

(No Model.)

4 Sheets—Sheet 1.

J. BOLAND & G. W. FRITZ,  
MINING MACHINE.

No. 571,259.

Patented Nov. 10, 1896.

Fig. 4.

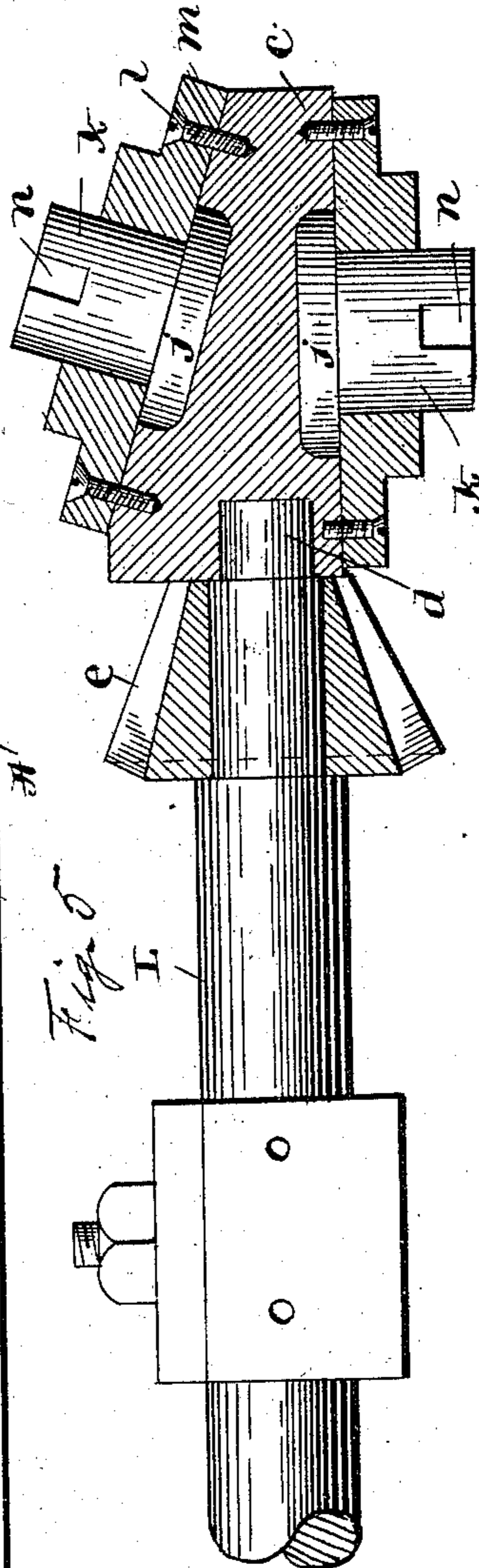
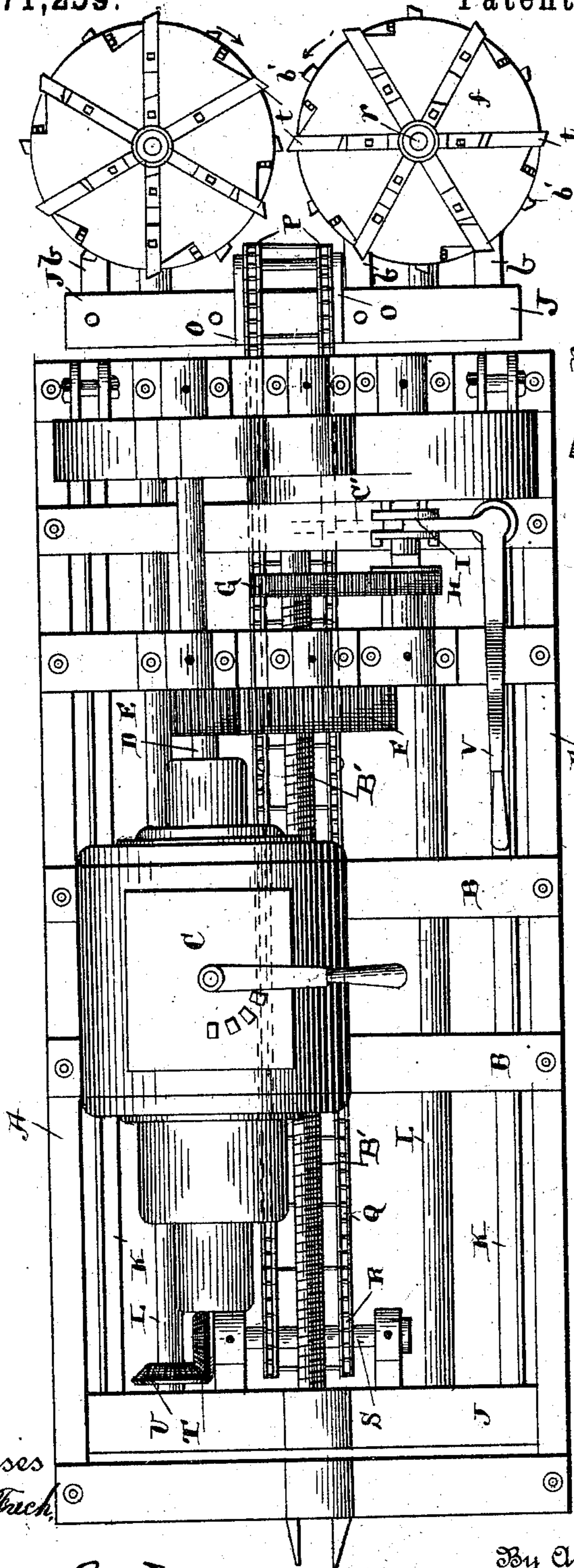


