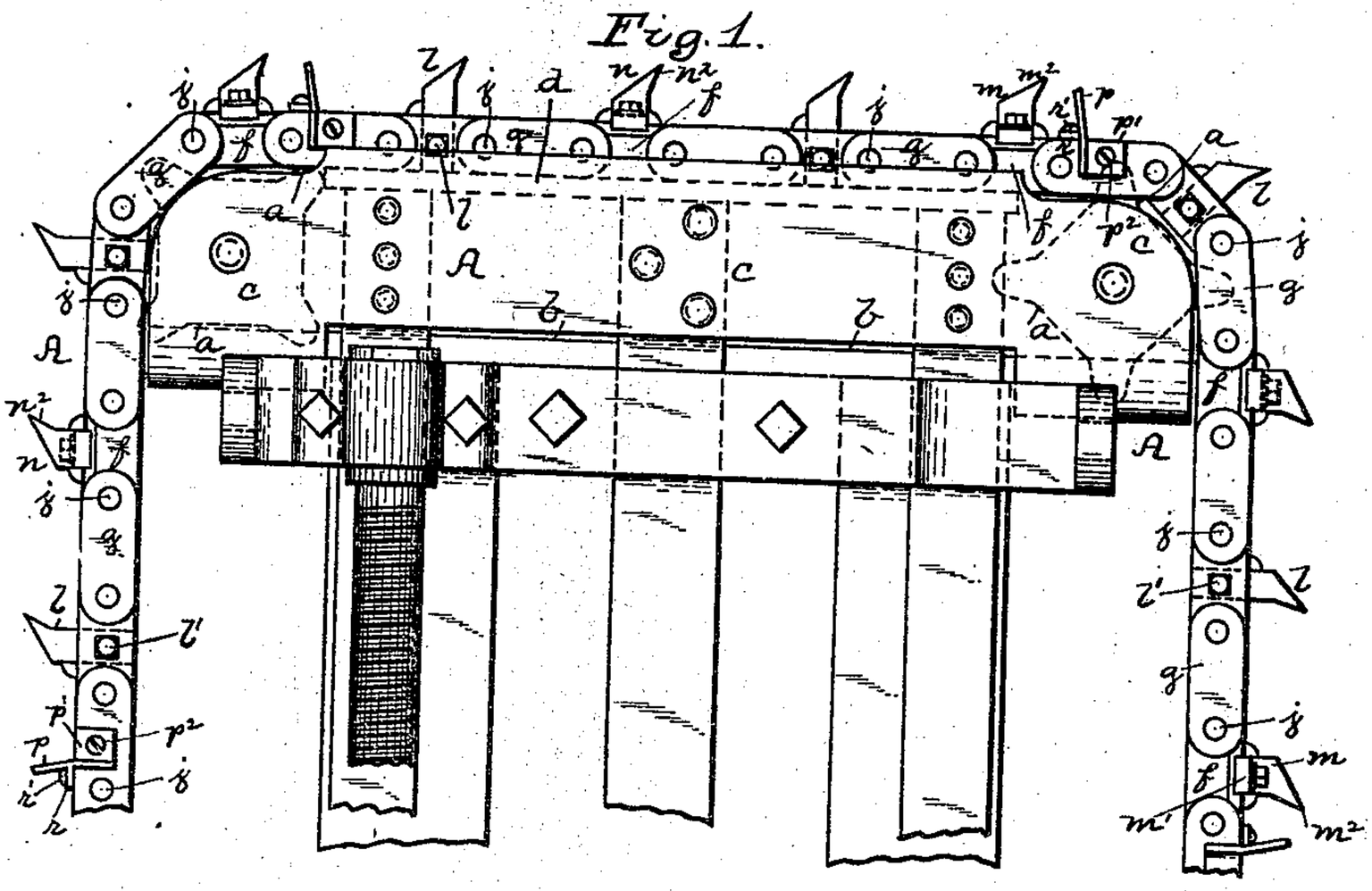
(No Model.)

B. A. LEGG & A. KEIL.

MINING MACHINE.

No. 501,795. Patented July 18, 1893.

Fig. 1.



