

TRACTOR.

1,021,911.

4 SHEETS—SHEET 1.



David C. Boyd, administrator of William S. Boyd Trust
 & Howard L. Hawley
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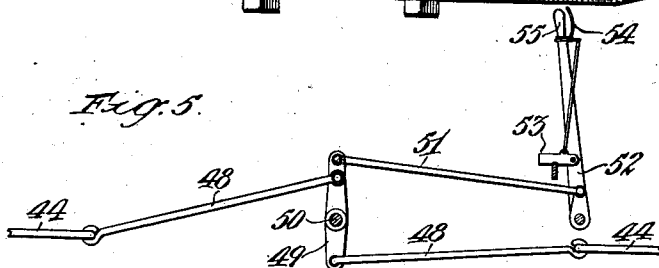
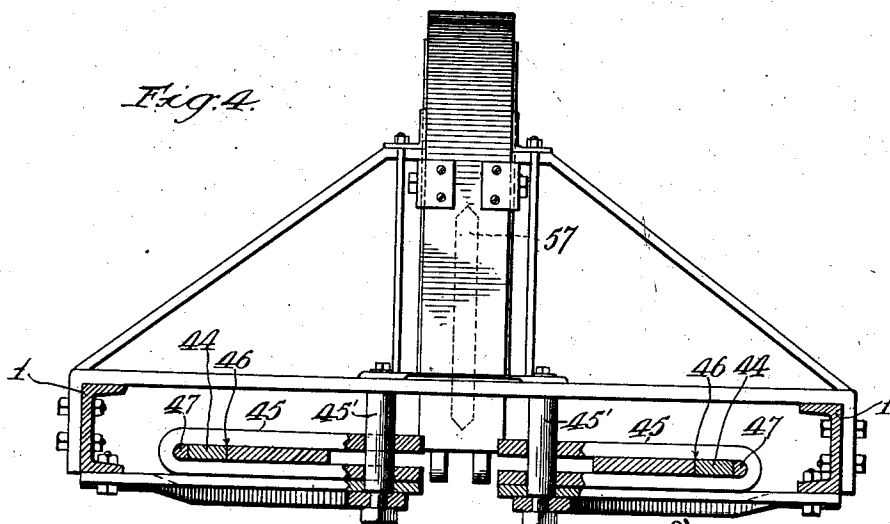
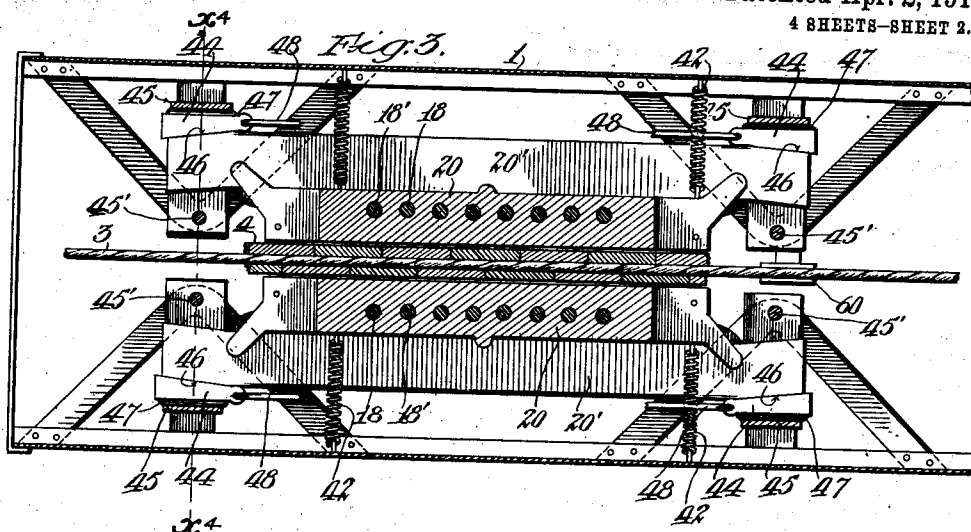
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TRACTOR.

APPLICATION FILED OCT. 19, 1909. RENEWED FEB. 6, 1912.

1,021,911.

Patented Apr. 2, 1912.

