(No Model.) 4 Sheets—Sheet 1.

J. A. WIGGS, Jr.

MINING MACHINE.

No. 541,134. Patented June 18, 1895.

Fig. 1.

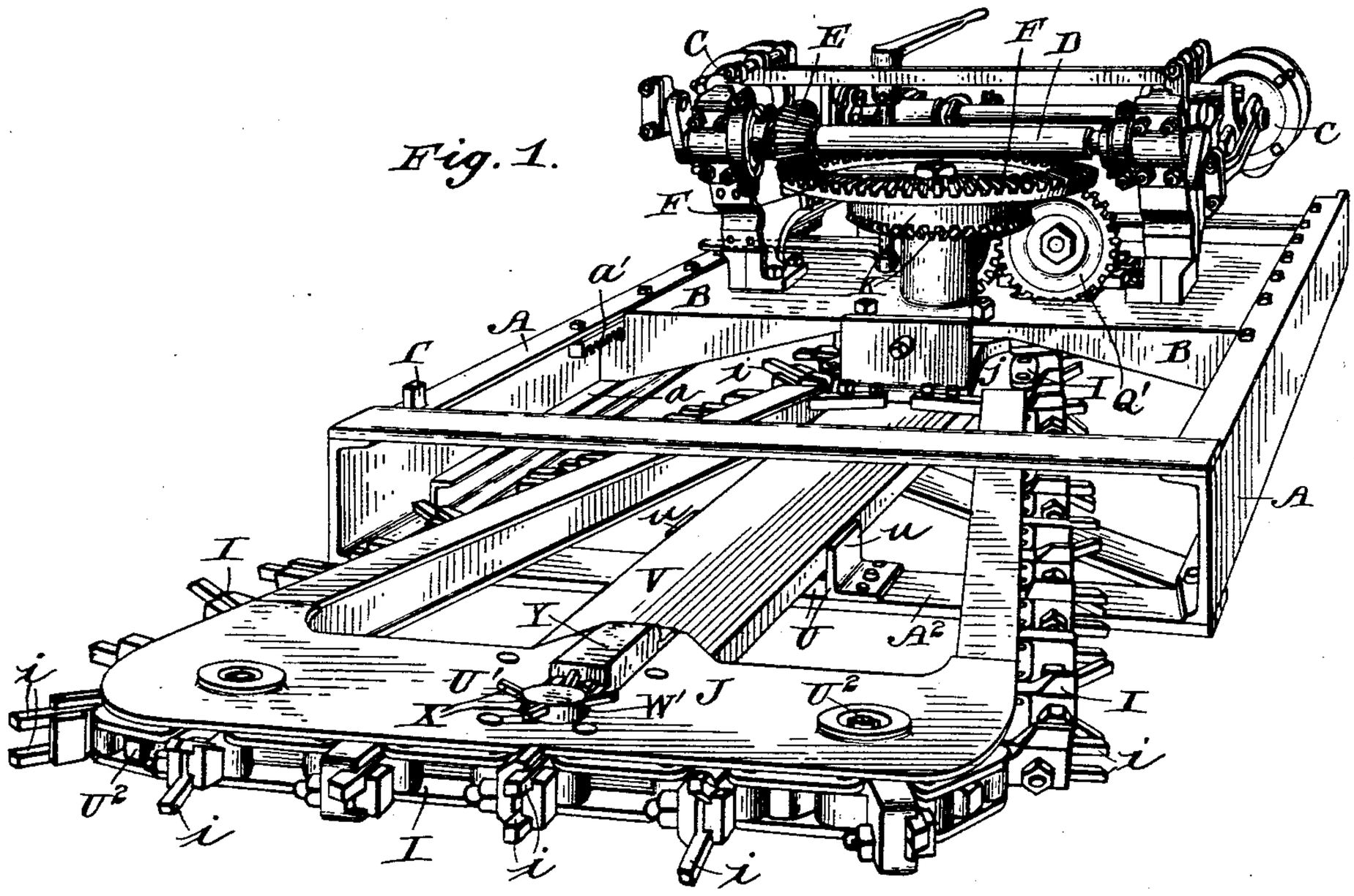
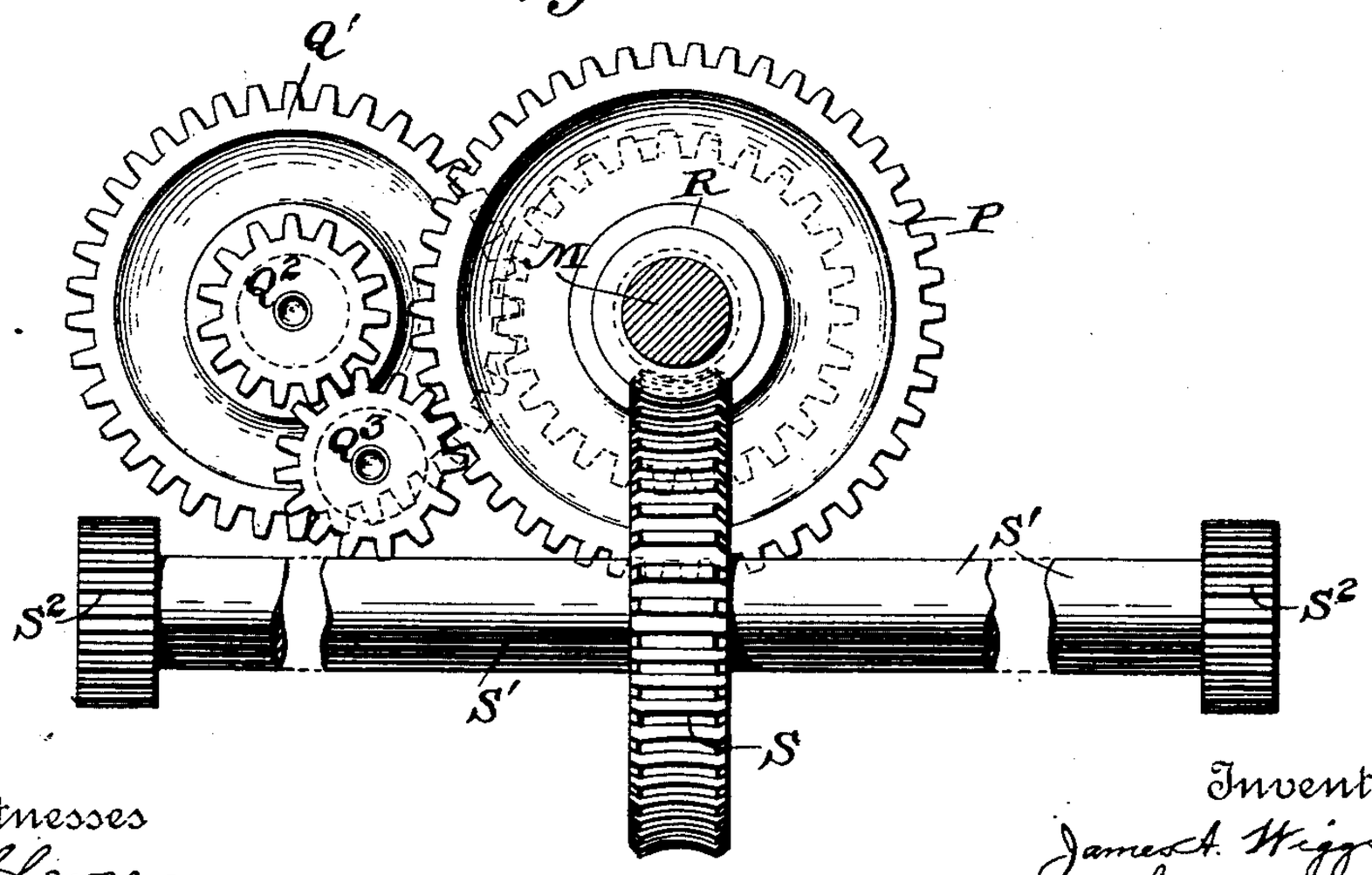