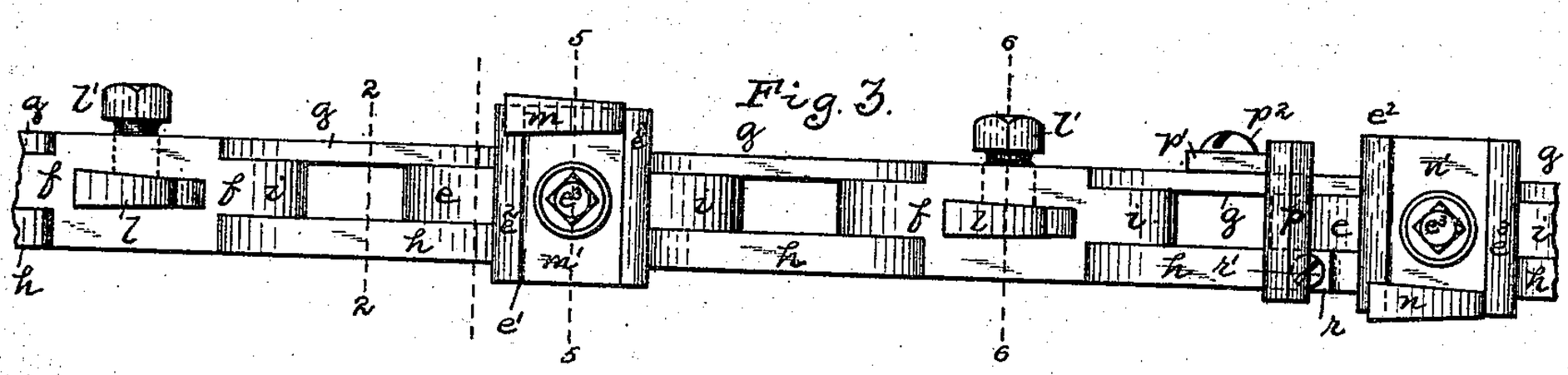


Fig. 3.

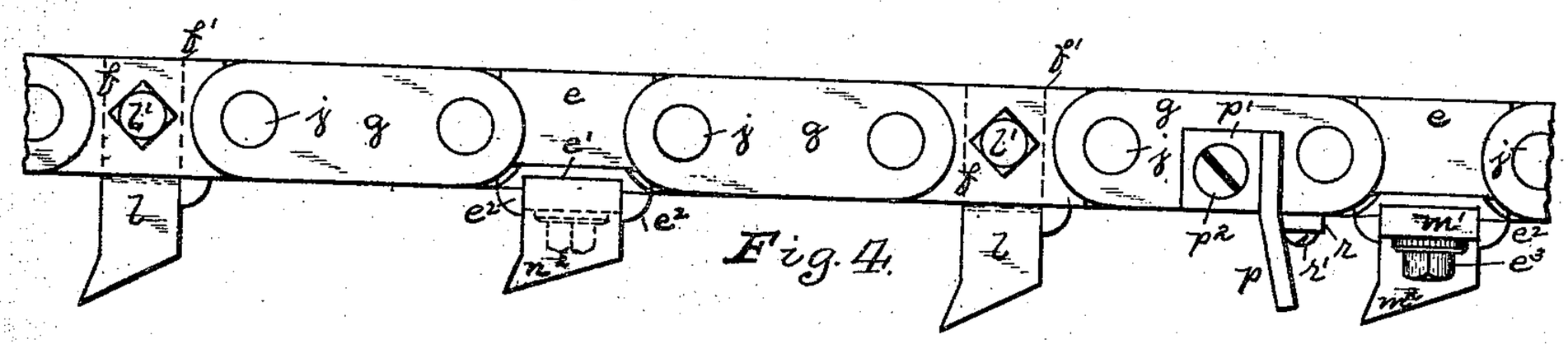


Fig. 4.

Fig. 2.

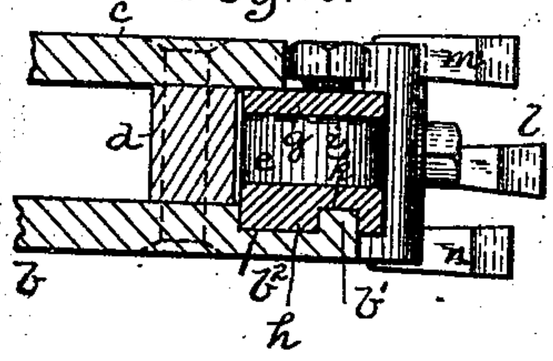


Fig. 5.

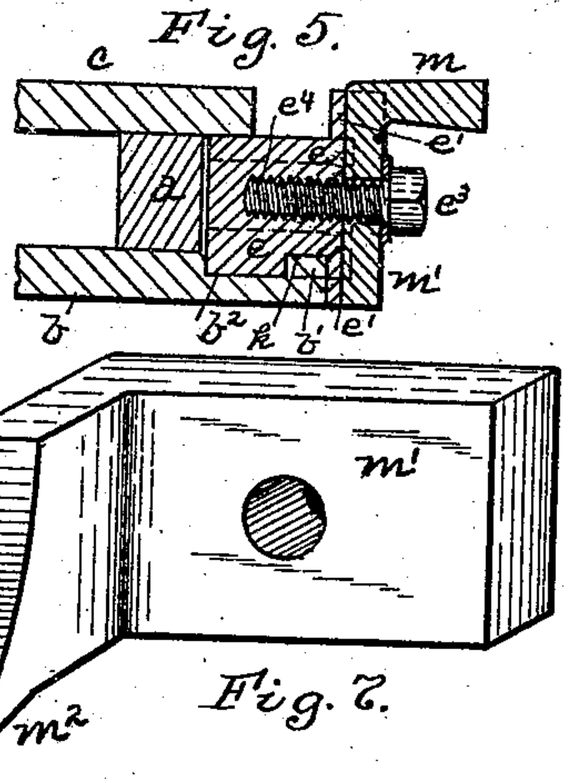


Fig. 6.

