No. 684,358. Patented Oct. 8, 1901.

# H. B. DIERDORFF.

## MINING MACHINE.

(Application filed Aug. 9, 1895.)

(No Model.) 2 Sheets—Sheet 1.

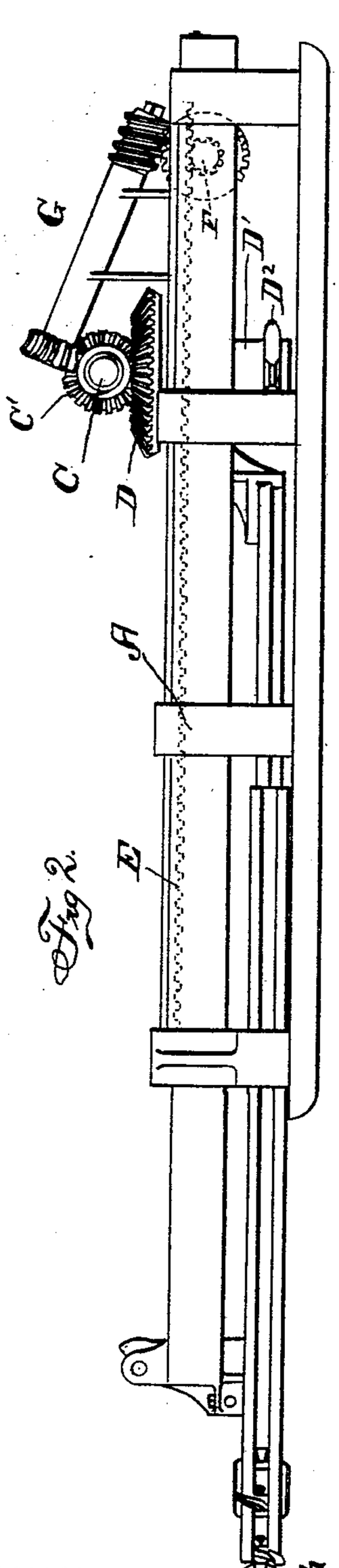


Fig 2.

