

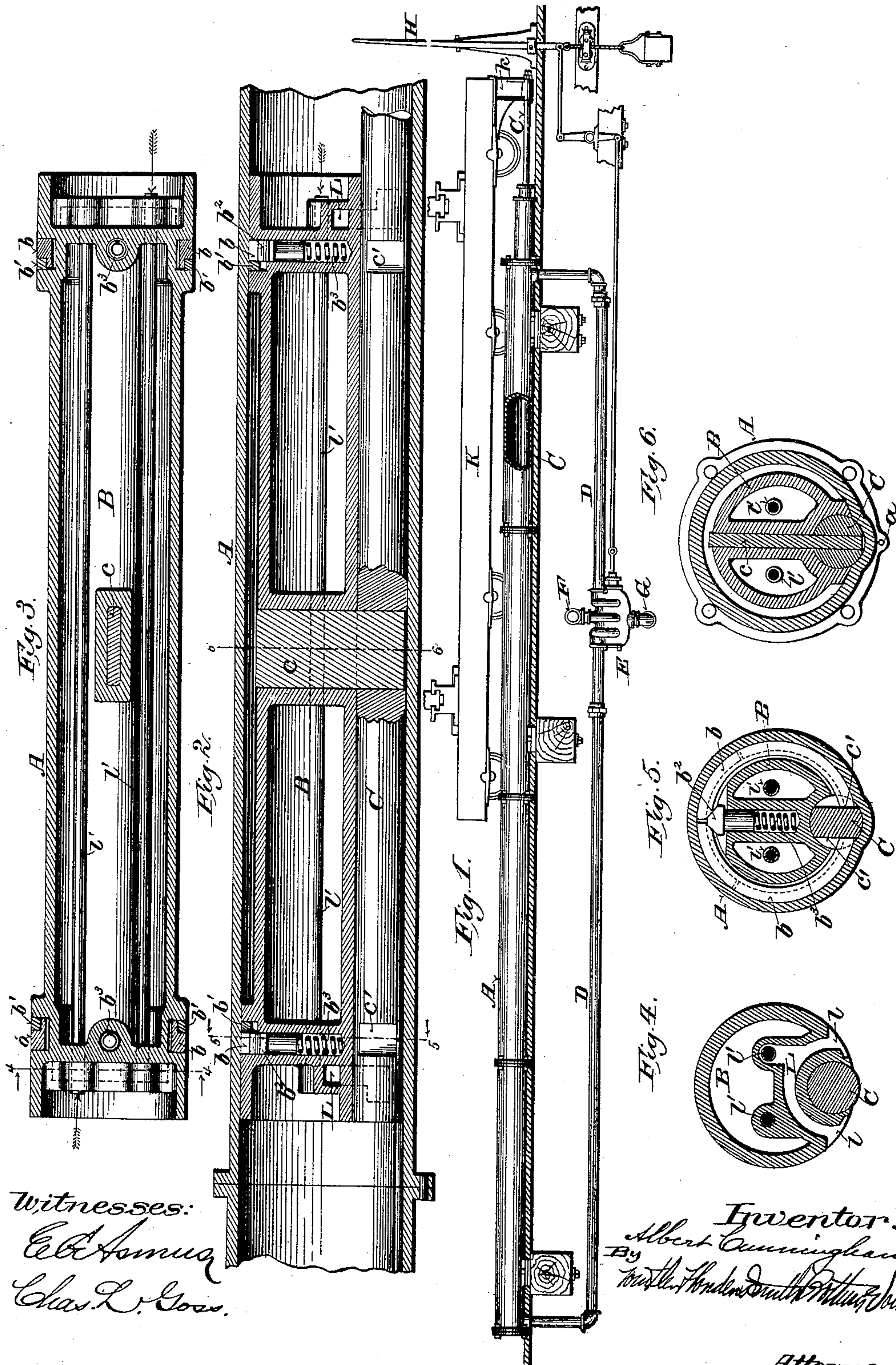
(No Model.)

A. CUNNINGHAM.

DIRECT ACTING STEAM FEED WORKS FOR SAW MILLS.

No. 434,657.

Patented Aug. 19, 1890.



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UNITED STATES PATENT OFFICE.

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DIRECT-ACTING STEAM-FEED WORKS FOR SAW-MILLS.

SPECIFICATION forming part of Letters Patent No. 434,657, dated August 19, 1890.