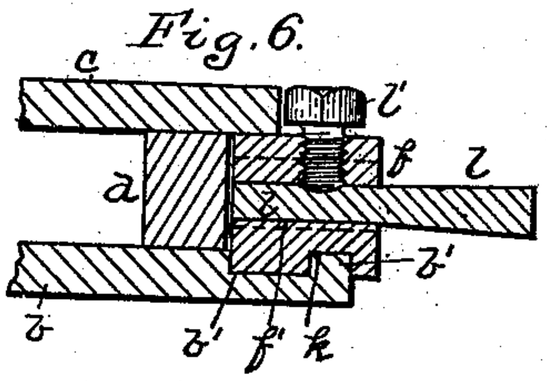


Fig. 7.

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UNITED STATES PATENT OFFICE.

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MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 501,795, dated July 18, 1893.

Application filed March 26, 1891. Serial No. 386,497. (No model.)

To all whom it may concern:

Be it known that we, BENJAMIN A. LEGG, of Allegheny, and ADAM KEIL, of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Mining-Machines; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to certain improvements in mining machines and more especially to that class of mining machines in which a cutter chain is employed, said chain passing across the face or forward end of or around a movable frame or carriage and cutting a kerf in the coal by means of cutters secured to the different links of the chain.

Our invention relates especially to the means of attaching the cutter scrapers to the cutter chain, as will be hereinafter more particularly set forth and claimed.

To enable others skilled in the art to make and use our invention, we will describe the same more fully, referring to the accompanying drawings in which—

Figure 1 is a top view partly broken away of the forward end of the mining machine carriage. Fig. 2 is an enlarged cross section of the same on the line 2—2 Fig. 3. Fig. 3 is an enlarged face view. Fig. 4 is an enlarged top view. Fig. 5 is a cross section on the line 5—5 Fig. 3. Fig. 6 is a cross section on the line 6—6 Fig. 3; and Fig. 7 is a perspective view of the cutters employed as upper and lower cutters in the chain.

Like letters of reference indicate like parts in each view.

The mining machine carriage A has secured at the forward end thereof, the bottom guide plate *b*, and the top guide plate *c*, between which is the bar *d* forming the back portion of the guide way between the sprocket wheels *a*, which guide the chain in its movement, the chain traveling around such sprocket and along the guide way formed by the plates *b c*, and bar *d*, to the sprocket wheel *a* at the other end of the carriage and thence back to the power driven sprocket which imparts motion to the chain. The cutter chain is formed of the upper and lower cutter links *e*, the central link *f*, and connecting straps *g*, *h*, by means of which these main links are connected. The main links *e* and *f* have extending out from the sides thereof, the bearings *i*, which are suitably perforated for the reception of the rivets *j* and the ends of the straps *g* and *h* are similarly perforated, the rivets *j* passing through the straps and the bearings *i* of the main links, and so securing the chain together.

In order to hold the chain in proper line in the guide ways formed by the plates *b* and *c* and the bar *d*, we form along the lower face of the several main links *e* and *f* and the lower straps *h*, the longitudinal groove *k*, these lower straps *h* being made of much greater thickness than the upper straps *g* in order to receive such groove and at the same time have the full strength of the upper straps; and upon the lower plate *b*, we form the projecting longitudinal rib *b'*, which enters into the longitudinal groove *k* and so holds the cutter chain in proper line in its course across the face of the carriage.

As it is desirable to form the bottom guide *b* of considerable thickness and also to support the chain in such position that its cutters may cut a kerf into which the entire carriage may enter, we generally form this projecting rib *b'* by grooving out the bottom plate *b*, as at b^2 to receive the body of the links between such groove *k* and the rear faces of the links. The link *f* supports the central cutter *l*, that is the cutter which extends out from the center of the kerf and acts to cut that portion of the kerf, said cutter being simply a straight cutter fitting within a mortised seat *f'* extending horizontally through the link *f* and the cutter being held in place by the set screw *l'* extending through the top of the link into the mortise so as to engage with the cutter.

