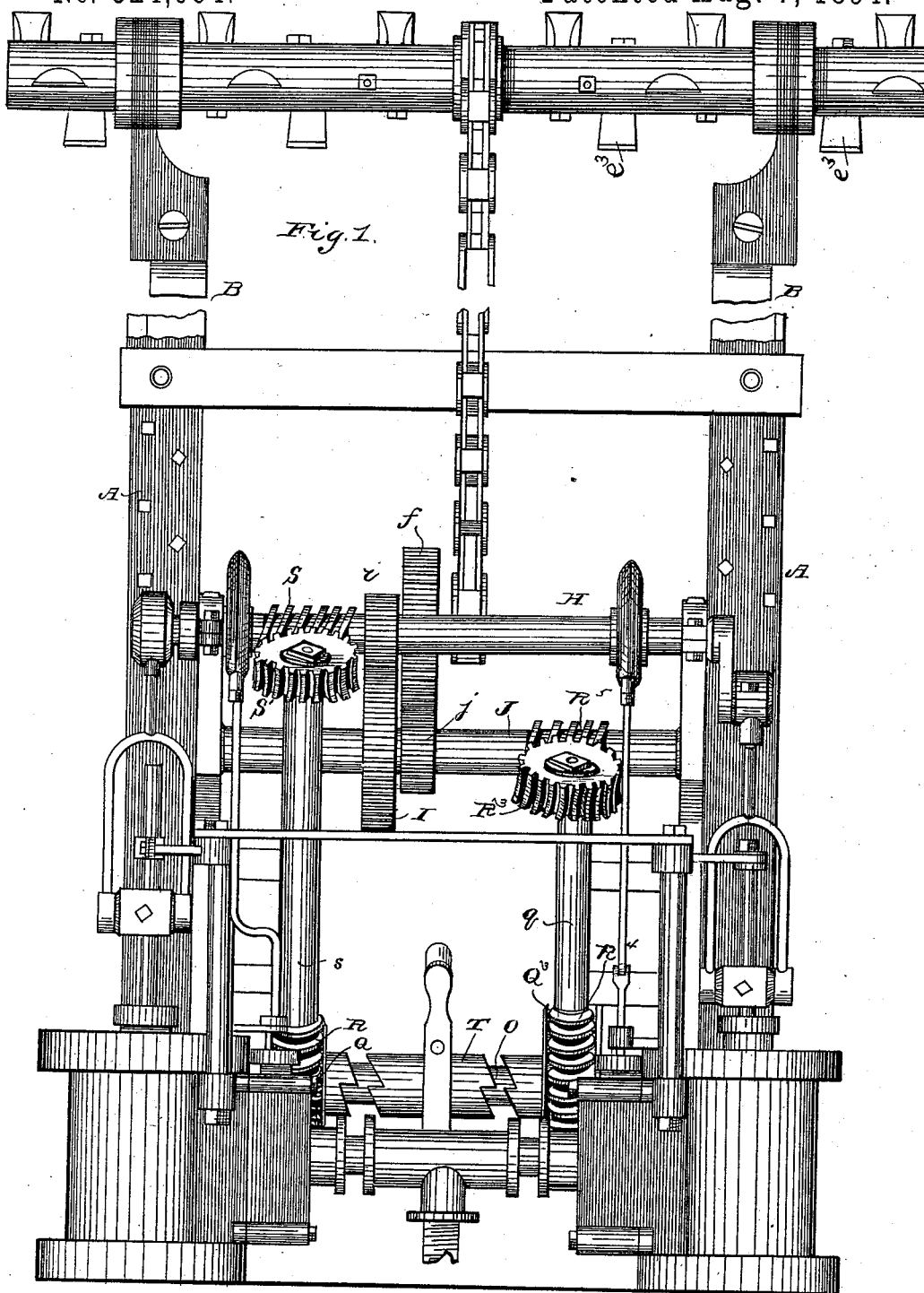


B. A. LEGG.
MINING MACHINE.

No. 524,064.