Fig. 5.

Witnesses  
Geo. E. Tuck, ©

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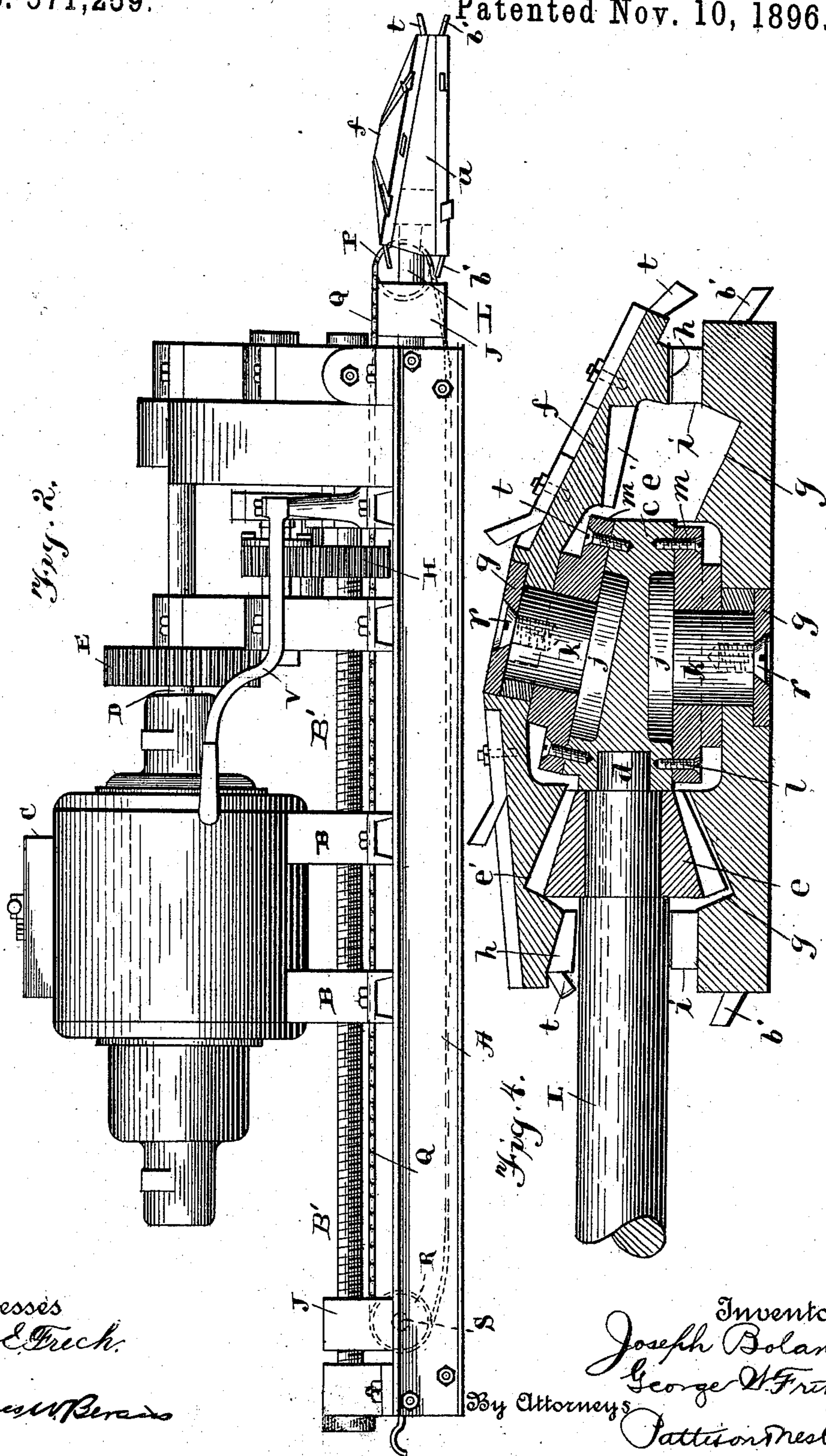
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