the projections C on the front side of the cutters and having their inner ends in the planes of the flanges *h*, *h'*, substantially as set forth.

In witness whereof I hereunto affix my hand in the presence of two witnesses.

CHARLES H. BOARDMAN.

Witnesses:

RUFUS HUTCHINS,

O. M. HEFFNER.