

(No Model.)

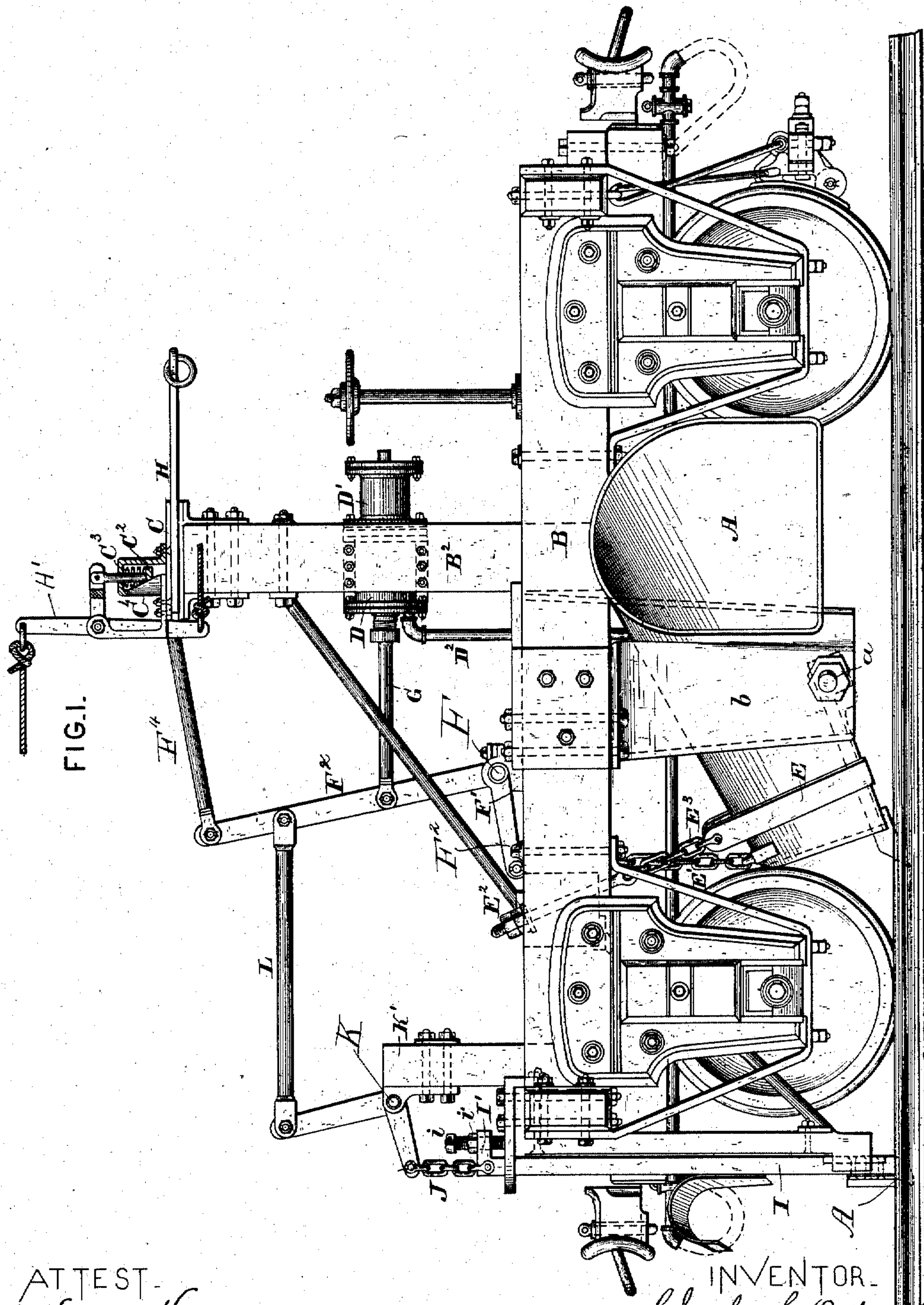
3 Sheets—Sheet 1.

C. C. QUINN.

TUNNEL EXCAVATOR.

No. 330,617.

Patented Nov. 17, 1885.



ATTEST.
J. Henry Kaiser.
Chas. E. Barber.

INVENTOR.
Charles C. Quinn
By *L. Deane* Att'y.