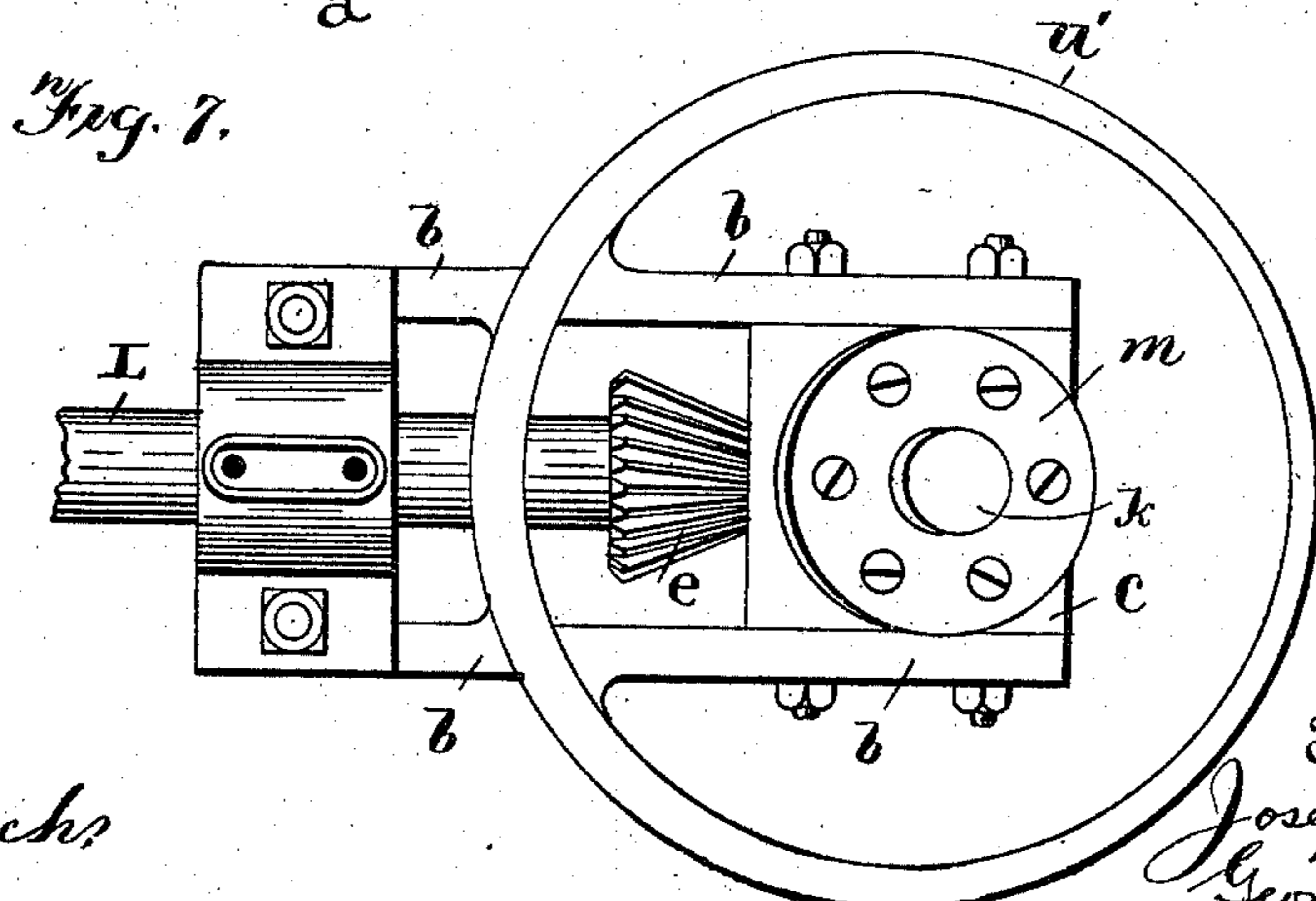