The upper and lower cutters are secured in links *e* in the following way:—Each link has a vertical transverse grooved seat *e'*, formed in its front face, the body of the link extending out on each side thereof, and such portions of the link forming supporting ribs e^2 for giving support to the body portion *m'* or *n'* of the upper cutter *m*, or lower cutter *n*. The cutters are angular in shape and said body portions *m'* or *n'* fit neatly within the seats *e'* and are secured therein by the bolts e^3 which pass through the body portions of the cutters and enter threaded seats e^4 below the grooved seat e^5, so securing the cutters firmly to the faces of the links.

Each cutter *m* or *n* is provided with the

cutting wing m^2 or n^2, which extends out at about a right angle from the body portion of the cutter in the position desired for the cutting operation.

It will be noticed that a considerable space is left between the horizontal plane of the central cutter and of the upper and lower cutters, respectively, and as will be seen from Figs. 2 and 5, the central cutter *l* extends out farther than the upper and lower cutters *m*, *n*, which are secured to the links *e*, the purpose of such construction being to enable the central cutter to cut ahead of the upper and lower cutters so as to form a groove in the face of the coal, while the upper and lower cutters, which, as will be seen from the several figures, extend out at such points that a considerable space is left between the horizontal plane of one cutter and the horizontal plane of the other cutter, will be enabled to break off the core or rib of coal extending into such space, so overcoming the necessity of cutting out the same; the coal being left weak by the course cut by the central cutter, and the upper and lower cutters following the same simply cutting along the upper and lower faces of the kerf and breaking out the cores which are left between their course and that of the central cutter.

It is considered necessary in the cutting of some coal to provide a scraper to carry out the cuttings or slack, and for this purpose in order to support such scraper without engaging with the lower faces of the links which are necessarily made in such form as to be supported by the bottom plate *b* we provide the scraper *p* with the horizontal lug *p'*, which is secured to the top face of the top link *g* by a screw or bolt p^2, while at the lower edge of the scraper *p* is a vertical lug *r* which extends out parallel with the front face of the lower strap *h*, and is secured thereto by a screw or bolt *r'*, such construction giving a proper support for the scraper and not in any way interfering with the lower face of the chain.

The operation of the mining machine having such chain is as follows:—The chain is carried across the face of the carriage by power applied at a suitable point in the chain, passing first around the sprocket wheel *a* at one end of the carriage and thence by the guide way formed by the upper and lower plates *c*, *b*, being held in perfect line by the rib *b'* fitting in the groove *k*. As it cuts its course, the center cutter *l* cuts ahead of the other cutters, which are supported in the links *e*. We prefer that the lower cutter *n* should follow the center cutter and break the coal upwardly into the space or cut made by the cutter *l*, and that following that, the upper cutter *m*, should cut its course. The two cutters *l* and *m* may of course be arranged in the same link, being formed at the upper and lower end of the body portion of the cutter, such arrangement being employed where a hard coal is encountered. The space between the plane of the three cutters is not acted upon by the same, except as that part is left weak, as a core, which will quickly be broken off by the cutters, and, in addition to the reduction of the power necessary to drive the chain, the advantage of such construction is that we do not reduce all the cuttings to dust, but leave a large portion thereof in the form of rather fine slack, which is very much preferred to the ordinary coal dust. The scraper will remove the cuttings when it is employed, as is found necessary in cutting soft coal, and where the chain is running rapidly. The upper and lower cutters are firmly supported by the body portions thereof in the vertical grooved seats in the links *e*, which extend down on a line with the cutting wings and so give a firm support thereto, all liability of the twisting or turning of such cutters, which has been one of the objections to the ordinary form of cutter heretofore employed, which entered horizontal mortises and were bent up into the position in which they were to cut, being overcome. At the same time as the lower straps *h* are much thicker than the upper straps *g*, though grooved for the reception of the guide rib *b'*, they have the full strength of the same.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a cutter chain for mining machines, the combination of a chain link having a vertical transverse grooved seat *e* formed in its front face and having a threaded seat e^4 below the same, and a cutter having a body portion fitting in said grooved seat and a cutting wing extending out at an angle to the body portion, and a bolt passing through the body portion and into the threaded seat e^4 of the link, substantially as and for the purposes set forth.

2. A mining machine having a guide way extending across the face thereof provided with an upwardly projecting rib, in combination with a cutter chain provided with a longitudinal groove formed in the lower face thereof to receive such supporting rib on the bottom guide plate, said chain being formed of main links and connecting straps, and the lower connecting straps being thicker than the upper connecting straps, substantially as and for the purposes set forth.

3. A mining machine cutter chain, having a scraper secured thereto, said scraper having a horizontal lug extending over and secured to the top face of a chain link, and having a vertical lug extending out from the side thereof, and connected to the front face of the chain link, substantially as and for the purposes set forth.

In testimony whereof we, the said BENJAMIN A. LEGG and ADAM KEIL, have hereunto set our hands.

BENJAMIN A. LEGG.
ADAM KEIL.

Witnesses:
ROBT. D. TOTTEN,
J. N. COOKE.