Fig. 3.



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(No Model.)

4 Sheets—Sheet 2.

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Fig. 5.

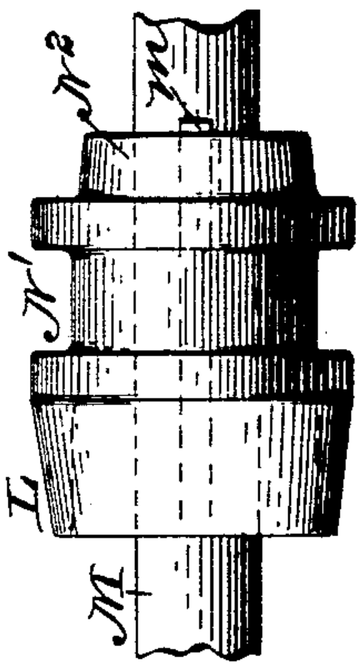

Fig. 2.

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Fig. 4.

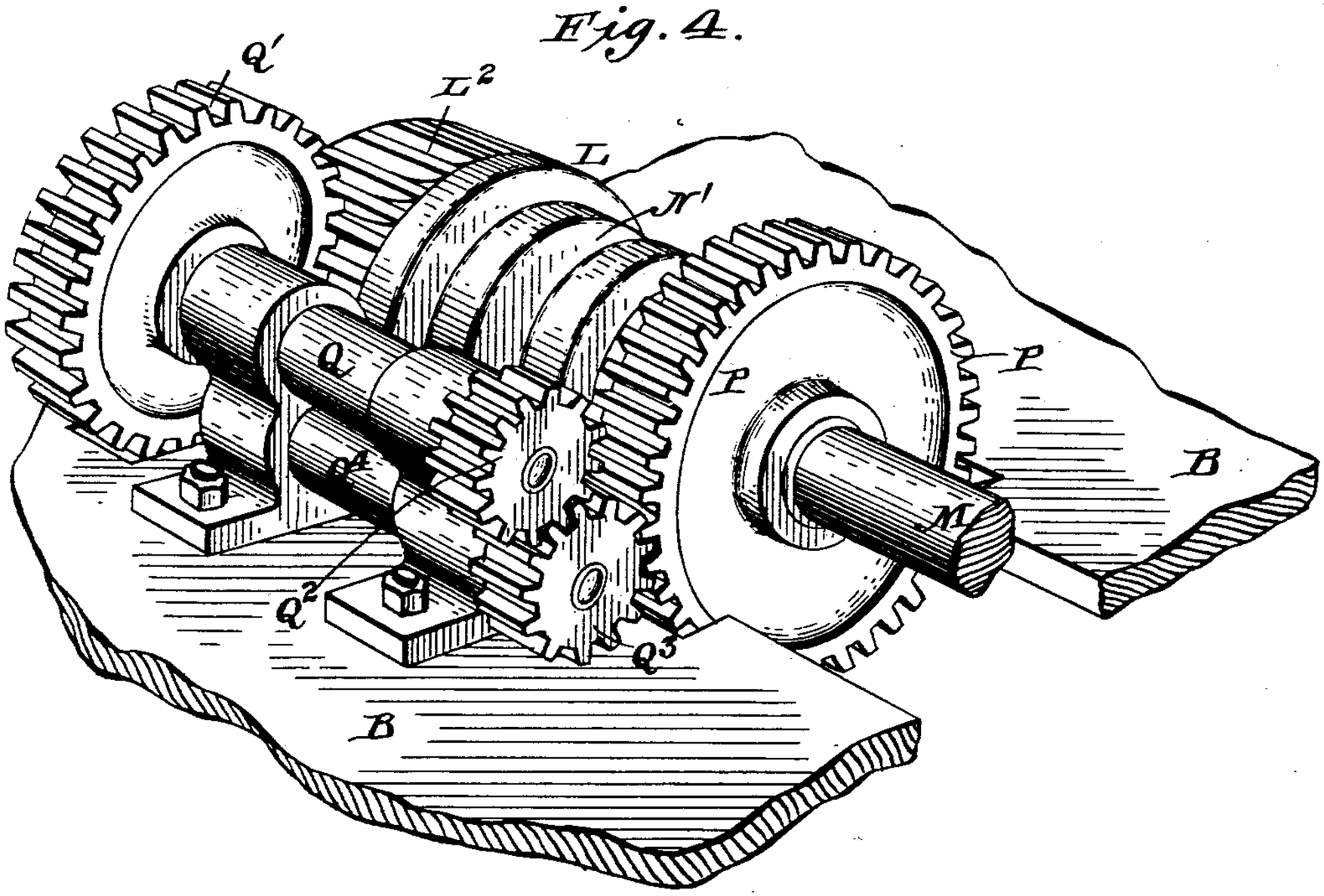
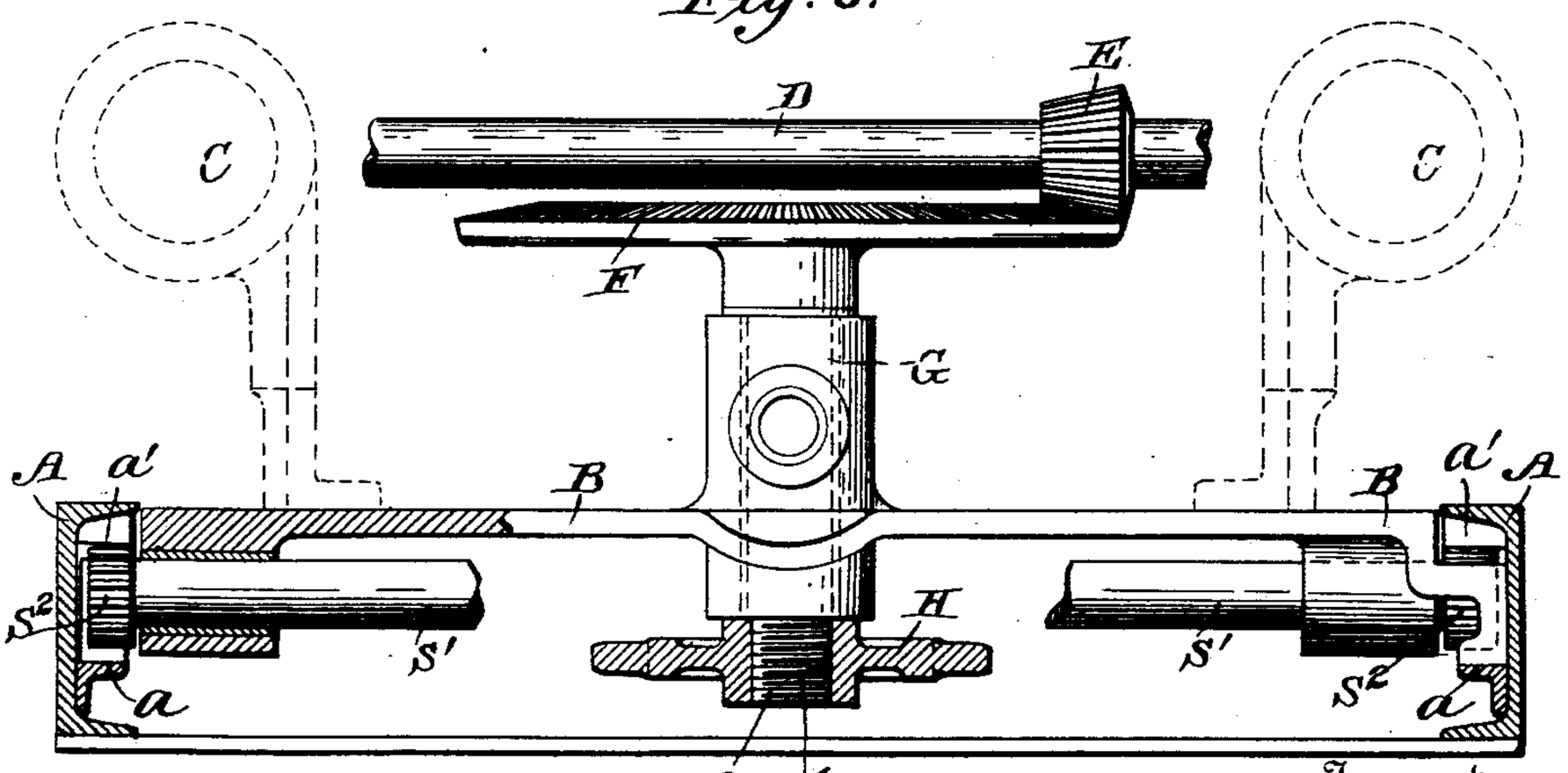