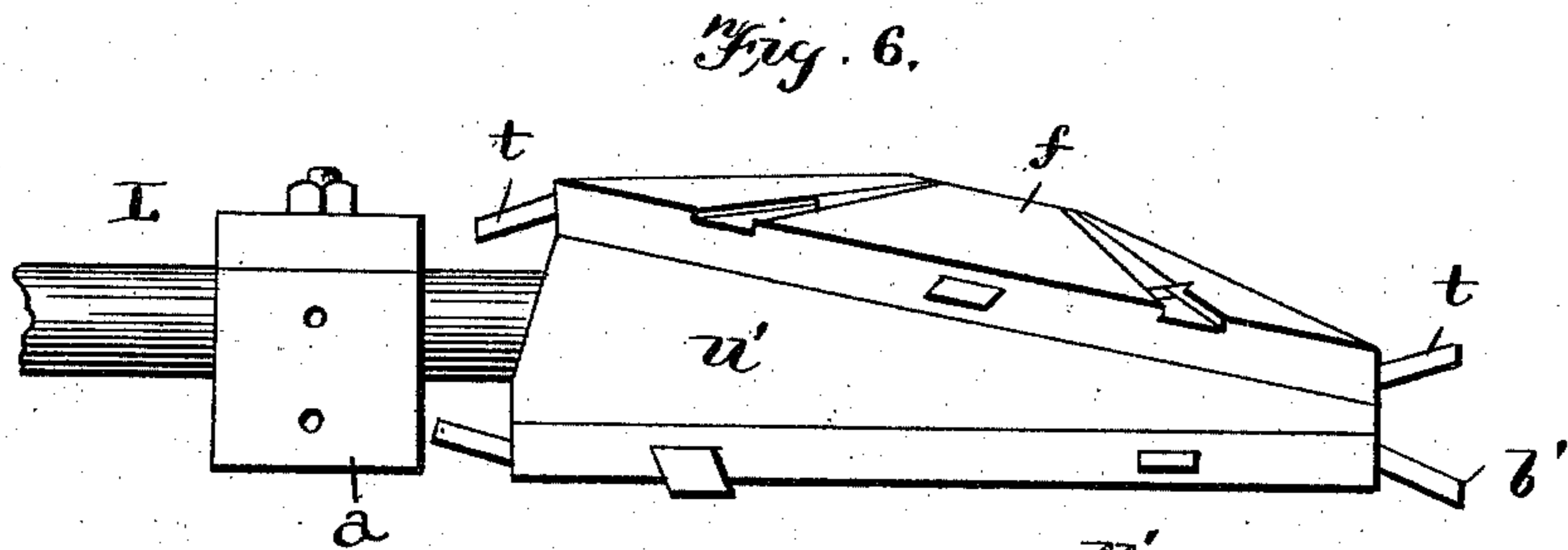
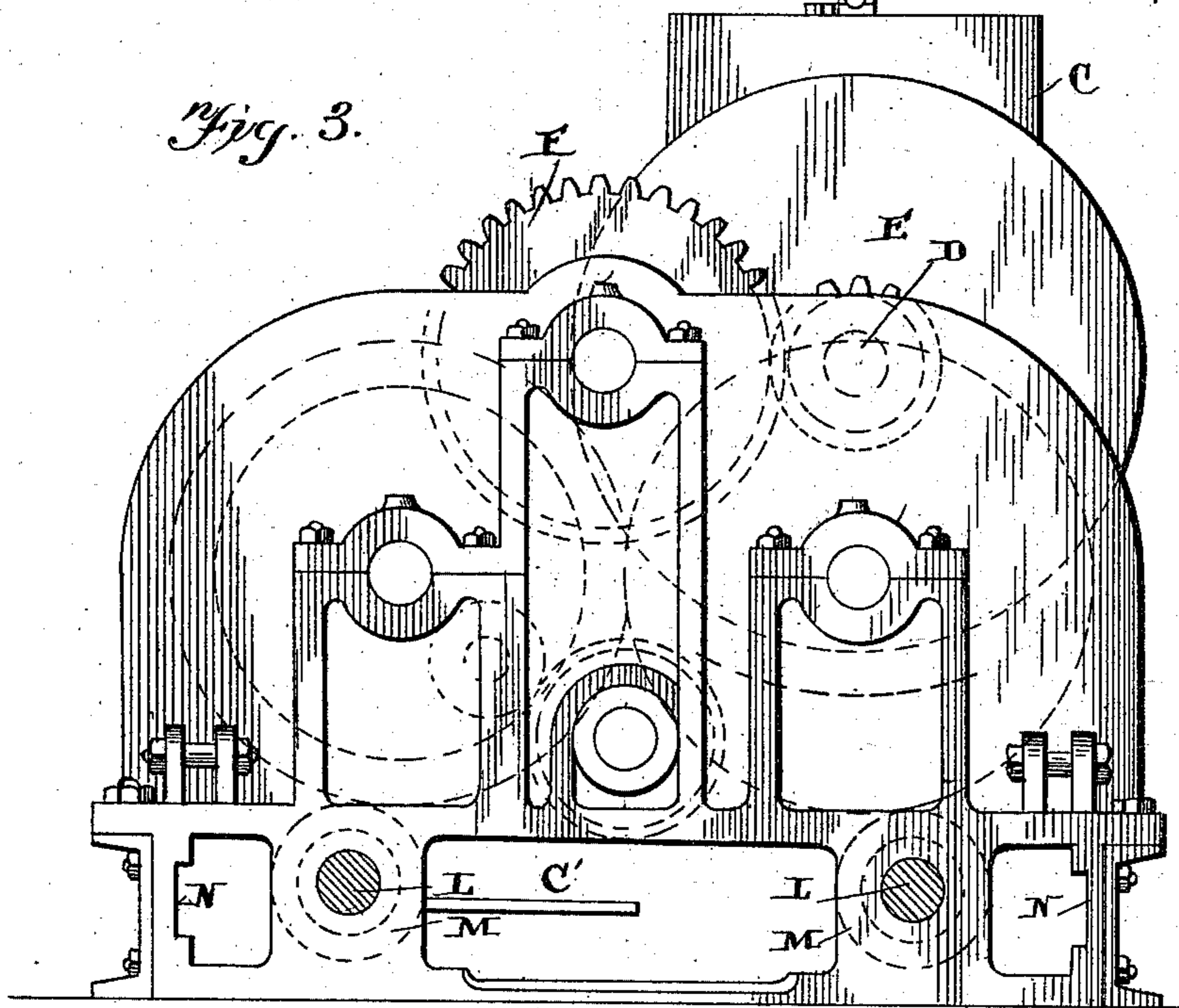
4 Sheets—Sheet 3.