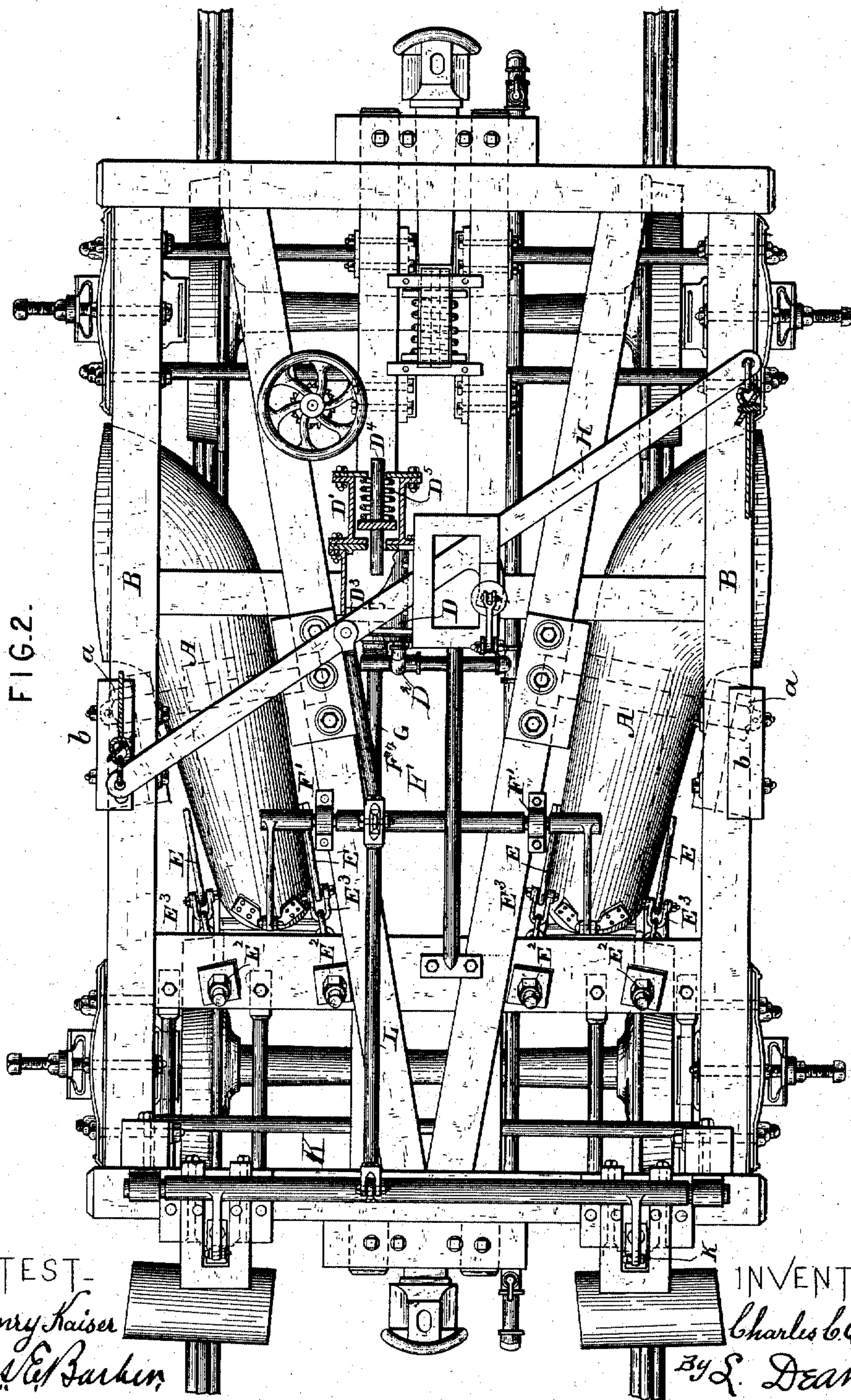
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