Fig. 6.



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MINING MACHINE.

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Fig. 7.

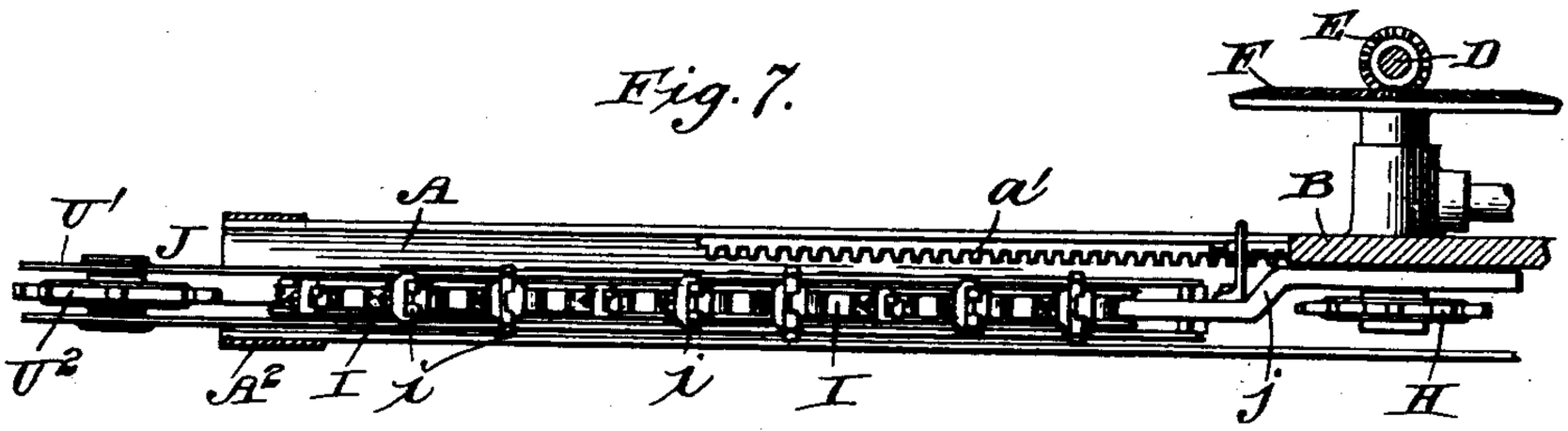


Fig. 8.

