

(No Model.)

2 Sheets—Sheet 1.

H. B. DIERDORFF.
MINING MACHINE.

No. 574,402.

Patented Jan. 5, 1897.

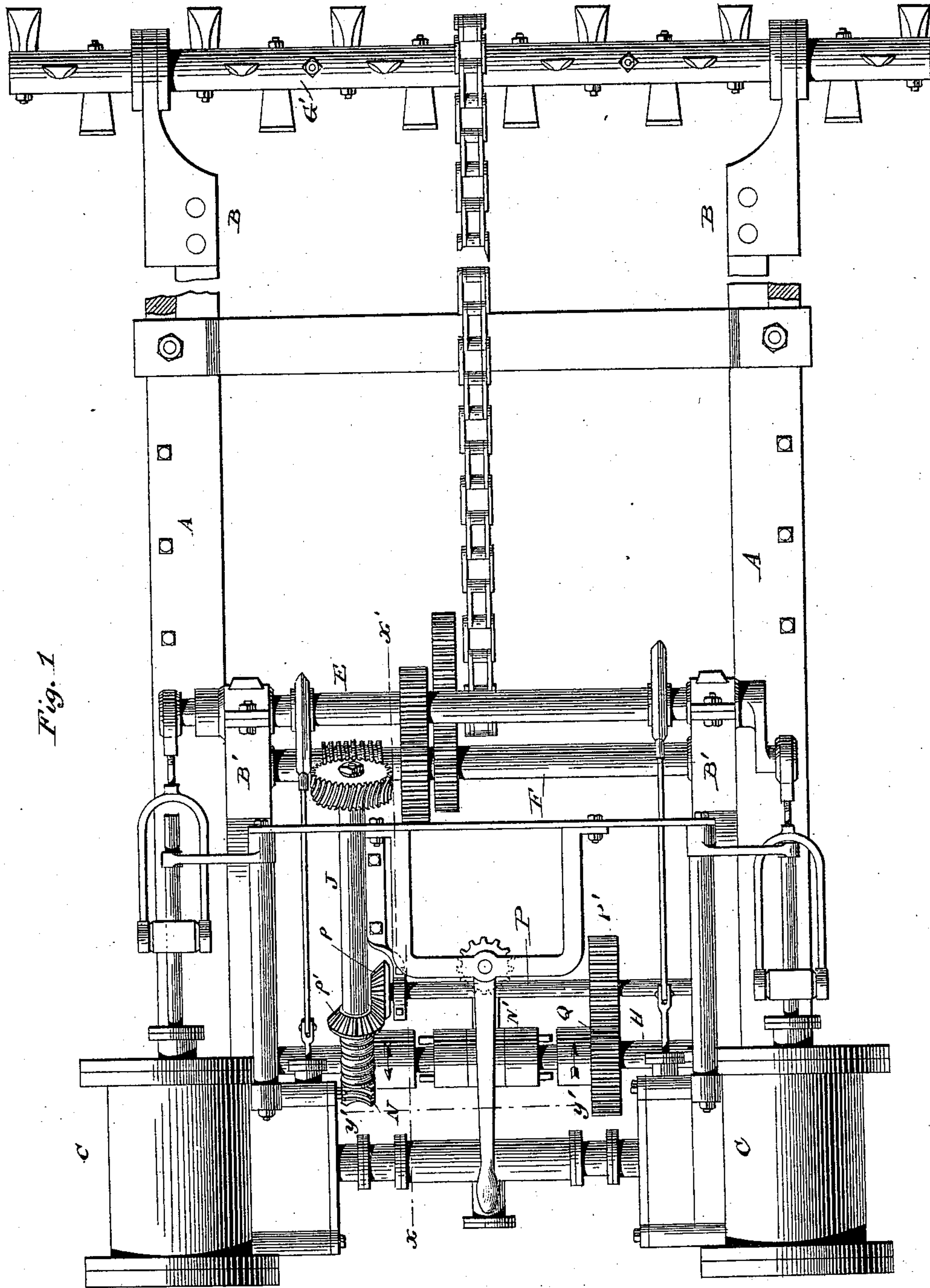


Fig. 1

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Attys.