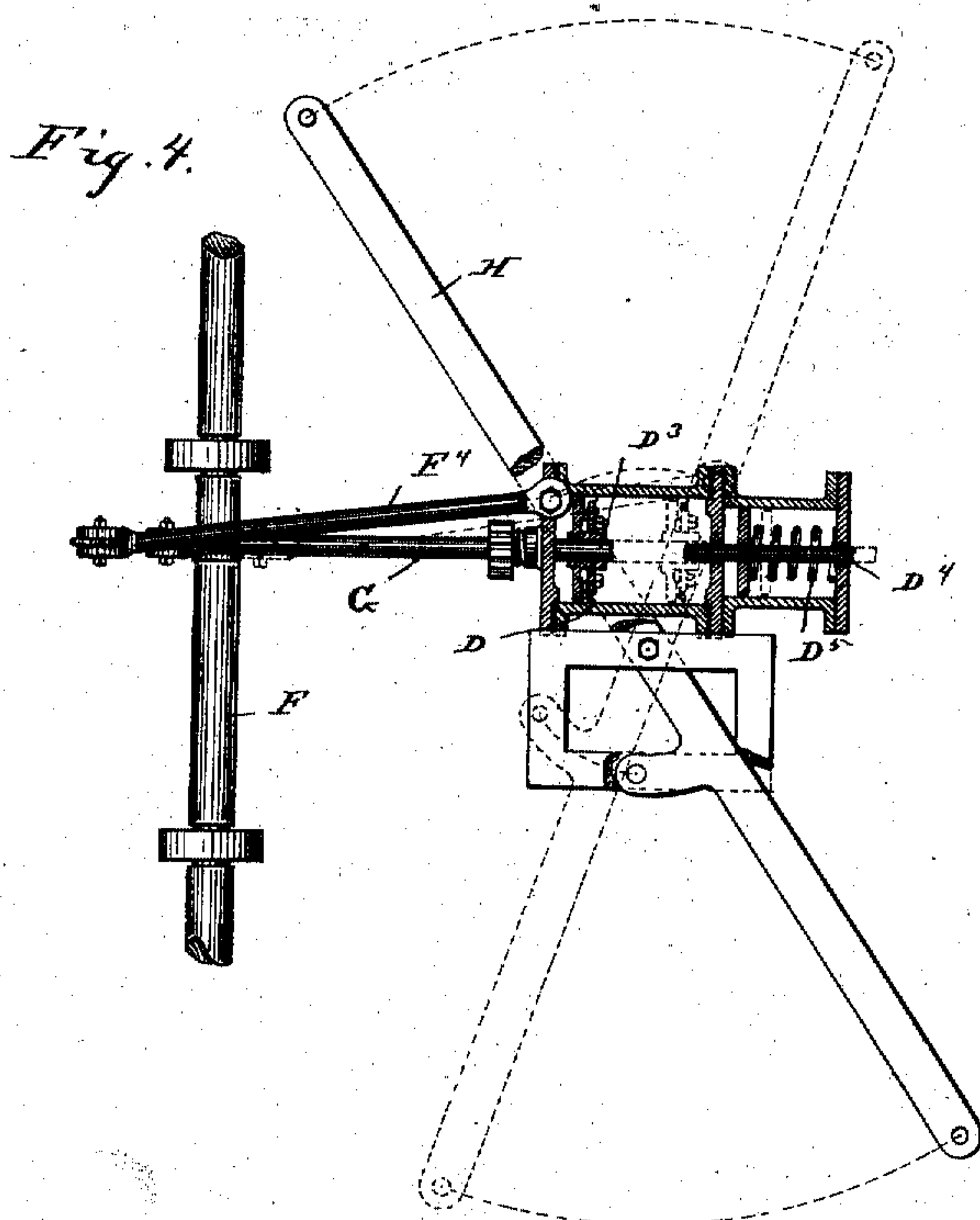
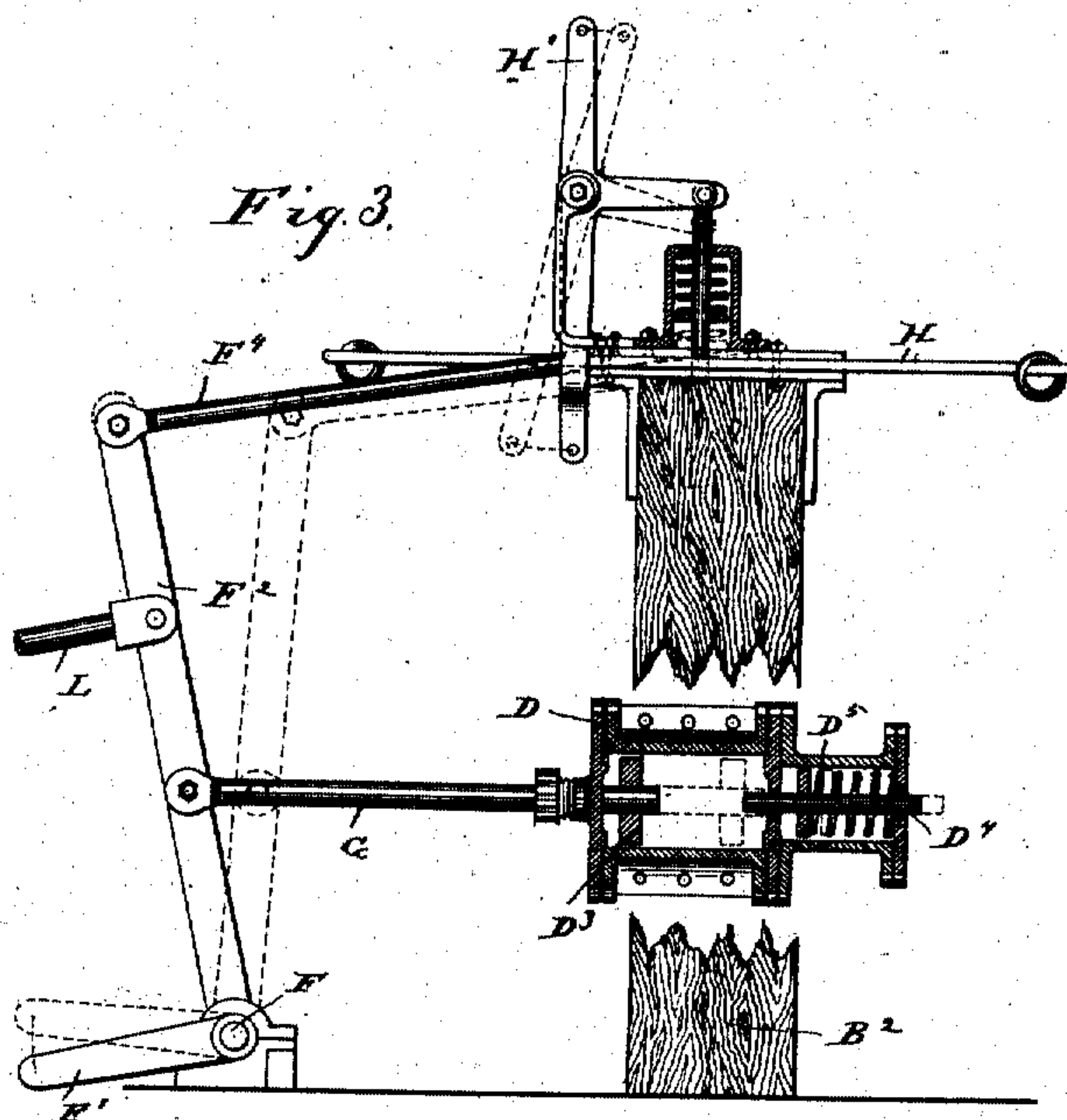
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WITNESSES