Patented Aug. 7, 1894.



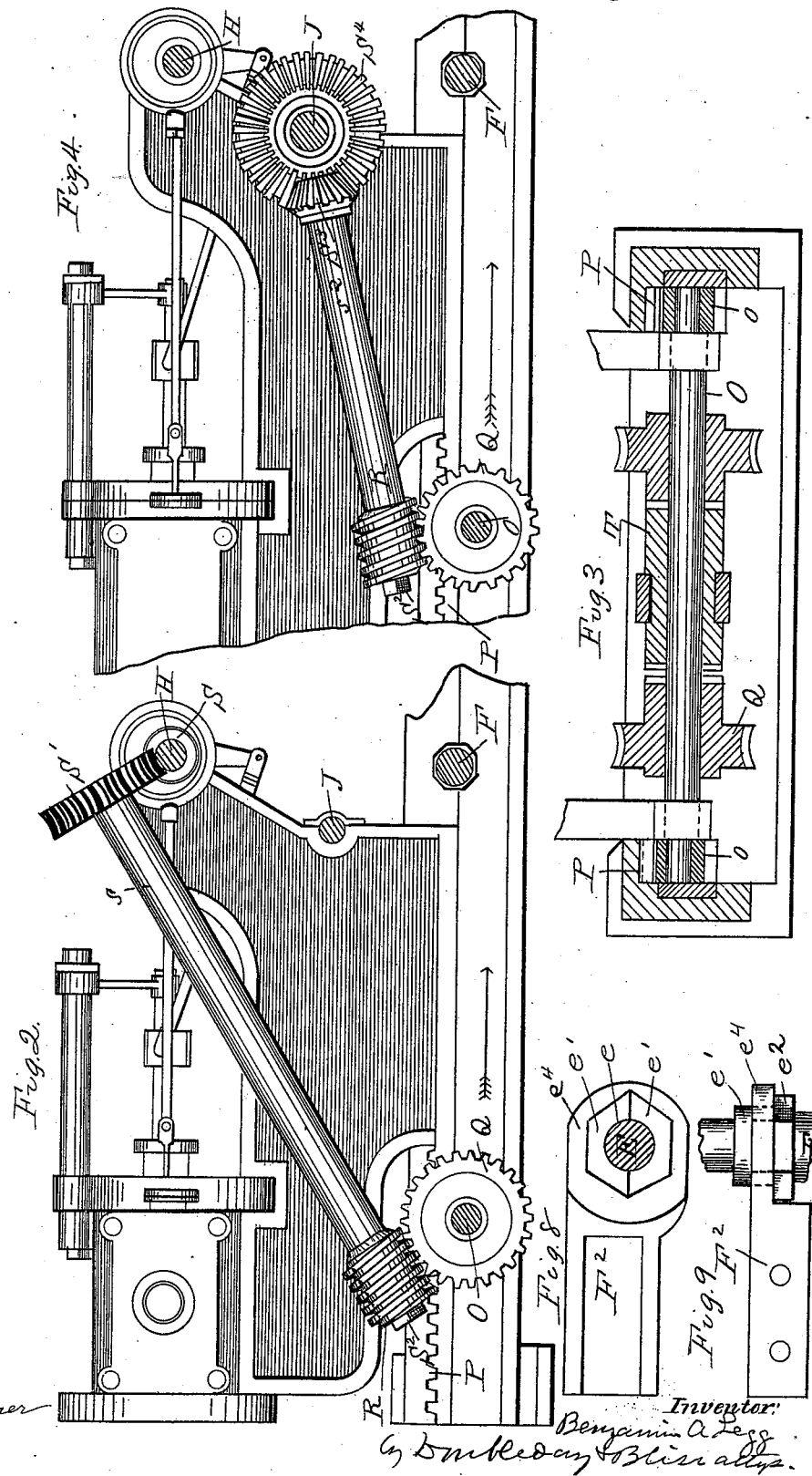
Witnesses:
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H. Burke

Inventor.
Benjamin A. Legg
By [Signature] Attorneys
Lambdon & Bliss atty.