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Patented Nov. 10, 1896.



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(No Model.)

4 Sheets—Sheet 4.

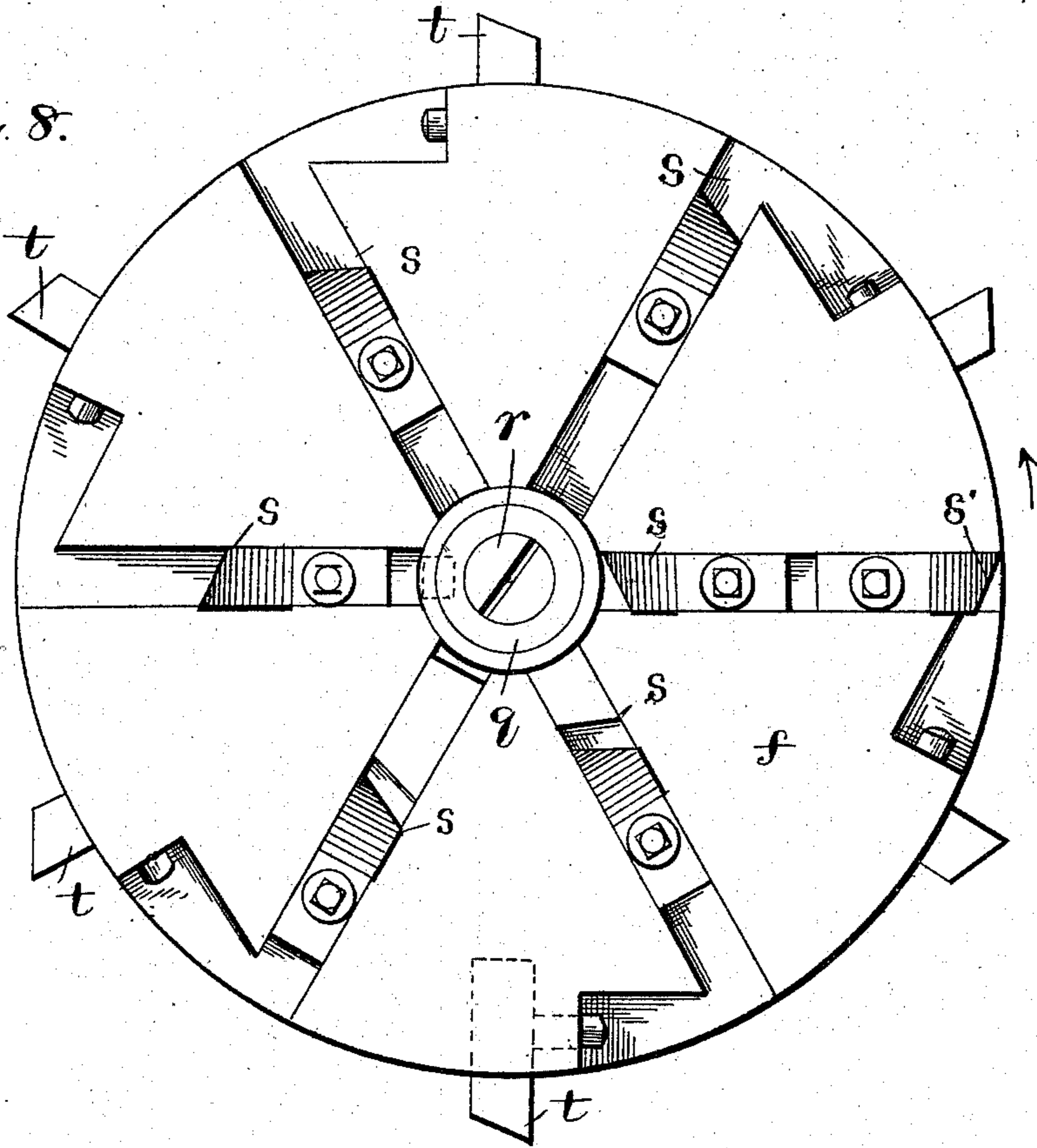
J. BOLAND & G. W. FRITZ.

MINING MACHINE.

No. 571,259.

Patented Nov. 10, 1896.

Fig. 8.



Witnesses

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# UNITED STATES PATENT OFFICE.

JOSEPH BOLAND AND GEORGE W. FRITZ, OF PITTSBURG, PENNSYLVANIA.

## MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 571,259, dated November 10, 1896.

Application filed March 6, 1895. Serial No. 540,741. (No model.)

*To all whom it may concern:*

Be it known that we, JOSEPH BOLAND and GEORGE W. FRITZ, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have  
5 invented certain new and useful Improvements in Mining-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as  
10 it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

Our invention relates to improvements in mining-machines, and is intended as an improvement upon our patent granted April 2,  
15 1895.

One object of our present invention is to support, construct, and journal the rotary cutters in their sockets that a larger wearing-  
20 surface is provided, and to have the outer extremity of the driving-shaft journaled in the inner ends of the said sockets instead of passing through the same.

Another object of our present invention is the peculiar location of the knives upon the  
25 cutter-wheels, whereby the lower series of cutters do the cutting while the other series of cutters merely break it away, thus reducing very materially the power required to  
30 drive the machine over that necessary where the entire face of the cutters is simultaneously exposed to the bank of coal, thus requiring the whole surface of the cutter to do cutting work instead of only a portion thereof, the  
35 other portion merely breaking it away, which requires less power than the cutting, as will readily be understood.

Another object of our present invention is the arrangement of an automatic shift for the  
40 clutch, whereby when the traveling frame carrying the cutters has moved to its forward limit the clutch is automatically moved by the traveling of the frame and the machine automatically stopped or reversed, as may be pre-  
45 ferred, and whereby the machine is also automatically stopped or reversed when the cutter-frame has reached its inward limit.