Wm. W. W. W.
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INVENTOR

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By *his* Attorney

L. Deane

UNITED STATES PATENT OFFICE.

CHARLES C. QUINN, OF FARGO, DAKOTA TERRITORY.

TUNNEL EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 330,617, dated November 17, 1885.

Application filed August 11, 1885. Serial No. 174,144. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. QUINN, a citizen of the United States, residing at Fargo, in the county of Cass and Territory of Dakota, have invented certain new and useful Improvements in Tunnel Excavators, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a side elevation. Fig. 2 is a top plan view on line *xx* of Fig. 1. Fig. 3 is a side elevation in section, showing device locked in full lines and unlocked in dotted lines. Fig. 4 is a sectional plan view illustrating the same point.

This invention relates to that class of devices known as "railroad-track clearers;" and it consists more particularly in the tunnel-shaped excavators and their arrangement in relation to the track; in the method and means by which they are suspended and carried; in the detail of their operation in the track-clearer and its operation in conjunction with the excavators, and in the construction, arrangement, and combination of all the parts, as will now be more fully explained.

The objects of my improvements in switch, frog, guard-rail, and crossing-flange clearers are—

First. To so construct and attach the tunnel excavators as to prevent them from cutting off fish-plates and bolt-heads on the insides of the rails. This I attain by placing the tunnel excavators as close as possible to the inside tops of the rails and by arranging them at an angle of from one to twenty degrees to the line of the rails, the number of degrees depending upon the gage and curve of the railroad. By placing the tunnel excavators as closely as possible to the top of inside of rails it is obvious that when there is too much side motion in the machine the tunnel excavators, being pivoted, will automatically rise and lower at their outer ends when brought into violent contact with the insides of the tops of the rails. This only occurs when the machine has too much side motion, and then only when cutting ice on one side of a rail, which is very often the case on railroads running east and west, there being hard ice on the south side of the north rail and no ice on the north side of the south rail.

Second. To render it unnecessary to go out on the machine while in motion to vertically adjust the perpendicular flange-cutters and tread-clearers. This feature I attain by providing a tumbling-shaft, which operates in conjunction with the automatic locking device and governor and the steam-cylinder device. This feature, however, is only necessary on railroads where shallow frogs and shallow railroad-crossings are used, in which case the perpendicular flange-cutters are lifted enough to clear the top base between frog-rails and the crossing rails.

Third. To provide an automatic locking device which may be operated with a vertical stop-bolt provided with a spring. This automatic lock insures safety to the governor steam device.

Fourth. To provide a governor steam-cylinder device to lift the tunnel excavators when clearing below the rail-tops and to raise the flange-cutters to clear shallow frogs and to cross between rails and below rail tops at crossings, the governor-steam-cylinder device being constructed to operate in conjunction with the automatic locking device to lift the tunnel excavators from their outer and top sides and to lift the perpendicular tread-cutters from their upper ends.

I attain these objects by the mechanism illustrated in the accompanying drawings.

The improvements consist in placing the tunnel excavators A diagonally across the frame at an angle to the line of the rail of from one to twenty degrees, the number of degrees depending on the gage and curves of the railroads. The outer ends of the tunnel excavators A are also arranged as closely as possible to the insides and tops of the rails when designed to scrape or clear below the tops of the rails. The tunnel excavators are pivoted on bolts *a a*, and bolts *a a* are secured to the diagonal drop-hangers *b b*, and these hangers are secured to a frame, B. Each of the tunnel excavators A is also secured to safety-strap E, provided with chains *E³* and to lifting-chains *E'*. When the tunnel excavators A are designed to scrape or clear below the rail-tops they are operated by the governor steam-cylinder D and D' in coincidence with automatic locking device C, tumbling shaft F, arm F²,

and the lifting-chains E' , each of the said tunnel excavators A being suspended by chains E' E^3 , the latter attached to arm F^3 on the tumbling-shaft F , which shaft has its bearings on the vertical iron brackets $F' F'$. The longer or upright arm F^2 of the shaft F is connected by a piston-rod, G , to the governor steam-cylinder D and D' , and by its upper arm, F^4 , with the automatic locking device C' . When scraping or clearing above the track, the tunnel excavator A is rigidly held by the safety-strap E , secured to the threaded bolt E^2 by the chains E^3 .

The governor and steam-cylinder device consists of the steam-cylinder D' , secured to vertical timber B^2 , the governor-cylinder D , secured to the steam-cylinder D' .

The operation of the governor and steam-cylinder is as follows: Steam or air is applied to cylinder D through the pipe D^2 , forcing the piston-head D^3 against the regulating diaphragm-stem D^4 and the governor-regulating spring D^5 , and by the excess pressure on the piston-head D^3 the tunnel excavators A are by means of piston G , arm F^2 , and connecting mechanism lifted. The regulating-spring D^5 , compressed by the piston-head D^3 , in conjunction with the mechanism connected therewith, regulates the height and vertical angle of the tunnel excavators A when designed to scrape or clear below the rail-tops. It also regulates the height of the perpendicular flange-cutters $A' A'$ when designed to cut below shallow frogs and crossings between the rails. Many frogs and crossings are shallow on account of being filled about two inches from the bottoms of the rails. The piston-head D^3 is also held in its respective positions by stop-bolt C^2 and bolt-spring C^3 in connection with the lever-arm H , arm F^4 , and connecting mechanism. The piston-head D^3 and the follower-stem D^4 are also held in their respective positions by stop-bolt C^2 and stop-bolt spring C^3 . The regulating governor-spring D^5 is of sufficient strength to resist a pressure of, say, one hundred pounds per square inch on the piston-head D^3 . As soon as the pressure on the piston-head D^3 exceeds this amount the stop-bolt spring C^3 forces the stop-bolt C^2 down ahead of the horizontal lever H . This governor steam-cylinder device not only holds and operates the tunnel excavators and perpendicular flange-cutters, but also insures the instantaneous release of the automatic locking device.