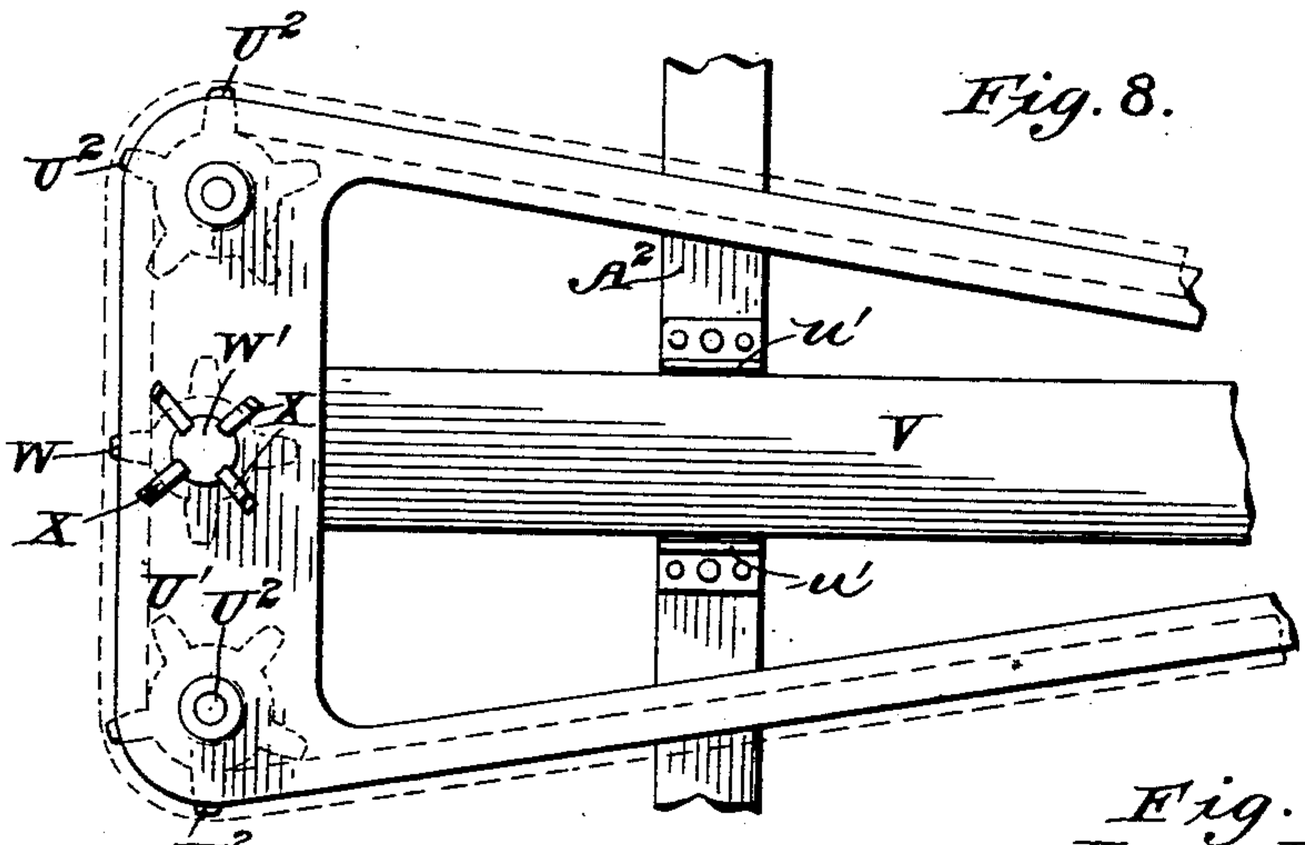


Fig. 9.

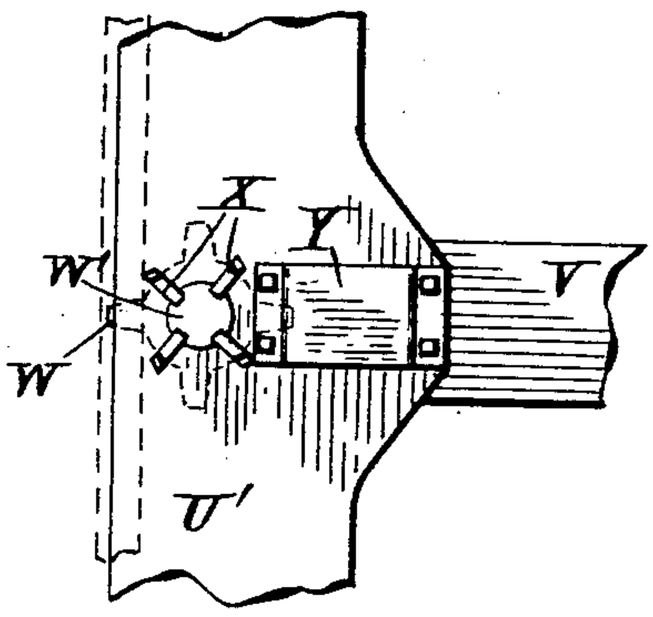


Fig. 10.