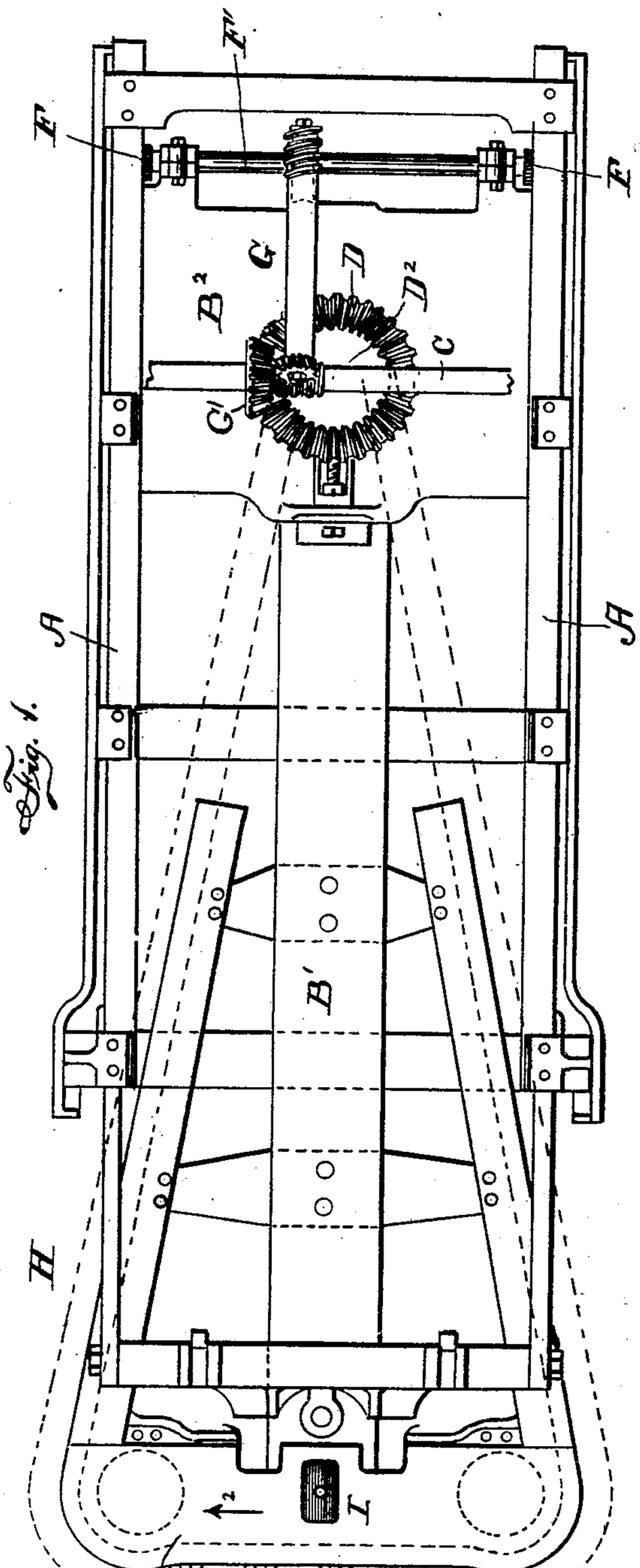


Fig. 1.

Witnesses
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Wm. L. Ludlow.

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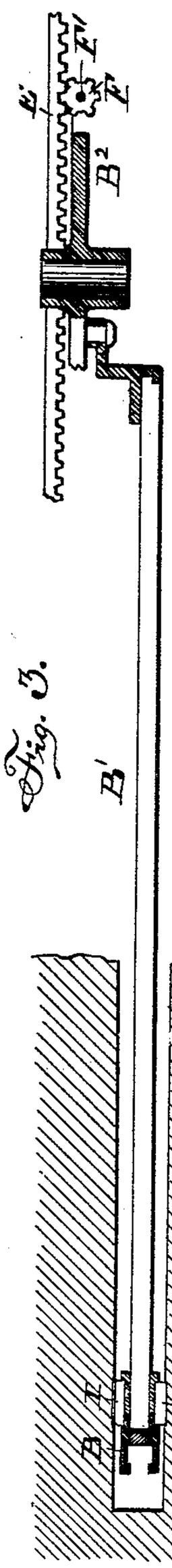


Fig. 3.