Application filed April 17, 1890. Serial No. 348,311. (No model.)

To all whom it may concern:

Be it known that I, ALBERT CUNNINGHAM, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Direct-Acting Steam-Feed Works for Saw-Mills; 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 pertains 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.

My invention relates to that class of direct-acting steam-feeding engines in which a long cylinder and piston-rod are employed.

It consists, essentially, of attaching the piston-rod to the lower side of the piston and giving it a bearing in the bottom of the cylinder along its entire length, of providing in each end of the piston a steam cavity or recess opening against the interior of the cylinder at the bottom and communicating with the steam-space of the cylinder at the opposite end of the piston so as to counteract the tendency of the eccentrically-attached piston-rod to turn the piston obliquely to the axis of the cylinder, and of certain other peculiarities of construction and arrangement hereinafter particularly described, and pointed out in the claims.

The main objects of my invention are to prevent the flexure and sagging of the long piston-rod employed in this class of engines and to prevent unequal wearing of the piston in the cylinder.

In the accompanying drawings, like letters designate the same parts in the several figures. Figure 1 is a side elevation of my improved steam-feed as applied to a saw-mill carriage. Fig. 2 is a vertical axial section, on a greatly-enlarged scale, of the piston and a portion of the cylinder. Fig. 3 is a horizontal axial section of the piston. Fig. 4 is a cross-section of the piston on the line 4 4, Fig. 3. Fig. 5 is a similar section on the line 5 5, Fig. 2; and Fig. 6, a similar section on the line 6 6, Fig. 2.

In this class of steam-feeding engines in which a long cylinder and piston-rod are employed the piston-rod as heretofore attached at the center of the piston will sag between

the distant points where it is supported, especially when it is acting against considerable resistance. This flexure or sagging of the piston-rod tends to carry the piston into a position oblique to the axis of the cylinder, and hence to wear it tapering toward the ends on the upper and lower sides. To avoid to a certain extent the ill effects of this unequal wear of the bearing-surfaces of the piston, it has been customary to turn it at frequent intervals in the cylinder, so as to present different portions of its bearing-surfaces in turn to the greatest wear. In this manner the piston is worn tapering toward the ends and its proper fit in the cylinder is destroyed. The sagging or flexure of the piston-rod also tends to wear the packing in the stuffing-box of the cylinder unevenly, thereby causing leakage.

To obviate these difficulties is the end of my improvements, which will be readily understood by reference to the accompanying drawings, in which—

A represents the cylinder, constructed in the usual manner of a number of sections of convenient length flanged and bolted together at the ends so as to produce a cylinder of the required length. The ports at the opposite ends and on the under side of the cylinder are connected by pipes D D with a steam-chest or valve-case E in the usual manner. A supply-pipe F is connected with the upper part of the valve-case and the exhaust-pipe G with the under side thereof.

H represents a lever connected in the usual manner with the valve for admitting, cutting off, or exhausting steam from either end of the cylinder.

K is a saw-mill carriage, provided at the rear end with a depending bracket *k*, to which the outer end of the piston-rod C is directly attached. I prefer to form a longitudinal groove in the bottom of the cylinder to receive and guide and afford a greater bearing-surface for the lower side of the piston-rod C. The piston B, which is preferably made five or six times as long as its diameter, is formed in the lower side with a longitudinal sleeve or bore for the reception of the piston-rod C. A key *c*, passing through a vertical slot in the middle of the piston and engaging with a corresponding slot in the piston-rod, secures the

latter in said piston, as shown in Figs. 2, 3, and 6. The piston B is turned up at the opposite ends to fit the cylinder, and between the bearing-surfaces so formed is reduced in diameter, so as to require less finishing and to avoid the friction of unnecessary bearing-surface. Near each end circumferential grooves are formed in the bearing-surfaces of the piston, and in these grooves are inserted suitable packing-rings b b' . The packing-rings b are formed in segments, as shown in Fig. 5, abutting at one end against squared recesses c' , formed for the purpose, as shown in Figs. 2 and 5, in the piston-rod C. At their opposite ends, which meet or come close together at the upper side of the piston, these segments are beveled on the inside, and are pressed and held outwardly and snugly against the cylinder A by an inverted-V-shaped block b^2 , the cylindrical shank of which is inserted in a socket formed for its reception in the cylinder-head. Spiral springs b^3 are placed in these sockets, bearing against the shanks of the blocks b^2 and force the latter outwardly into engagement with the segments of the rings b . The packing-rings b' are placed in rabbets or circumferential recesses in the rings b , so as to break joints therewith and prevent leakage through the spaces between the ends of the segments of which the rings b are composed.