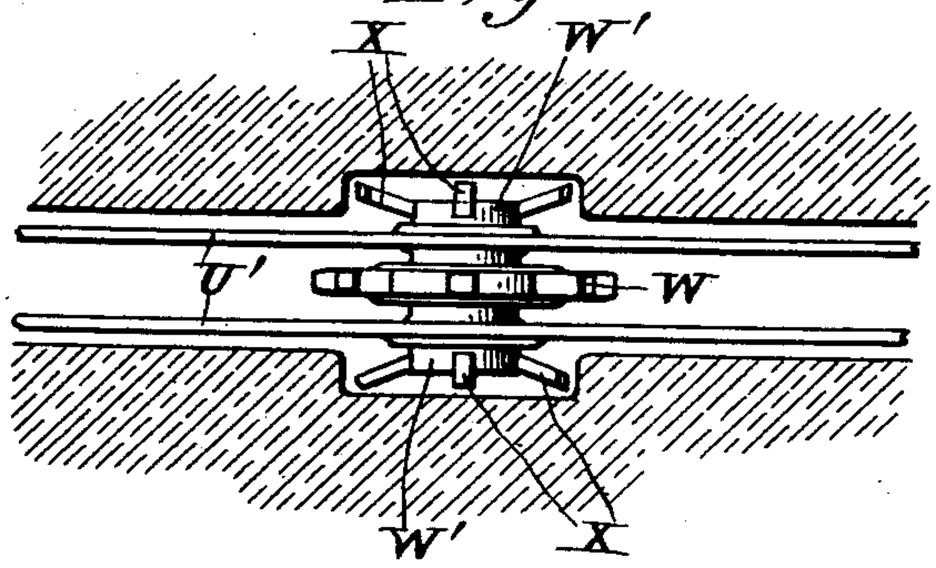
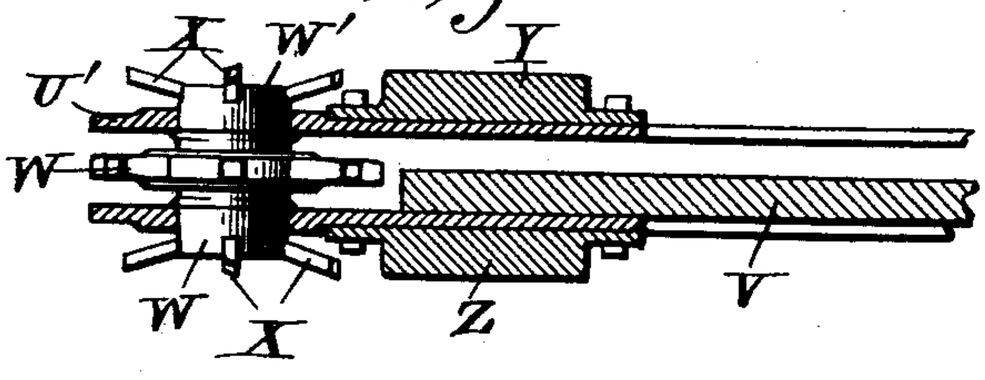


Fig. 11.



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UNITED STATES PATENT OFFICE.

JAMES A. WIGGS, JR., OF BIRMINGHAM, ALABAMA.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 541,134, dated June 18, 1895.

Application filed September 15, 1894. Serial No. 523,077. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. WIGGS, Jr., a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Mining-Machines; and I do hereby 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.

This invention relates especially to mining machines which use a traveling cutter-carrying chain fed automatically into the coal or other material which is to be mined and withdrawn also by the feeding gear. Such a machine is illustrated and described in reissued Patent No. 10,818, dated March 15, 1887, which employs two fixed racks engaged by pinions, that are mounted in a sliding frame whereby the cutter-carrying chain and operating mechanism are supported. These pinions are driven by the main shaft and intermediate reversing mechanism is provided.

An important object of this invention is to supply simpler and more satisfactory feeding and withdrawing mechanism and to lessen the wear and tear and risk of breakage by permitting a part of the gearing to be inactive and therefore not under strain. Another important object is to keep the cutter-carrying chain and the pusher-head to which it is attached from shifting laterally out of their most effective position.

To these ends and for the general improvement of the machine, my invention consists in the construction and combination of parts hereinafter particularly set forth and claimed.