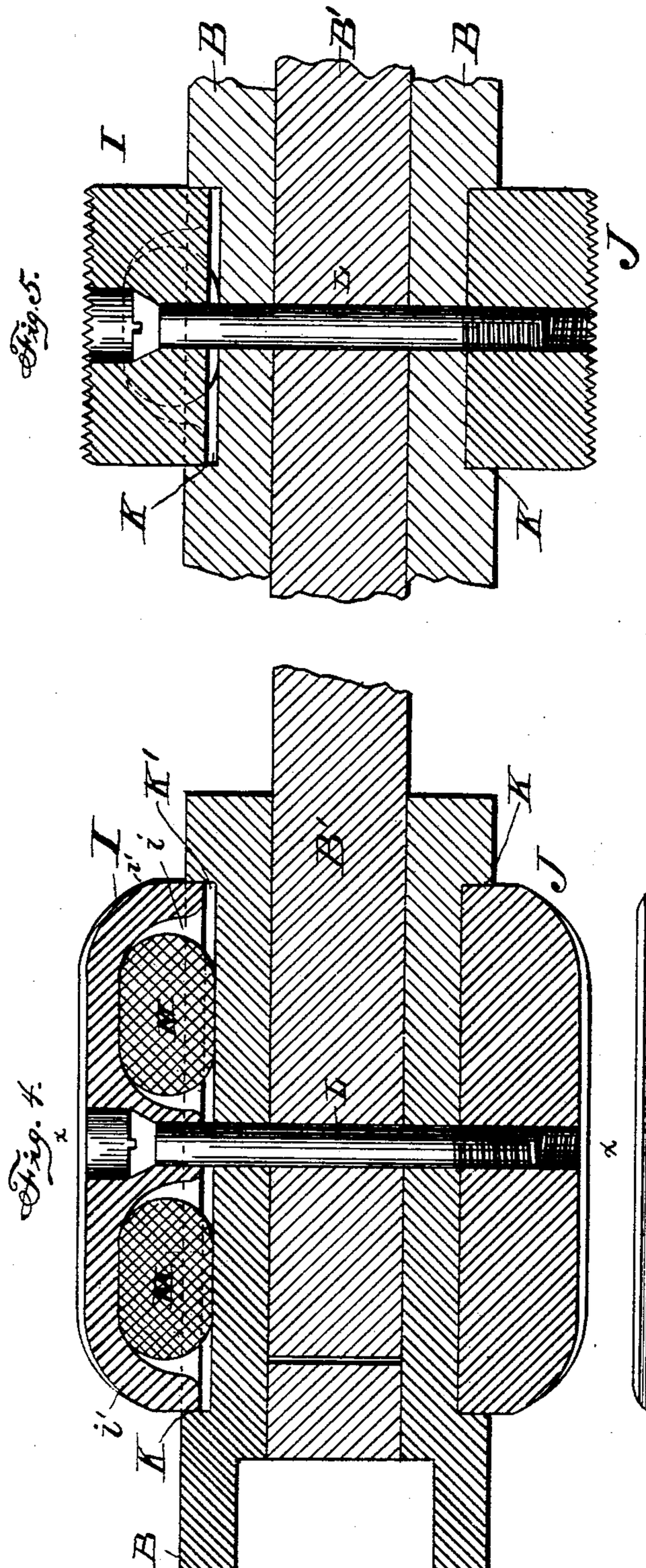


Fig. 5.




Fig. 4.

Fig. 6.

Witnesses:
Wm. H. Edwards
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# UNITED STATES PATENT OFFICE.

HENRY B. DIERDORFF, OF COLUMBUS, OHIO, ASSIGNOR TO JOSEPH A. JEFFREY, OF SAME PLACE.

## MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 684,358, dated October 8, 1901.

Application filed August 9, 1895. Serial No. 558,765. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY B. DIERDORFF, 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 Mining-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in mining-machines, it pertaining more particularly to improvements in machines of the sort in which use is made of a bed-frame, a sliding carriage, and a cutting apparatus at the front end of the carriage adapted to be thrust directly forward therewith, the cutters being arranged to move transversely of the carriage or across its front, they traveling on lines at an angle to the line of advance of the carriage. There is incident to machines of this sort a lateral thrust or pressure on the carriage in a direction opposite to the travel of the cutters, which results in a tendency to move or displace the carriage. Prior to my present invention one or the other of four methods have been followed in attempting to overcome this difficulty. In the first case use was made of a moving cutter above or below the main kerf—such as an auger, rotary cutter-wheel, or the like—dependence being placed upon such rotary cutter alone to effect the holding or alining of the machine. In the second case use was made of two cutters to form the main kerf moving simultaneously and in opposite directions—as, for instance, two chains, two saws, or the like. In the third instance use was made of a moving cutter, such as an auger or the like, and a supplemental plate or bar of metal behind it following in its cut. Fourthly, a stationary cutter-holder has been used projecting vertically from the carriage and adapted to be constantly pressed against the coal, it being constructed in such way as to cut a shallow vertical groove or kerf.

I have found that when any of the devices above referred to are used there is a consumption of power at all times which is undesirable and that at some times obstructions are met which seriously impede the advance of the carriage and cause not only a back pressure, but a wedging of the front parts of the carriage between the top and bottom walls of the kerf.

The object of the present invention is to provide a friction-holder which shall act to provide an engagement both with the top and bottom walls of the main kerf without requiring the presence of a cutter of any of the sorts heretofore used.

It also relates to providing a holder of the sort last described which shall be adapted to yield readily when obstructions are met which would be apt to cause breakage or serious back pressure and loss of power unless a yielding action were provided.

Figure 1 is a plan view of a portion of a mining-machine embodying my improvements. Fig. 2 is a side elevation thereof. Fig. 3 is a view more or less conventional, showing the positions and actions of the parts when the machine is at work. Fig. 4 is a longitudinal section showing the front cross-head and the holding device on a larger scale. Fig. 5 is a section on the line $x\,x$, Fig. 4. Fig. 6 is a top plan view of the upper part of the holder.