(No Model.)

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Fig. 3

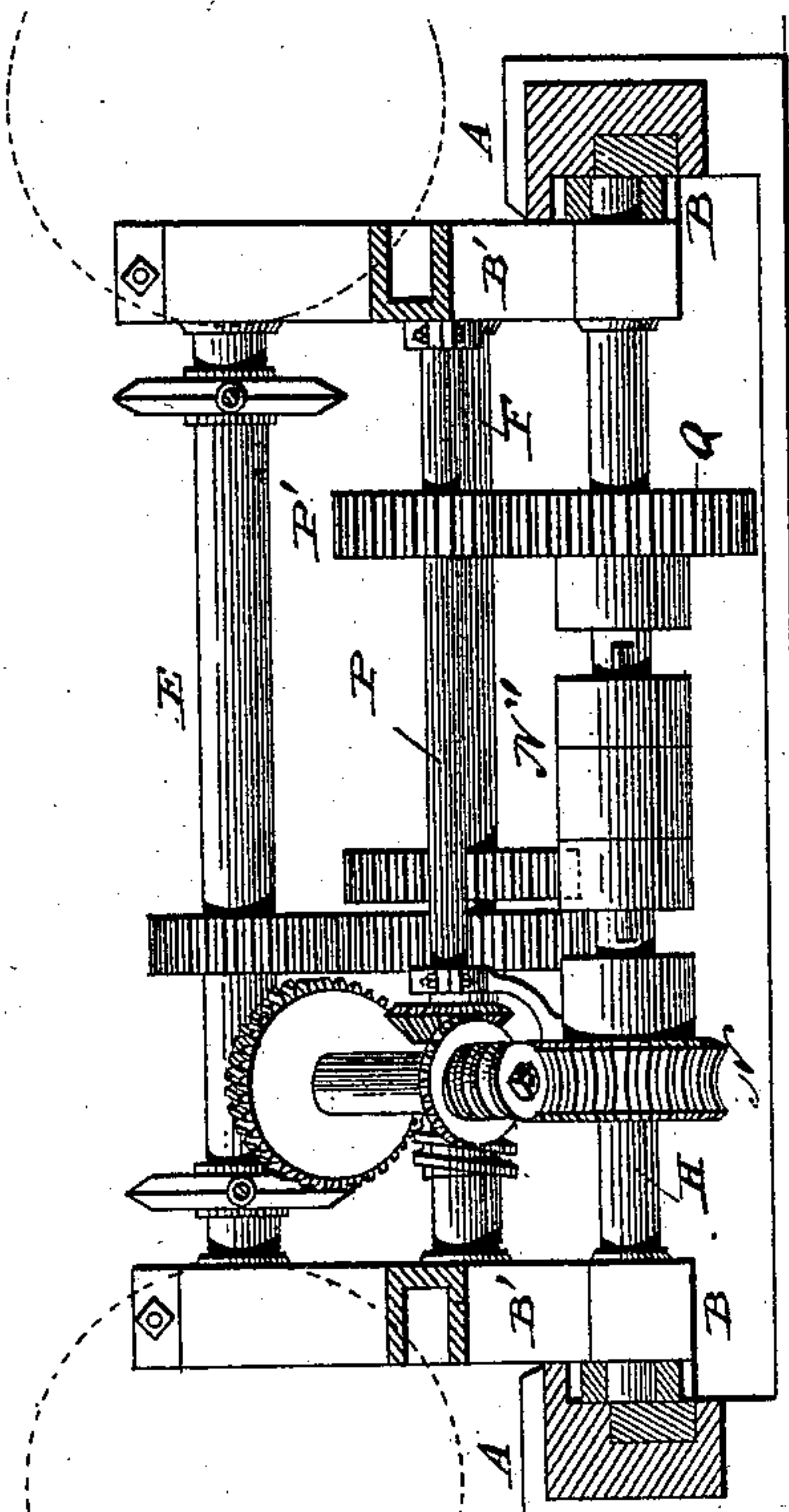


Fig. 5