In the accompanying drawings, Figure 1 is a plan view of our invention complete. Fig. 2  
50 is a side elevation of the same. Fig. 3 is a front elevation with the traveling frame or carriage removed. Fig. 4 is an enlarged sec-

tional view of the cutters and their supporting-sockets, taken longitudinally of the driving-shaft. Fig. 5 is a similar view with the cut-  
55 ters removed. Fig. 6 is a side elevation of the cutter, with the side supporting-bars for the cutter-sockets removed. Fig. 7 is a plan view of the cutter-sockets, the gearing shields or bands, and the supporting-arms for the said  
60 sockets, the cutters being removed. Fig. 8 is an enlarged plan view of the upper cutter.

Referring now to the drawings, A indicates a rectangular frame of proper dimensions, in which a carriage, composed of the end pieces  
65 J and the side bars K, moves. These side bars K move in grooves N, formed in the frame, which are shown clearly in Fig. 3, and this carriage is moved endwise by means of the  
70 screw-shaft B' passing through a suitable screw-nut in the carriage, the ends of the screw-shaft being journaled in the rectangular frame A. This screw-shaft is driven  
75 through the medium of a motor C and an intermediate changeable speed-gearing E, F, G, and H, substantially the same as that shown in our patent herein referred to, whereby the  
80 carriage is made to travel out slowly and to recede or travel in at an increased speed. The motor likewise drives the cutters, to be specifically hereinafter referred to, through the  
85 medium of the gearing, which is the same as that shown in the said patent, and therefore the speed-gearing and the manner of driving the cutters need not be more fully described  
hereinafter, except as they may relate to our improvement hereinafter to be fully set forth.

A clutch I is adapted to engage gear-wheel H, and thus either lock it to the shaft or to  
90 allow it to rotate freely thereon, as described in our said patent, and this clutch is moved through the medium of a bell-crank lever V. (Clearly shown in Fig. 1.) The shaft of this  
95 bell-crank lever extends downward and has connected with its lower end an inwardly-extending arm C', (shown in dotted lines, Fig. 1, and solid lines, Fig. 3,) which is in the path  
100 traveled by the rear cross-piece J of the carriage. When the carriage has traveled outward its prescribed limit, the cross-piece J will strike the arm C', thus moving it and  
throwing the clutch out, which reverses the gearing, and the carriage travels backward. So also when the carriage has traveled its

prescribed distance backward, a forward cross-piece of the carriage will strike the said arm and throw the clutch in against it or move it sufficiently far to stop the movement of the carriage. Likewise, instead of having the forward movement of the carriage reverse the motion thereof through the medium of the lever, as just stated, the locking device or feather upon the collar-shaft may be so situated that when the collar or clutch is thrown out of engagement it will not be locked to the shaft, in which event the carriage will merely be stopped and require a further movement of the collar through the medium of the handle or bell-crank lever P. This may be the case in the operation of the carriage in either direction, or, as previously stated, it can be made to reverse the movement of the carriage automatically. The cutter-driving shaft L is suitably journaled in the carriage and travels with the same, the outer ends being provided with the bevel-pinion *e*, engaging the teeth *e'* of the upper cutter, thus driving the same, while the teeth *h* of the upper cutter engage the teeth *i* of the lower cutter, and thus drive it, substantially the same as that described in our herein-referred-to patent.

Particular attention is directed to the cutter-socket *c*, which is supported by the longitudinally-extending arms *b*, which have their inner ends bolted to block *a*, and these blocks *a* are clamped between the front cross-bars J of the carriage. In this manner we make a rigid and firm support for the socket, and the shaft L is journaled in the block *a* and has its outer end journaled in an opening or recess *b*, made in the inner ends only of the socket *c*, in contradistinction to having the shaft pass through the socket and supported as in our previous patent. The advantages of this construction are that we are thus enabled to secure a larger bearing-surface for the journals of the cutter, which will now be particularly referred to.