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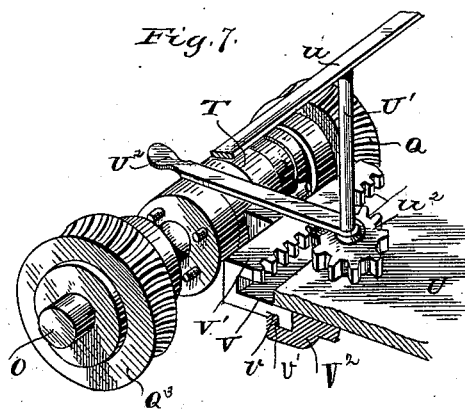
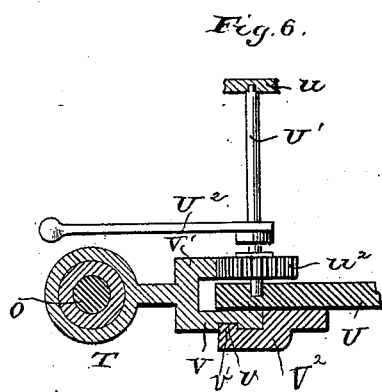
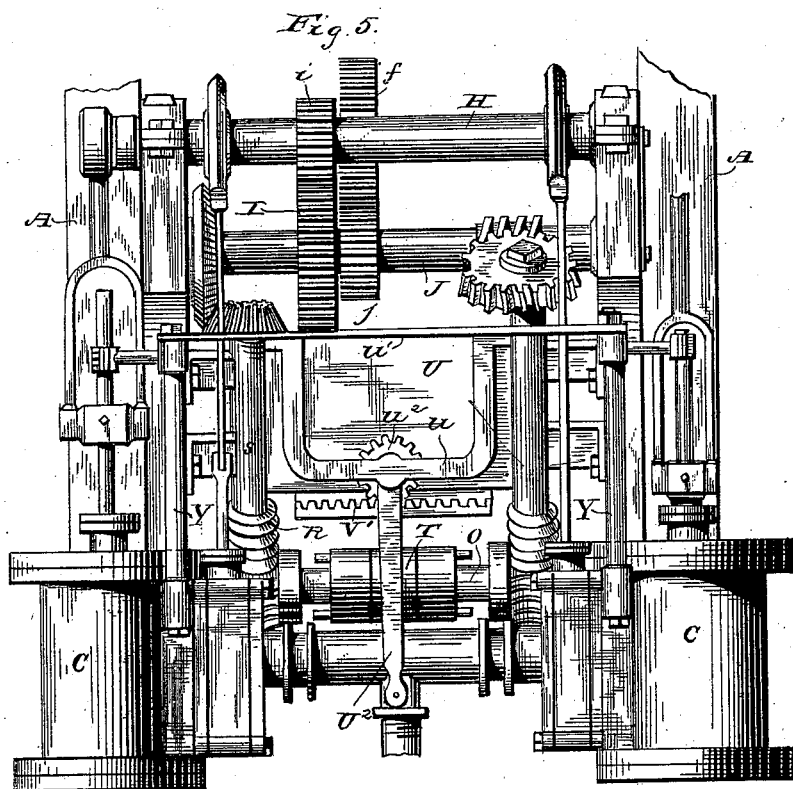
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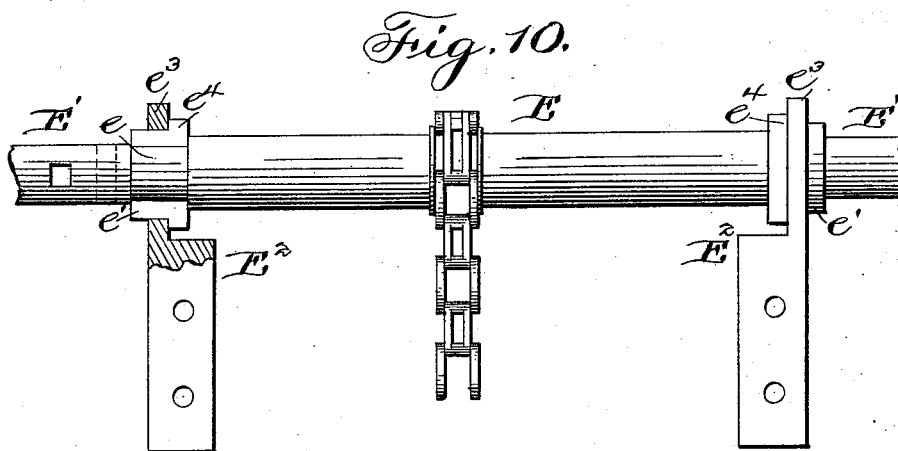
(No Model.)