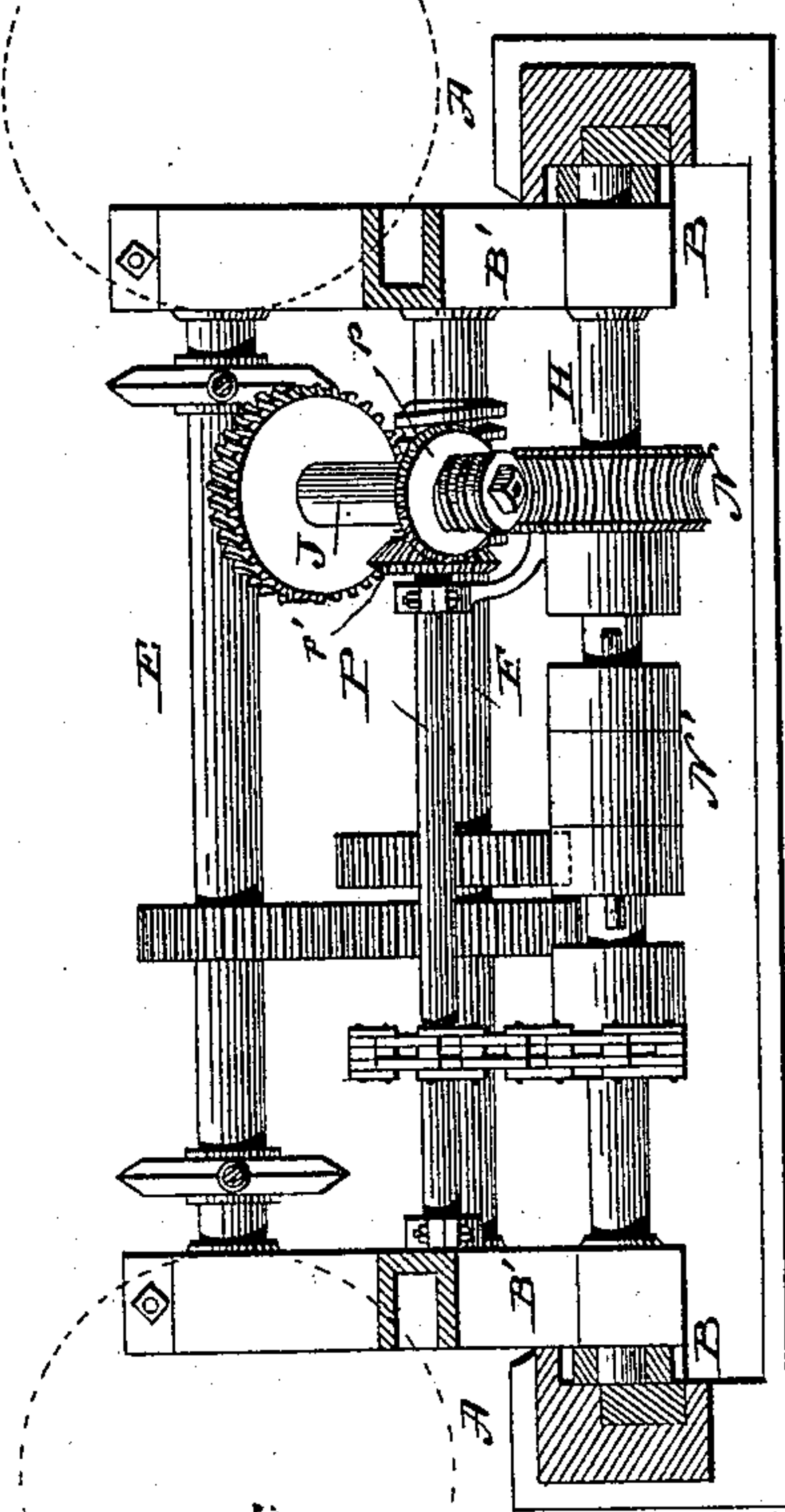


Fig. 2