The improvement in the locking device consists of a lever, H , the stop-bolt C^2 , the stop-bolt spring C^3 , and a spring-box, C^4 , as is shown in the drawings, working in conjunction with the governor steam-cylinders.

When the device is unlocked, the bottom end of diaphragm-bolt C^2 is forced down in front of horizontal lever H .

To lock the device, admit air or steam into cylinder D , which of course forces piston-head D^3 against diaphragm-stem D^4 , and compresses the regulating-spring D^5 about one and three-

fourths inch, and at this point spring C^3 forces diaphragm-bolt C^2 down in front of horizontal lever H .

To unlock the device, pull on the lever H' to raise diaphragm-bolt C^2 and compress spring C^3 . Thus the diaphragm-bolt C^2 is raised high enough to clear horizontal lever H , and of course the regulating-spring D^5 will force diaphragm-stem D^4 against the opposite follower-stem, which will move piston-head D^3 and horizontal lever H back, thereby unlocking the device.

The improvements in the perpendicular flange-cutters consist in bars $I I$, provided with the elbows $I' I'$ on the upper ends, and provided with set-screws $i i$, set-nuts $i' i'$, the said bars being held suspended by chains $J J$, and attached to arms on the tumbling-shaft K , which is pivoted on the vertical timbers $K' K'$. The longer or upright arm of the shaft K is connected by rod L to the long arm F^2 of the tumbling-shaft F , and operates in coincidence with the governor steam-cylinder and the automatic locking device. When the flange-cutters are designed to scrape or clear sand, dirt, ice, and snow below the shallow part of the frogs and crossings, they are operated by the tumbling-shaft K , in conjunction with the locking device and the governor steam-cylinder D and D' , and when designed to scrape or clear above the shallow parts of the frogs and crossings they are held by the set-screws $i i$ and set-nuts $i' i'$.

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

1. The combination of the main frame, the tunnel excavators secured diagonally across the frame at an angle to the line of the rails, and pivoted on bolts $a a$, which are secured to the diagonal drop-hangers, said hangers being secured to the main frame, with safety-straps secured to the tunnel excavators and the main frame, substantially as described.

2. In combination with the perpendicular flange-cutters, the elbows $I' I'$ on the upper ends of the square bars, set-screws and set-nuts, lifting-chains, tumbling-shaft, vertical timbers, and the connection-rod, substantially as described.

3. In combination with the automatic locking-plate, the stop-bolt, the stop-bolt spring, and the stop-bolt-spring box, substantially as described.

4. In combination with the governor-cylinder D , the steam or air cylinder D' , the steam or air pipes, the follower-stem, the regulating diaphragm-stem, and the regulating-spring, substantially as described.

5. The tunnel excavators and flange-cutters, in combination with a common lever which simultaneously operates both excavators and flange-cutters, substantially as described.

6. The main frame and the tunnel excavators, in combination with the safety-straps E E , as set forth.

7. The combination, with the perpendicular flange-cutters and the excavators, of the levers which connect them and the locking device, substantially as described.

5 8. In combination with the excavators and the flange-cutters, the locking device consisting of the plate H, bolt C², spring C³, and spring-box C⁴, as set forth.

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

C. C. QUINN.

Witnesses:

H. C. SOUTHARD,
ORIN W. FRANCIS.

It is hereby certified that in Letters Patent No. 330,617, granted November 17, 1885, upon the application of Charles C. Quinn, of Fargo, Dakota Territory, for an improvement in "Tunnel Excavators," errors appear requiring the following corrections, viz: In line 3, page 2, of the printed specification, the word "latter" should read *former*; in Fig. 1 of the drawing the lower arm of the bell-crank lever mounted upon the shaft F should read as if lettered F^3 instead of " F^2 "; and in Fig. 3 " F^i " should be read as F^3 ; and that the Letters Patent should be read with these corrections therein to make it conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 20th day of April, A. D. 1886.

[SEAL.]

H. L. MULDROW,
Acting Secretary of the Interior.

Countersigned:

M. V. MONTGOMERY,
Commissioner of Patents.