4 Sheets—Sheet 4.

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UNITED STATES PATENT OFFICE.

BENJAMIN A. LEGG, OF COLUMBUS, OHIO, ASSIGNOR TO THE LECHNER
MANUFACTURING COMPANY, OF SAME PLACE.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 524,064, dated August 7, 1894.

Application filed December 10, 1885. Serial No. 185,267. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN A. LEGG, 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 top or plan view. Fig. 2 is a longitudinal section of the rear part of the machine. Fig. 3 is a transverse vertical section through the shaft which advances and withdraws the side of the frame. Fig. 4 is a section taken longitudinally through part of a modified form of the machine. Figs. 5, 6 and 7 show a modified form of mechanism for shifting the clutch. Figs. 8 and 9 are sectional views showing the relation of the cutter bar to its supports. Fig. 10 is a view partly in horizontal section showing the same matters.

A A are the side pieces of the stationary frame or bed.

B B are T-bars sliding in the side pieces of the stationary frame.

As the general construction of this machine is shown and described in Letters Patent No. 299,655, granted to myself June 3, 1884, to which reference is herein made no detailed description of the machine need be given except in so far as is necessary to a clear understanding of the invention for which protection is sought in this case, and which relates specifically to the devices employed for withdrawing the cutters from the coal; which devices are commonly referred to under the term "pullback." In this construction use is made of the same devices as those shown in said patent, for advancing the sliding frame.

R⁵ is a worm, which engages with worm wheel R³ said wheel being carried by a shaft mounted in a sleeve bearing g, this shaft having a worm R⁴ which engages with a worm wheel Q³ on the shaft that advances and withdraws the frame.

I will now proceed to describe fully the parts to which this invention pertains.

O is a shaft by which power is applied for the purpose of first advancing and afterward

withdrawing the sliding frame and cutters. Pinion i on the engine shaft rotates wheel I on shaft J, and pinion j on shaft J rotates wheel f on shaft F from which shaft F power is transmitted to the cutters.

At P there is a rack secured to the stationary frame and shaft O is provided with spur pinions o o adapted to engage with these racks, there being one of the latter on each side of the machine.

In order to so rotate shaft O and pinions o, o, that they shall draw the sliding frame backward; that is to say, rotate them in the direction of the arrow 2, Fig. 2, I secure to the engine shaft H a worm S. Engaging with this worm S is a worm wheel S' secured to the forward end of a shaft S². This shaft is mounted in a sleeve bearing s which is supported upon a standard or upright piece, secured to, or cast, or formed integral with, the sliding frame.

At the rear end of shaft S² there is a worm, or short hollow screw section R adapted to engage with a worm wheel Q mounted upon the aforesaid shaft O. Said worm wheel is loose upon the shaft, but is adapted to be engaged therewith by means of the sliding clutch T which is provided with teeth adapted to fit sockets in the wheel, although in lieu thereof any preferred style of clutch may be employed. The part T, shown, is secured to the shaft O by means of a feather or spline which permits it to slide, but insures that it shall be rotated with the shaft. This clutch part T can be engaged either with the devices which draw the sliding frame and the cutters backward or with those which force them forward.