In the drawings a portion of a mining-machine is shown—a bed-frame A, formed in the usual manner of side bars and cross connecting-girths. Upon this there is arranged a carriage adapted to support the cutters. I have shown my form of carriage, but there can be variation in this respect. That illustrated comprises the front cross-head B, the thrusting and guiding bar B′, and the platform for the power devices at $B^2$. Power can be generated or applied in any suitable way.

C indicates a power-shaft having a bevel-pinion C′, meshing with a bevel-wheel D on the upper end of the shaft D′, which carries at its lower end a sprocket-wheel $D^2$. The carriage is advanced by means of racks E, secured to the bed and the pinions F on the carriage, the latter being carried by the shaft F′. Power is transmitted by the shafting and gearing (indicated at G) from the shaft

C to the shaft F′. By means of these devices a powerful, constant, and steady forward thrust is exerted upon the carriage and the cutting apparatus.

H indicates the cutting-chain. It is driven from the sprocket-wheel $D^2$ and passes thence forward to the cross-head B, traverses the front side of the latter, and returns thence to the driving-wheel.

When the cutters *h* are engaging with the coal, they travel in the direction of the arrow 1, Fig. 1, and they tend to push the carriage and the machine as a whole in the opposite direction, as indicated by the arrow 2 in Fig. 1. To overcome this, I employ a holding and alining device. It is composed of an upper part I and a lower part J. The part I is of the form of a block having one or more chambers, as at *i*, for a purpose to be described. It is situated so as to bear against shoulders or projections on the carriage-plate, as shown at K, these being preferably provided by sinking a cavity or recess in the carriage-plate adapted to receive the holder I. I have attained satisfactory results when the upper or operative surface of this holder I is comparatively smooth; but in order to meet all conditions I prefer to form it with a roughened or corrugated upper surface, so that its slipping laterally or transversely to the corrugations will be impeded. At its front and rear edges it is rounded, as shown at *i′*, so that it can slip or move along the overhanging surface of coal readily both when the carriage is advancing and when it is receding. J indicates a more or less similar block or shoe-piece secured to the under side of the carriage. It also has a smooth or slightly corrugated surface adapted to press against the bottom of the main kerf and is held in place by shoulders or projections K, provided by forming a cavity or countersink in the under side of the carriage-plate. Preferably the upper and lower parts I and J are fastened by a common bolt L; but this is not necessary. The upper block or shoe-piece I is held by a yielding support, so that it can give way vertically to a greater or less extent in case a severe downward pressure is exerted upon it. I have found that hard-rubber balls, such as shown at M, are the cheapest, most durable, and most easily manipulated means for this purpose. They can be readily seated in the cavities *i* and held in place by the vertical walls thereof. They are compressed considerably before the machine is set to work, so that the shoe-piece I shall be held upward with a severe rigidity and yet be capable of a slight yielding upon an extreme occasion. The yielding over a very small fraction of an inch is all that is ever required, and blocks or balls of rubber can be so compactly arranged that they are superior to coiled springs or metal and kindred devices, which require more or less boring or cutting out of the parts to allow them to be fitted.

It will be seen that one of the features of the invention consists in combining with a carriage which supports laterally-acting cutters a spring-actuated holder that engages with the kerf-wall formed by the cutters and which is adapted to yield on lines transverse to the plane of the chain while moving bodily with the carriage and also means bearing transversely against the holder to prevent it from yielding laterally. In the present construction an abutment of this sort is provided by the shoulders or walls at the edge of the recess in which is seated the spring-actuated holding-block.

The mode of operation of the above-described devices will be readily understood. The machine is fastened down near the face of the coal and the power devices set in action, whereupon the chain H travels in the direction of the arrow 1, Fig. 1, and at the same time the carriage is advanced. As soon as the cutters have entered the coal a few inches the holder or alining device reaches the kerf and its top and bottom parts bear firmly against the upper and lower walls. They are pressed and held forward with a constant pressure from the carriage-feed devices and never lose the hold which they acquire.