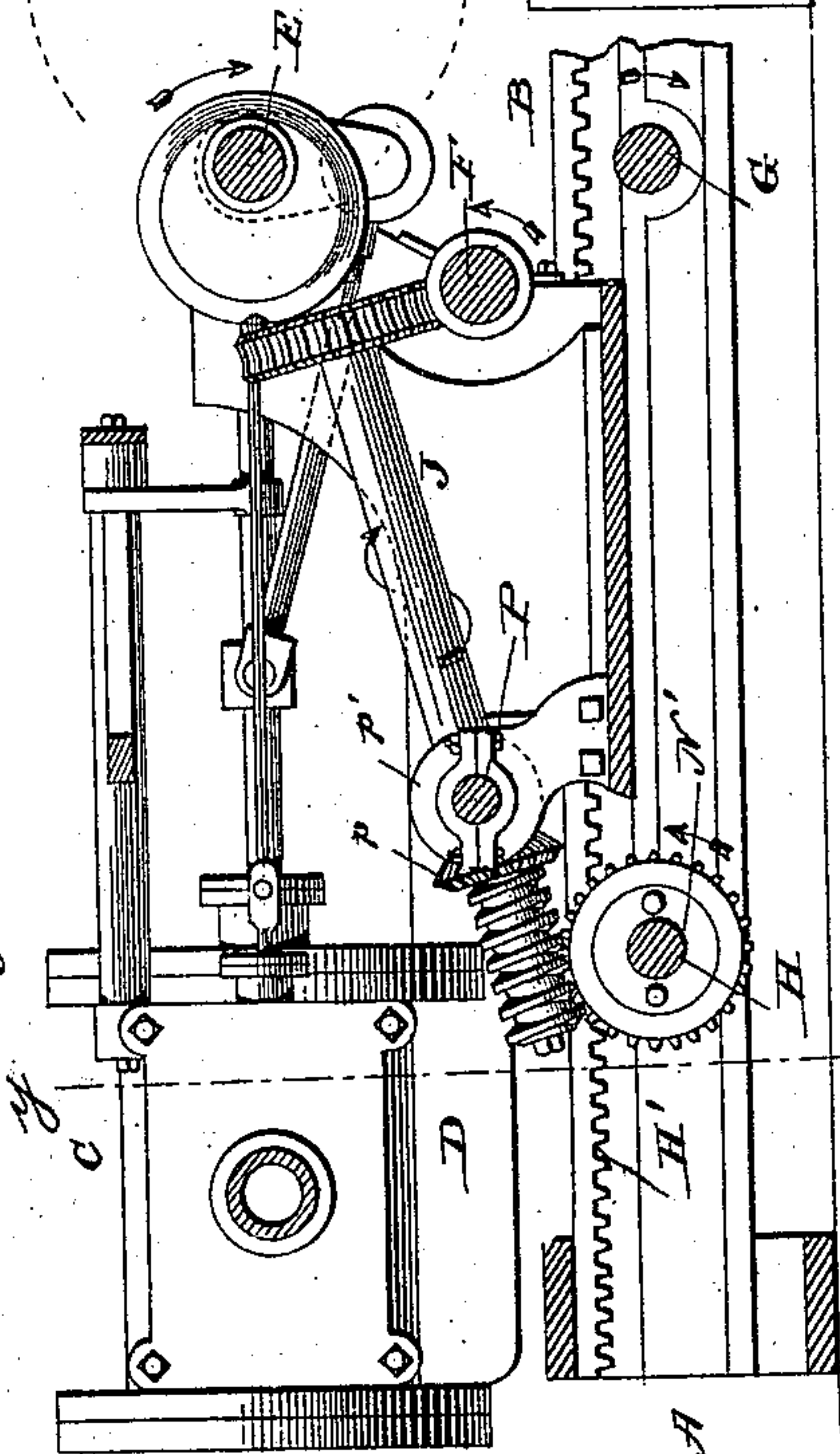
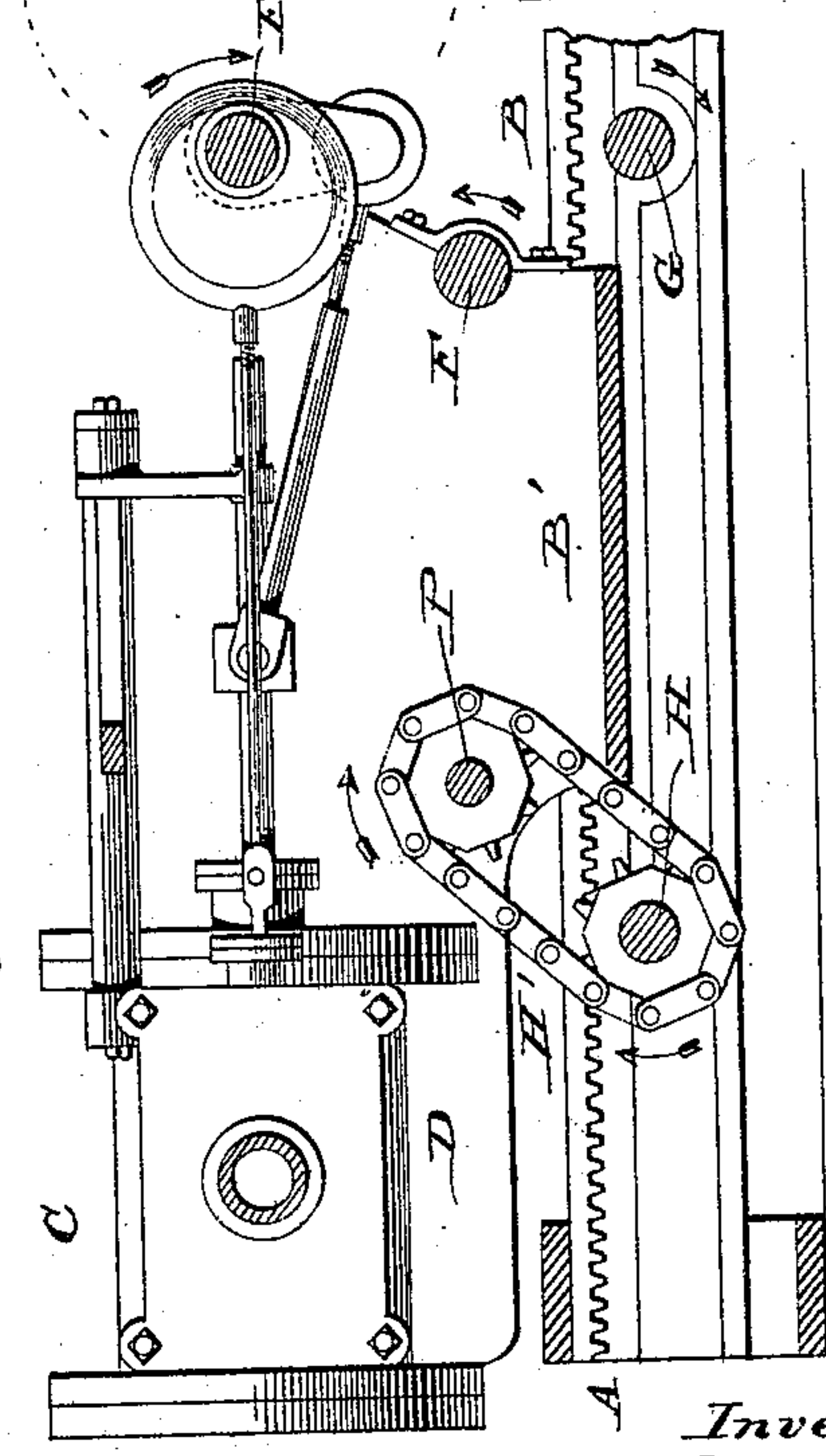