4 SHEETS-SHEET 2.



Witnesses:
Louis W. Grady
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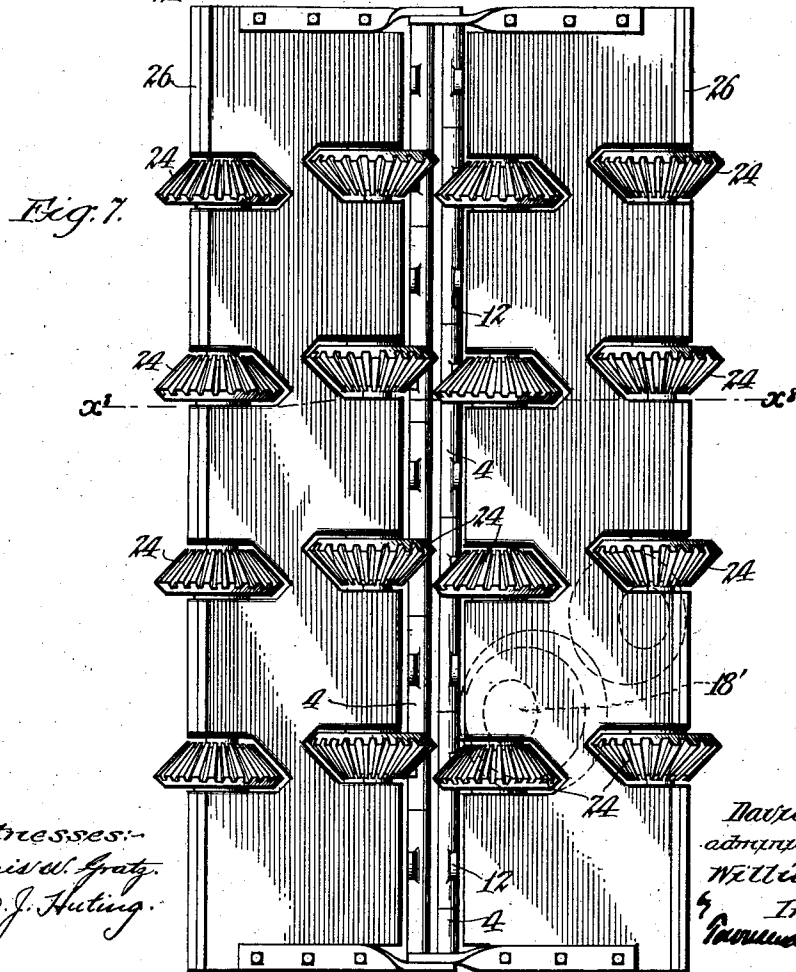
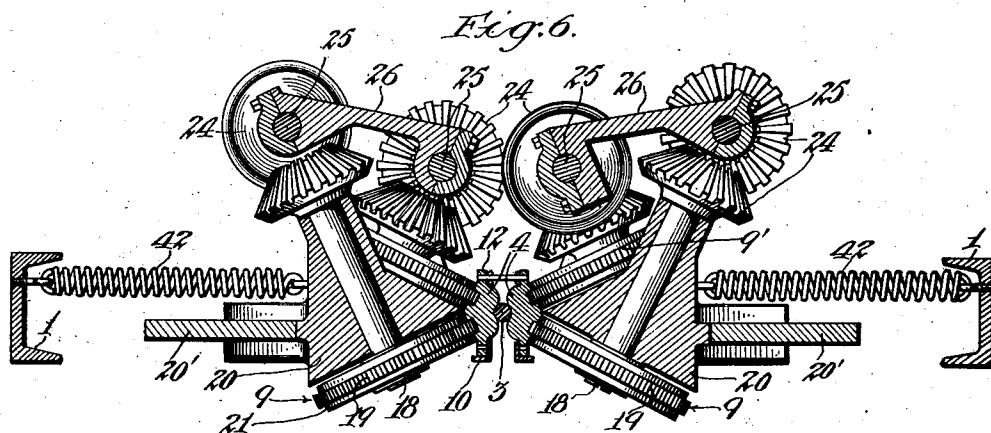
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

Fig. 8.

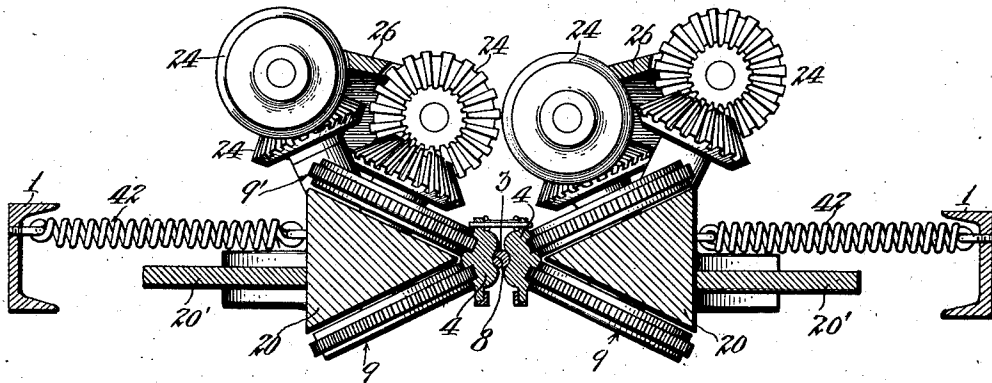


Fig. 9.