In the accompanying drawings, Figure 1 represents a perspective view of a machine embodying my invention. Fig. 2 represents a transverse vertical sectional view, on a larger scale, of the feeding and withdrawing mechanism, some of the parts being shown in elevation. Fig. 3 represents an elevation of a part of the said mechanism, taken at right angles to Fig. 2. Fig. 4 represents a detail perspective view of the three gear-wheels which mesh together and the parallel shafts that carry them, the latter being broken away. Fig. 5 represents an external view of the combination clutch and gear. Fig. 6 represents a transverse vertical section through the fixed frame and sliding frame of the machine, showing in elevation a part of the devices carried by the latter frame, and especially the feeding-pinions engaging the racks; and Fig. 7 represents a side elevation of the pusher-head, cutter-carrying chain, and sprocket-wheel. Figs. 8, 9, 10, and 11 represent detail views illustrating the devices for preventing the lateral shifting of the pusher-head or cutter-head.

A designates the relatively fixed frame of the machine, provided on the inner faces of its sides with guide flanges *a* for the longitudinal movement of the sliding frame B toward and from the coal that is to be cut. Cogged racks *a'*, parallel with the said flanges, are also formed with or attached to the said inner faces.

C designates the two engines or other motors which are mounted on the said sliding frame, as is also the driving shaft D that they operate. This shaft carries a bevel pinion E, which meshes with a large bevel gear wheel F, that is fast on a shaft G at right angles to the said driving shaft and preferably vertical. This shaft G, like all those herein described, has its bearings in the said sliding frame a part of which appears in Fig. 2. It is provided with a metallic bushing *g* and an annular facing *g'* of similar material surrounds the reduced upper end of the said shaft being interposed between the hub of the said bevel wheel and the top of the said bearing and bushing as well as the shoulder of the said shaft. A sprocket wheel H is detachably secured, preferably by screw-threads *h*, on the lower end of this shaft, and engages and drives a cutter-carrying chain I provided with knives or cutters *i* and running between the upper and lower plates of a pusher head J. These plates are at first bent down as at *j* to the level of the sprocket wheel, and then extend horizontally forward, so that the cutting will be parallel with the floor of the coal seam and at the lowest attainable level wasting none of the coal. A downwardly facing bevel gear wheel K is fastened to the said bevel wheel F and of course turns therewith, meshing continually with the bevel gear face L' of the combined gear and clutch L, that is loose on a shaft M arranged at right angles to the said

shaft G, and provided with bushings M′ at intervals. The middle part of the outside of the said combined gear and clutch is provided with or constructed to form a spur gear L^2 and the end of it away from the said face L′ is recessed conically at L^3 to form a clutch surface for receiving a conoidal sliding clutch N, which is feathered on the said shaft M by a spline *m*, and of course turns therewith. The middle part of this clutch is constructed with an annular groove N′, to receive a shifting lever O, and the other end of the said clutch is provided with a projecting part N^2 adapted to enter a corresponding recess *p* in the side of a large gear-wheel P which is loose on the said shaft, and thereby clutch the said wheel.

The spur-gear L^2 meshes with a gear-wheel Q′ on a shaft Q which carries also a pinion Q^2. A similar pinion Q^3 on a shaft Q^4 meshes continually both with the pinion Q^2 and the gear-wheel P.

The shaft M carries also a worm R, which is fast thereon and meshes with a worm wheel S on a short transverse shaft S′, provided at its ends with the feeding pinions S^2, which engage the fixed racks *a*′ so as to feed the sliding frame and cutter-carrying chain toward or from the coal, according to the direction of rotation of shaft M. This is determined by the position of clutch N. When the said clutch, as in Fig. 2, engages the combined gear and clutch L, the shaft M and worm R, being driven directly thereby, turn so as to feed the sliding frame forward and to cause the cutter-carrying chain to enter more and more deeply into the coal, while the gear-wheel P is loose on its shaft, and the intermediate gears Q′ Q^2 Q^3, though continuously in engagement and rotation, are under no strain.

When the clutch N is shifted into engagement with the wheel P, the combined clutch and gear L turns on the shaft M, without directly driving it, but drives the said shaft more rapidly in the reverse direction through the train of gears Q′ Q^2 Q^3 and P, the latter being then fast on the said shaft by the said clutch-engagement. The shifting of the said clutch is automatically effected at the proper intervals by the contact of the said shifting lever with stops T fixed on the stationary frame A or otherwise supported. From the action of these and the devices before described it results that the cutter-carrying chain is first fed steadily forward into the coal until the under-cutting is complete, and then rapidly withdrawn to its first position; these reciprocatory actions being repeated as the machine is moved along the face of the coal.