Fig. 4



Witnesses;

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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. 574,402, dated January 5, 1897.

Application filed March 8, 1892. Serial No. 424,153. (No model.)

To all whom it may concern:

Be it known that I, HENRY BEECHER 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, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a plan view of a machine embodying my improvements. Fig. 2 is a longitudinal section on the line $x'x'$, Fig. 1. Fig. 3 is a view, partly in rear elevation and partly in cross-section, on the line $y'y'$, Fig. 1. Figs. 4 and 5 are similar sections of the modified form of the machine.

The object of this invention is to provide an improvement in machines for mining coal wherein use is made of a bed, a carriage moving to and fro on the bed, a cutting apparatus on the carriage, and shafting and gearing on the carriage for actuating the cutting mechanism and for moving the carriage. Considerable trouble and inconvenience have been experienced in moving the carriages of these machines, particularly in receding the cutter and the carriage after a cut has been made, the mechanism for this being ordinarily called the "pull-back."

Prior to my invention use had been made of an intermittently-acting mechanism as a pull-back, comprising a ratchet and dog actuated by an eccentric and connecting-rod, as is shown in Patent No. 299,655 to B. A. Legg, dated June 3, 1884, and use had also been made of sprocket-wheels and a chain, as is also shown and described in the said patent, and, again, use has been made of a train of gear-wheels extending back from the "intermediate" shaft to the carriage-moving shaft. Serious objections were found to be incident to each of these constructions, the ratchet-and-dog mechanism having an intermittent jerking action, the chain-and-sprocket mechanism acting too rapidly, it not being practical in these machines as ordinarily made to get the room for a large sprocket-wheel wherewith to properly reduce the speed, and the train of gear-wheels being liable to clog or choke with slack and occupying considerable of the restricted room.

One of the objects of the present invention is to provide a continuously-moving pull-back mechanism in conjunction with a continuously-moving advancing mechanism, which pull-back mechanism shall comprise parts of such nature and so related to the other parts that any desired speed can be obtained in receding the carriage without multiplying the number of the parts to such an extent as to seriously take up the limited space which is available.

The invention also relates to other matters of construction and arrangement, which will be readily understood from the drawings and the description given below.

The invention is applicable to machines of any of the numerous sorts, although particularly so to one of the class illustrated in the said Patent No. 299,655, to which reference is herein made, and having selected one of that class for purposes of illustration it is not necessary to here give a detailed description of the machine as a whole, but I will mention a number of them, so that the essential parts of the present invention will be clearly understood.

A A represent the side bars of the bed; B B, the sliding side bars of the carriage fitted to the bed; B' B', the carriage-plate fitted to bars B B; C C, the engines; D D, the engine plates or supports; E, the crank-shaft; F, the intermediate shaft; G, the rear chain-shaft, shafts E F G being geared together in the usual way; G', the cutter-bar, connected by chains to shaft G; H, the rear transverse carriage-moving shaft, having pinions fitted in the rack H'; J, the longitudinally-arranged carriage-advancing shaft, having the worm-wheel j engaging with worm j' on intermediate shaft F and having worm L at its rear end engaging with worm-wheel N, loose on shaft H, and N', a clutch splined to shaft H and adapted to engage with worm-wheel N.

Referring to Figs. 1, 2, and 3, the improved mechanism for withdrawing or pulling back the carriage is shown as being constructed and arranged as follows: Upon the shaft J and at a short distance from the worm thereon is a bevel-wheel p' , which meshes with a bevel-wheel p , keyed upon the end of a shaft P, which is mounted in bearings and arranged

parallel to the transverse carriage-moving shaft H. Upon the said carriage-moving shaft H is a straight spur-wheel Q, loose thereon and continuously rotated by a similar wheel P', fast upon the said shaft P. Although the said wheel Q is loose upon the shaft H, yet it is adapted to be rigidly connected thereto by the clutch N'. When the clutch is in engagement with the wheel N, the carriage advances slowly, and when it is in engagement with the wheel Q the carriage is moved in the opposite direction at a higher speed, proportional to the relative sizes of the wheels p' , p , P, and Q. By varying the relative dimensions of any of these wheels any necessary variations in the speed in this pull-back mechanism can be attained, such variation being necessary in order to properly work upon different materials. By taking the power from the bevel-wheel p' on the lower end of shaft J the pull-back mechanism is arranged low down and its parts are compact and take but little room. It is continuously in operation, and I therefore avoid the serious trouble met with in using an intermittently-acting mechanism, such as a ratchet and pawl. Prolonged and extensive experience has demonstrated that machines of this class must have their parts arranged within restricted limits in order that the machine may be easily portable, the power properly applied to the cutters, the parts be of small number, and the energy of the engines economically transmitted. Thus the wheels at N and Q cannot well be over a foot in diameter or thereabout. The wheel N should make anywhere from one to three revolutions while the crank-shaft is making six hundred to one thousand and the intermediate shaft from three hundred to five hundred, the shaft J revolving at about the rate of thirty revolutions a minute. Then the wheel Q in the pull-back should at the same time make from eight to ten revolutions a minute. As the chain-shaft makes from one hundred and fifty to two hundred and fifty revolutions a minute and the wheel Q being of such small diameter, the difficulty in reducing the speed by such devices by a chain and sprocket-wheels will be readily appreciated, it being remembered that the shaft G is the slowest of the three power-shafts, revolving from seven to ten times as fast as the shaft H should revolve, the shaft F revolving from fifteen to twenty times as fast; hence the employment of the bevel-gearing actuated by the shaft J and suitable gearing driven thereby and actuating the carriage-moving shaft, the latter being of great importance in these machines.