U is a plate or bar, firmly attached at its ends to the sliding frame.

U' is a shaft, stepped at its lower end in plate U, and at its upper end in a brace bar u, which, at its upper end, is made fast to a transverse bar u' and this in turn, is made fast to the horizontal arms Y Y attached at their rear ends to the steam chests of the cylinders C C.

U² is a shipping lever keyed to upright shaft U'.

u² is a pinion also keyed to shaft U and meshing with a rack V V', the lower plate V'

of which is arranged underneath the plate U and is grooved longitudinally, as at *v*.

V² is a clamping plate bolted to the under side of plate U and provided at its rear edge with a rib *v'* which takes into the groove *v* of the sliding plate V V', so that this sliding plate is firmly held in position, but can be moved to the right and left by means of the shipping lever and pinion.

W *w w* is a shipping fork, formed integrally with, or bolted to, the sliding cogged plate, its forked end taking into the groove of the sliding clutch T.

From the above description it will be readily understood that when the clutch T is engaged with the worm wheel Q, the sliding frame and cutters will be withdrawn or "pulled back" from the coal, but when the clutch T is engaged with the worm wheel Q³, the cutter frame is advanced and the cutter bar is thrust into the coal, and this reversing of the movement of the cutter frame and cutter bar will be effected, even though the worm and worm wheels which are used for advancing the machine are all adapted to drive with the sun, from the fact that the crank shaft and the counter shaft J run in opposite directions.

In Fig. 4 I have shown a modification in which the shaft S² is rotated by means of a bevel pinion S³ mounted on said shaft, and a bevel wheel S⁴ mounted on the shaft J.

The modification possesses some advantages over the construction shown in the other figures from the fact that it is more convenient to drive the shaft S² at the requisite speed by means of the bevel gears than it is to drive it by the worm S and worm wheel on S'. Again, the bevel gearing does not add to the height of the machine as does the worm and worm wheel S and S'.

The cutter bar E is of reduced diameter at its ends, and has a still further reduced portion *e* near each end to receive half boxes *e'*, each of which is provided at its inner end with an outward projecting rib *e*².

The shoes E² are each made of a single piece of metal, its outer end having a circular opening of such internal diameter as to fit closely the outer surface of each pair of half boxes.

The cutters *e*³ are removable, and are held in position by set screws which enter the cutter bar, and project through the walls of the sockets in which the shanks of the cutters are seated so as to impinge upon said shanks and hold the cutters in any desired position in the way now well known.

From the above description it will be readily understood that the half boxes may be placed in pairs upon the bearings *e*, then the shoes may be slipped into position over the ends of the cutter bar and over the ends of the half boxes against the rims or flanges *e*² *e*². Then the shoes may be bolted to the front ends of the T-bars, when, as will be seen, the cutter bar can rotate within the half boxes, but

endwise movement of the cutter bar will be prevented by reason of the ribs *e*² engaging with the inner faces of the shoes. I have found that, in practice, these shoes having the continuous unbroken rings or loops *e*⁴ are much more durable than shoes made in two parts, as have been heretofore used. These matters are more particularly shown in Figs. 8, 9 and 10, the showing in Fig. 1 being of a conventional nature in respect to the cutter bar, and relating more to the worm gear feed and the worm gear pull back.