The main-frame A of the machine has a cross-bar A^2 extending under the front part of it and attached at the ends to the side bars of the said frame on the outside thereof. On this I attach a casting U having two upwardly extending guide lugs *u* as in Fig. 1; or two lugs *u*′, similarly arranged, may be attached directly to the said cross-bar as in Fig. 8. In either case the said lugs receive between them the pusher-bar or pusher-head V of the guide-chain. This bar extends to the front of the said chain and is attached to the casing U′ which protects the same and in which the guide rollers U^2 of the said chain are journaled. The front of the said chain is open to allow the action of the cutters on the coal. The pusher bar, casing, rollers U^2 and cutter-carrying chain of course all move together, with the sliding frame or carriage B. The lugs *u*′ prevent the pusher-head from moving laterally under pressure or strain, and thereby keep the cutter-chain in position for working properly. Such strain occurs when the cutters come in contact at one point or another with a bed or mass of sulphur or other hard material. To further provide against such shifting, I supply to the middle or any other convenient part of such casing a sprocket wheel W having journals W′, which extend above and below its bearings therein, the extended ends being provided with radial cutter blades X which cut two parallel straight grooves in the coal one groove being directly below, and the other directly above, the sprocket wheel W as the latter is driven by the said cutter-carrying chain, and the said chain is fed forward. Of course the walls of the said grooves, as shown in Fig. 10, will prevent the cutters or blades X from leaving them and will equally resist any sidewise tendency of the said pusher head and chain. This, however, causes now and then an injurious strain on the cutters or blades X. To relieve this and still more effectually to guard against shifting I provide the pusher head in the rear of the sprocket wheel W with guide blocks Y Z attached to the same respectively above and below it in line with the said grooves in the coal, on the proper level to enter the same, and of such width as to fill or nearly fill them from side to side, though free to move easily forward and backward therein. Of course either one of the said blocks may be dispensed with, as they are duplicates of each other in construction, arrangement and function; but both together are more effective.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a mining machine, a combined clutch and gear having two sets of cog-teeth and a friction-clutch surface, in combination with a driving shaft and intermediate gears engaging one set of such teeth, a gear-wheel and an intermediate train of gears meshing with the other set of the said cog teeth, a shaft on which the said gear wheel and the said combined clutch and gear are loosely mounted, a clutch feathered on the said shaft and adapted to engage the said gear wheel and the said clutch and gear alternately, cutting devices and mechanism driven by the said shaft for feeding forward the said cutting devices and withdrawing them alternately substantially as set forth.

2. In a mining machine a combined clutch and gear having two sets of cog-teeth and a friction-clutch surface, in combination with a driving shaft and intermediate gears engaging one set of such teeth, a gear wheel and an intermediate train of gears meshing with the other set of the said cog-teeth, a shaft on which the said gear-wheel and the said combined clutch and gear are loosely mounted, a clutch feathered on the said shaft and adapted to engage the said gear wheel and the said combined clutch and gear alternately, cutting devices, mechanism driven by said shaft for feeding forward the said cutting devices and withdrawing them alternately, a shifting lever engaging the said clutch and fixed stops arranged to be struck by the said lever to cause the shifting of the clutch automatically from the said gear wheel to the said combined clutch and gear or back again as the movable frame approaches either end of its travel substantially as set forth.

3. In a mining machine a combined clutch and gear having a set of bevel teeth a set of spur teeth and a friction-clutch surface in combination with a bevel wheel K engaging the said bevel teeth a gear wheel F fast to and turning with the said wheel K, a driving shaft and gear meshing with said wheel F, a loose gear wheel P on the same shaft M with the said combined clutch and gear, a gear wheel Q′ engaging the spur gears of the latter, gearing from the wheel Q′ to the wheel P, a clutch arranged for alternate engagement with the wheel P and the combined clutch and gear aforesaid and feathered on the shaft M between them, a transverse shaft carrying pinions mounted in the movable frame which bears the cutters and geared to this shaft M, and a pair of racks attached to the fixed frame of the machine and arranged to be engaged by the said pinions substantially as and for the purpose set forth.

4. In a mining machine, a movable frame, a centrally arranged pusher bar attached thereto, traveling cutters carried by the said pusher bar, and mechanism for actuating the said movable frame and cutters, in combination with a fixed frame, provided with guideways for the said movable frame, a pair of raised lugs rigidly attached to the said fixed frame and arranged at each side of the said pusher bar for bracing the same against the lateral strain of the cutters, an additional cutting device operating at the middle of the front of the machine in a plane different from that of the said cutters in order that it may cut a straight groove in the coal as the movable frame advances into the same and a block which is rigid with the said pusher bar and in line with the said groove, the said lugs cutting device and block all cooperating to brace the pusher bar against the lateral strain on the cutters substantially as set forth.

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

JAMES A. WIGGS, JR.

Witnesses:
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PAUL PARCELLS.