I believe myself to be the first to have discovered or made practically available the fact that machines of this sort could be held to the desired line with all necessary steadiness provided the grip of the holder (of whatever sort) is never lost during the advance and that in consequence of this fact a holder can be used which exerts what would once have been thought an insignificant amount of alining force, such a device being in marked contradistinction from those in which a rapidly revolving or moving cutter was used and which necessarily caused a rapidly intermitting series of engagements and releases from the coal, and I have utilized this fact in the construction of numerous machines, each with a combined cutting and holding piece having one or more points adapted to form more or less of a groove; but after discovering the above facts—namely, that the constant engagement of the holding device with the coal was the most important matter—I was next led to doing away practically entirely with the cutting function and to depend upon a mere upward and downward pressure against the horizontal walls of the coal, and the results attained in practical work show fully that this constant engagement is the most efficient feature of action with these devices.

I do not herein claim specifically the combination in a mining-machine of this sort, with the carriage for the cutter-chain, of a shoe or supporting device on the under side of the carriage, and a spring-bar on the upper side of the carriage, having one end or part secured rigidly to the carriage and the other end arranged to press upon or slide along the carriage, such construction having been, as I am informed, devised by C. W. Miller.

What I claim is—

1. In a mining-machine, the combination with the bed, the carriage sliding thereon, and the cutters arranged to move laterally relatively to the carriage, of the holding device having a laterally-expanded surface adapted to bear upward against the upper wall formed by the main cutters above the carriage, and a horizontally-expanded bearing-surface arranged to engage with the lower horizontal wall of the main kerf, said holder being formed in two parts, of which one is adapted to yield vertically relatively to the other, substantially as set forth.

2. In a mining-machine, the combination with the bed, the carriage, and the cutter-chain on the carriage, of the holder having the upwardly-projecting block I and the downwardly-projecting block J, both formed with laterally-expanded surfaces adapted to bear against the under side of the upper wall and the upper side of the lower wall of the coal, and a spring for forcing them into engagement with the said two walls, substantially as set forth.

3. In a mining-machine, the combination with the bed, the carriage thereon, and the cutters arranged to move laterally relatively to the carriage, of a holding device consisting of two blocks, seated in seats formed in the upper and lower faces of the carriage and connected together, one of such blocks being adapted to move vertically relatively to the other, substantially as set forth.

4. In a mining-machine, the combination with the bed, the carriage thereon, and the cutters arranged to move laterally relatively to the carriage, of a holding device consisting of a block seated in a recess or seat formed in the carriage and moving therewith said block having an expanded surface arranged to engage with the upper wall of the kerf formed by the cutters, and elastic or yielding supports interposed between such block and the body of the carriage, substantially as set forth.

5. In a mining-machine, the combination of the bed, the carriage mounted on the bed, the cutters supported on the carriage and adapted to operate in a path transverse to the path of the carriage, a vertically-yielding holding-block mounted on the carriage and adapted to contact with one of the horizontal walls of the kerf formed by the cutters, and another block arranged to contact with the other horizontal wall of said kerf at a point opposite to said vertically-yielding block, substantially as set forth.

6. In a mining-machine, the combination with the sliding carriage and a cutter-carrying chain on said carriage, of a holding device traveling with the carriage and having a friction-surface bearing against the coal, and a spring traveling with the carriage for forcing the said friction-surface against the coal on lines transverse to the plane of the cutter-chain, substantially as set forth.

7. In a mining-machine, having laterally-acting cutters, the combination with the advancing carriage which supports said cutters, of a holding device moving with the carriage and having a surface sliding along the surface of the coal, a spring for forcing said surface against the coal, and means traveling with the carriage and bearing in an opposite direction against the coal to resist the pressure from the said surfaces, substantially as set forth.

8. In a mining-machine having laterally-acting cutters, the combination with the forwardly-sliding carriage supporting the said cutters, of a holder secured to and traveling with the carriage and having a friction-surface adapted to bear against a wall of the coal, a spring for moving said friction-surface toward the coal, and means on the carriage bearing transversely against said holder to prevent the latter from yielding laterally, substantially as set forth.

9. In a mining-machine of the character described, the combination of the laterally-acting cutters and the sliding carriage which supports said cutters, of a spring-actuated holder engaging with the kerf-wall and adapted to yield on lines transverse to the plane of the chain and moving bodily with the carriage, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY B. DIERDORFF.

Witnesses:
CHARLES W. MILLER,
G. C. HORST.