In Figs. 7 and 8 is shown a modification in which use is made of a chain and sprocket-wheel instead of the spur-gearings P' Q, there being incident to such an arrangement many of the advantages incident to that in Figs. 2 and 3.

The positions of the bevel-gearing, or the directions of the threads at $j j'$, will of course be properly related to get the right direction

of rotation of the sprocket-wheels and the shaft H.

What I claim is—

1. In a mining-machine the combination with the stationary frame and the sliding frame, of the transverse carriage-moving shaft H, the relatively fast-moving power-shaft, the intermediate shaft, the carriage-advancing mechanism consisting of the shaft J, the worm-wheel thereon engaging with a worm on the intermediate shaft, a worm-wheel on the carriage-moving shaft and a worm on said shaft J for driving it, and the carriage-withdrawing mechanism having the continuously-rotating pinion-wheel on said shaft H, a shaft P having a bevel-wheel driven by a bevel-wheel on the shaft J, and gearing connecting said shaft P with the wheel Q, substantially as set forth.

2. In a mining-machine, the combination with a stationary bed-frame and the sliding frame, of the power-shaft, the intermediate shaft, and the reversible double-speeded carriage-moving shaft, the carriage-advancing mechanism having the shaft J driven by the intermediate shaft and having a worm driving a worm-wheel on the carriage-moving shaft, and the carriage-withdrawing mechanism consisting of a shaft parallel with the carriage-moving shaft geared to the said shaft J, and the straight spur-gearing connecting said shaft J with the carriage-moving shaft, substantially as set forth.

3. The combination with a stationary frame provided with a rack and a sliding frame provided with a pinion to engage said rack, of a shaft H, a worm-wheel thereon, a shaft J provided with a worm for driving said wheel, a wheel Q on said shaft H, a shaft P parallel with said shaft H and having a bevel-wheel p driven by a bevel-wheel p' on shaft J and gearing connecting said shaft P with said wheel Q, substantially as set forth.

4. The combination of the bed, the carriage, the chain-actuated cutting apparatus on the carriage, the prime power-shaft, the secondary shaft driven thereby, the chain-driving wheel connected to the chain-driving shaft, a transversely-mounted reversible shaft having pinions engaging with racks on the bed, a carriage-moving shaft, P, parallel to the pinion-shaft, a worm on the secondary shaft, a worm-wheel driven thereby, a relatively slow-moving gearing actuated by said worm-wheel for turning the reversible shaft slowly in one direction, means for connecting the worm-wheel to the carriage-moving shaft, P, the relatively faster straight spur-gearing connecting said carriage-moving shaft with the pinion-shaft, and the clutch, substantially as set forth.

5. The combination of the bed, the carriage, the chain-actuated cutting apparatus on the carriage, the prime power-shaft, the reversible double-speeded carriage-moving shaft mounted transversely on the carriage, the pinions thereon, the racks on the bed, the

shaft parallel to the reversible pinion-shaft, one of said shafts (to wit the reversible pinion-shaft and the shaft parallel thereto) having two loose wheels, and the other thereof having two fastened wheels, a clutch between the two loose wheels, and a worm and worm-wheel interposed between the two last-said shafts and the prime power-shaft, and adapted to impart power to rotate the reversible pinion-

shaft slowly in one direction or rapidly in the opposite direction, substantially as set forth. 10

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

HENRY B. DIERDORFF.

Witnesses:

A. RUPPERSBERG,
W. E. RICH.