The ring-like projecting part *e*³ of the shoes must, as is well known, be made as thin as possible so that only a thin web of coal will be left in front of the journal parts of the cutter bar, and when these thin plates are divided on their central horizontal plane and secured independently of each other to the top side and the bottom of the carriage bar as has been customary heretofore, two weak arms are provided, and they are the parts which are immediately subjected to the greatest backward and lateral strain when the bar is being pressed against the coal. By having each shoe unitary so that the part above the cutter bar and the part below it can be together attached to that bar independently of the carriage bars, they can be made thin, and yet so as to possess sufficient strength to perform their work. In machines made prior to my invention, the cutter bar was of substantially uniform diameter from end to end and two annular grooves were formed to receive the shoes, the bar being of the same thickness outside and inside of these grooves. But by making the parts in the way described, the central part of the cutter bar between the bearings can be left as thick as desired to receive the straining of the power chain, while at the same time the ends can be reduced, the result being an increase in the strength throughout, as well as the possibility of readily attaching and detaching the bar in the way described.

I do not claim any of the following matters, to wit:—the combination with a stationary frame, and the sliding frame, of the rack secured to the stationary frame, the pinion engaging therewith, the worm which revolves said pinion to withdraw the sliding frame, and the bevel gearing which drives the said worm; or, second, the combination with the stationary frame provided with a rack, and the sliding frame provided with a pinion to engage with said rack for advancing and withdrawing the sliding frame, of the shaft, the worm wheel thereon, the worm which drives said wheel, the bevel gearing and the intermediate shaft which carries one of the bevel wheels; or, third, the combination of a stationary bed, a sliding frame, a rack secured to said stationary bed, a pinion engaging therewith, a worm which revolves said pinion to withdraw the sliding frame, and gearing which drives said worm. But I believe myself to be the inventor of the specific

mechanism set forth in the following claims. Nor do I claim, specifically, a worm gear having a double thread, either in connection with the carriage moving shaft, or with the driving shaft, as I am aware that that is one of the modifications of the invention which has been proposed merely for varying speed ratios.

What I claim is—

1. The combination of the stationary frame, the sliding frame, the rack upon one frame, and the feed shaft and pinion on the other, mechanism substantially as set forth for rotating the said pinion in one direction to advance the cutters and cutter frame, said mechanism being situated on one side of the central longitudinal line of the machine, and mechanism, substantially as set forth, upon the other side of the said line for withdrawing the cutters, it consisting of the worm gear and worm connected to the shaft of said pinion, the shaft for said worm and the worm gear and worm connected to the crank shaft for driving the said pinion shaft; substantially as set forth.

2. The combination of the cutter bar having the relatively reduced ends and the thicker central part of the boxes adapted to be placed on the reduced parts, and the shoes each adapted to be secured to the cutter bar independently of the carriage bar, substantially as set forth.

3. The combination of the cutter bar formed with the relatively reduced ends and thicker central part with the reduced journals *e* between the said central part and the end parts, the boxes each provided with the ribs bearing against the central part of the bar, the shoes to which the boxes are fitted, and the

carriage to which the shoes are attached, substantially as set forth.

4. In a mining machine, the combination of the cutter bar having the relatively reduced ends, and the thicker central part, the sliding frame, the boxes, the shoes, and the cutters removable from the bar, as described.

5. In a mining machine, the combination of the stationary bed frame, the sliding carriage thereon, the cutter bar mounted on the carriage transversely, a relatively fast power shaft on the carriage, a second shaft driven thereby, speed reducing gearing connecting said two shafts, a reversible, rotary, double speeded, carriage moving device on the carriage, a train of carriage-recede devices commencing with and comprising a fast driving worm on the aforesaid relatively fast power shaft and terminating with and comprising a continuously rotating fast wheel mounted loosely on the carriage moving device, and a second train of devices for advancing the carriage commencing with and comprising a relatively slow driving worm on the second aforesaid shaft and terminating with and comprising a slow wheel mounted loosely on the carriage moving device, both wheels moving continuously and in opposite directions, and a clutch mounted on said reversible device and adapted to slide from one of said loose wheels to the other, substantially as set forth.

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

BENJAMIN A. LEGG.

Witnesses:

J. S. BARKER,
M. P. CALLAN.