Formed in the upper and lower sides of the socket *c* are the cavities *j*, which receive the head *l* of the pins *k*, and these pins are held in place by means of the washers or caps *m*, which engage the outer faces of the said heads *l*. Owing to this construction we are enabled to secure a broad wearing-surface for the cutters adapted to support them more rigidly and firmly and to cause less trouble in the maintenance of the machine. The cutters *f* are keyed to the outer ends of the pins *k* by means of keys *p*, passing into the keyway *n* of the pin and also into a corresponding keyway in the cutter. These keys are then held in place by means of the washers *q*, having the screws *r* passing through them into the pins, as clearly shown in Fig. 4. This enables us to make a convenient way of holding the cutters and at the same time a very firm bearing for them.

The lower cutter has a groove *d*, in which the bevel-pinion *e* freely rotates, as in our

previous patent, so that the upper cutter drives the lower one by setting at an angle to it and engaging the teeth *i* of the lower cutter, as before stated.

We desire now to call particular attention to the form of the knives on the upper cutter-wheel, as used in relation to the cutters on the lower wheel.

It will be noticed that the lower wheel has outwardly-extending cutters *b'*, every other one being slightly above the other, as illustrated, whereby each cuts out a small proportion of the coal bank, and also that the upper cutter has correspondingly-arranged cutters *t*, which have their cutting-faces on a line with the cutters *b'* of the lower cutter-wheel. The knives or cutters on the upper convex surface of the upper cutter-wheel are arranged in a spiral manner, beginning with the cutter *s'*, and each succeeding one *s* being a little nearer the center of the wheel, until finally the last one is at the center. Owing to this construction the peripheral cutters of the lower and upper cutting-wheel do the cutting, while those on the upper concave surface of the upper cutter merely cut or break away a small proportion of the coal, and this enables us to greatly reduce the amount of power necessary to drive the cutters.

A shield or band *u'* being tapered from its inner end extends around between the cutter-wheels, and thus incloses entirely the gearing between them and protects the gearing from the dust arising from the cutting operation. This band or shield incloses completely, as will be clearly seen from the drawings, and being connected only at its inner side is adapted to have a slight vibratory movement at its outer edge to accommodate itself to any slight movement which the cutter-wheels may have, as will be readily understood.

Referring to the plan view in Fig. 1, it will be seen that we use a transverse shaft S at the rear of the carriage, having at one end a bevel-wheel T engaging a bevel-wheel U of one of the cutter-driving shafts L. This shaft carries two sprocket-wheels R, around which the sprocket-chains Q pass, the said chains passing around sprocket-wheels P at the outer end of the carriage, these last-named sprocket-wheels being supported upon outwardly-extending arms O. The sprocket-chains are connected by angle-bars S', thus making scrapers which continually convey the cut coal or dust back under the machine away from the cutters, owing to the fact that the cutters have their inner peripheries revolve in the direction indicated in Fig. 1, so that the dust is brought around to that point.

Having thus fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a mining-machine, the supporting-frame, the cutter-carriage, forwardly-extending arms having their inner ends firmly con-

5 nected to the forward end of the carriage, a  
cutter socket or head firmly connected be-  
tween the said arms beyond the carriage-  
frame, the cutter-driving shaft having its  
10 outer end journaled in the inner portion only  
of said head or socket, the socket having re-  
cesses in its top and bottom at points beyond  
the journal of said shaft for the purpose de-  
scribed, headed pins with their heads in said  
15 recesses, a cap or washer engaging the said  
pin-heads and secured to the outer sides of  
the socket, and the cutter-wheels keyed to the  
shanks of the pins, substantially as described.

2. In a mining-machine, the combination  
15 of the two cutting-disks, a driving-shaft mesh-  
ing with one of said disks, a socket-piece pro-  
vided with a cavity on its upper surface, said  
upper cutting-disk being provided with a  
journal-pin having an enlarged head fitting  
20 in said cavity, and means for securing the

journal-pin in its socket, substantially as de-  
scribed.

3. In a mining-machine, the combination  
with a driving - shaft, of upper and lower  
disks, a socket-piece, brackets supporting the 25  
socket-piece, the driving-shaft having its end  
journaled in one side of the socket-piece,  
said socket-piece having an enlarged cavity,  
a journal-pin secured to the upper disk, hav-  
ing an enlarged head fitting in said cavity, 30  
and a tap for holding said enlarged portion  
in the cavity, substantially as described.

In testimony whereof we affix our signa-  
tures in presence of two witnesses.

JOSEPH BOLAND.  
GEORGE W. FRITZ.

Witnesses:

S. J. TOOLE,  
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