In the ends of the piston B are formed steam chambers or cavities L around the sleeve encircling the piston-rod, and opening at ll on each side thereof against the bottom of the cylinder, as shown in Fig. 4. The cavity at each end of the piston communicates through a pipe or passage l' with the steam-space at the opposite end of the piston. By this means when steam enters, for example, the right-hand end of the cylinder, as shown in the drawings, it will be admitted through one of the pipes l' into the steam-cavity L at the opposite end of the piston, and acting against the bottom of the cylinder through the wide openings ll will tend to force that end of the piston upward, thereby counterbalancing the tendency of the eccentrically-attached piston-rod to carry it downward. The cavity L in the opposite end of the piston being open to exhaust through the other pipe l' , opening into the exhausted end of the cylinder, leaves the steam-pressure upon the upper side of the piston unbalanced, and thereby counterbalances the tendency of the eccentrically-attached piston-rod to lift or carry that end of the piston-rod upward. When steam is admitted to the opposite end of the cylinder, the reverse of the operation just described takes place, so that in whichever direction the piston is moved the tendency of the piston-rod connected therewith out of its center to move it obliquely to the axis of the cylinder is counteracted.

The sections of which the cylinder is composed are each formed on the under side adjacent to the groove for the piston-rod with

perforated ears a , as shown in Fig. 6, which serve as guides for boring or forming said groove and connecting the sections with said groove in perfect alignment. Although I prefer the construction shown, the groove in the bottom of the cylinder may be dispensed with and the piston-rod allowed to bear simply upon the bottom of the cylinder; but in this way a much smaller bearing-surface is afforded.

Various changes may be made in the details of my improvements without departure from the spirit of my invention or change in the results thereby attained.

I claim—

1. In a steam-feed engine, the combination of a cylinder, piston, and a piston-rod attached to said piston at its lower side and bearing on the bottom of said cylinder, substantially as and for the purposes set forth.

2. In a steam-feed engine, the combination of a cylinder having a longitudinal groove on the inside along the bottom, a piston adapted to said cylinder, and a piston-rod attached to said piston at the lower side and bearing at the bottom of said cylinder in said groove, substantially as and for the purposes set forth.

3. In a steam-feed engine, the combination of a cylinder composed of sections and provided with a groove on the interior along the bottom, said sections being each formed with a perforated ear, which serves as a guide for forming said groove and connecting the sections with the groove in line, a piston, and a piston-rod eccentrically attached to said piston and adapted to bear in said groove at the bottom of the cylinder, substantially as and for the purposes set forth.

4. In a steam-feed engine, the combination of a cylinder, a piston, and piston-rod eccentrically attached to the piston, said piston being provided at each end with a steam-cavity opening against the interior surface of the cylinder and communicating with the steam-space at the opposite end of the piston, substantially as and for the purposes set forth.

5. In a steam-feed engine, the combination, with the cylinder having an interior longitudinal groove along the bottom, of a piston having a longitudinal bore in one side for the reception of the piston-rod, said bore being open on one side, and a piston-rod inserted and secured in such bore and adapted to bear in the groove along the bottom of the cylinder, substantially as and for the purposes set forth.

6. In a steam-feed engine, the combination, with the cylinder, of a piston formed with circumferential grooves near its ends, packing-rings inserted in said grooves, spring-actuated beveled blocks bearing outwardly against said packing-rings and holding the same snugly against the cylinder, said piston being provided at each end with a steam-cavity opening against the interior of the cylinder and communicating through a passage in said piston with the cylinder at the opposite end of

the piston, and a piston-rod attached to said piston at the lower side thereof and bearing on the bottom of the cylinder, substantially as and for the purposes set forth.

5 7. The combination, with the cylinder, of a piston and its rod eccentrically attached to the piston, said piston being provided at or near one end with a cavity opening against the cylinder and communicating with the
10 steam-space therein so as to counteract the

side-thrust of the piston-rod, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

ALBERT CUNNINGHAM.

Witnesses:

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M. E. BENSON.