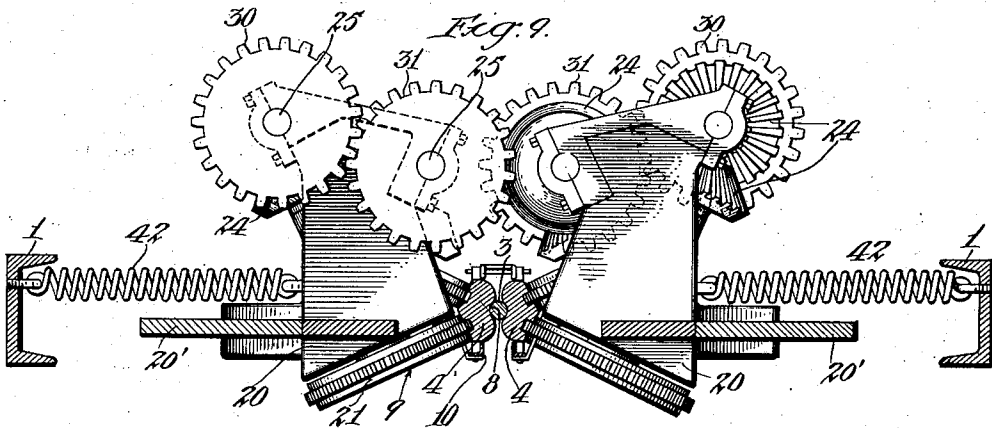


Fig. 10.

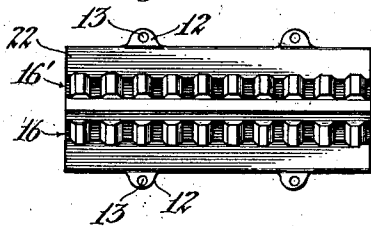


Fig. 11.

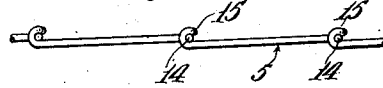
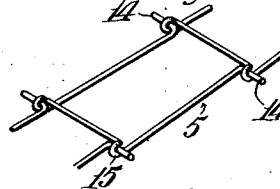


Fig. 12.



Witnesses:
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attys.

UNITED STATES PATENT OFFICE.

WILLIAM S. BOYD, DECEASED, LATE OF LOS ANGELES, CALIFORNIA, BY DAVID C. BOYD, ADMINISTRATOR.

TRACTOR.

1,021,911.

Specification of Letters Patent.

Patented Apr. 2, 1912.

Application filed October 19, 1909, Serial No. 523,550. Renewed February 6, 1912. Serial No. 675,910.

To all whom it may concern:

Be it known that I, DAVID C. BOYD, a citizen of the United States, residing at Riverside, in the county of Riverside and State of California, am the administrator of the estate of WILLIAM S. BOYD, deceased, a citizen of the United States, who resided at Los Angeles, in the county of Los Angeles and State of California, and that said WILLIAM S. BOYD did invent a new and useful Tractor, of which the following is a specification.

This invention relates to a tractor of the type designed to grip a stationary cable and to be self-propelling by pulling itself along the cable.

The main object of the present invention is to provide a tractor of this character in which the cable can be readily taken up or dropped as required.

Another object of the invention is to provide for distributing the gripping strain on the cable over an extended area, thereby diminishing the pinching and crushing of the cable by the grip.

Other objects of the invention will appear hereinafter.

The accompanying drawings illustrate the invention and referring thereto: Figure 1 is a plan of the machine. Fig. 2 is a side elevation thereof. Fig. 3 is a horizontal section on the line x^3-x^3 in Fig. 2. Fig. 4 is a vertical section on the line x^4-x^4 in Fig. 3. Fig. 5 is a side elevation of the grip control. Fig. 6 is a transverse section of the grips and the adjacent traction means on the line x^6-x^6 in Fig. 1. Fig. 7 is a plan of the gearing for operating the traction means. Fig. 8 is a transverse section on the line x^8-x^8 in Fig. 7. Fig. 9 is a transverse section on the line x^9-x^9 in Fig. 1. Fig. 10 is an outside elevation of one of the gripping jaws. Fig. 11 is a side elevation of a portion of the operating chain. Fig. 12 is a perspective thereof.

The machine comprises a frame 1 mounted on wheels 2 adapted to run on any suitable surface such as a field or roadway or in some cases a track or railway. Along the course which the tractor is to pursue there is laid a cable indicated at 3 and the object of the tractor is to take up this cable as it passes along and to draw itself along by pulling on the cable. The gripping of the cable is effected

by two series of gripping jaws 4 carried by an endless chain 5 whose upper run is supported by a guide rail 10' and by two drums or wheels 6 journaled in supports 7 on the frame 1, the lower run of said chain being supported by the tractor wheels 9 which engage with the aforesaid gripping jaws 4 and by guide means 10 supported on the frame 1 and extending beneath the gripping jaws 4, each gripping jaw being provided with downwardly extending lugs 12 which slide on said guide means, said guide means being formed as angle-irons to fit said lugs. The gripping jaws 4 are also provided with lugs 12 on their upper portions, said lugs being perforated as at 13 to receive projecting pins 14 extending from the supporting chain 5 and serving as pivotal supports for the gripping jaws. The chain 5 may be constructed as shown in Figs. 11 and 12, each link being formed of a section of round-iron or wire bent in U-shape with its ends bent out to form the pivots 14 and its middle portion bent over as at 15 to form a pivotal mounting for said pivotal portion 14 of the next preceding link. Gripping jaws 4 have grooves 8 in their inner faces to receive and embrace the cable.

The tractor wheels are arranged in four series, an upper series 9' and a lower series 9 being provided at each side of the machine and engaging with the centers of the gripping jaws 4 on that side. Each gripping jaw 4 is provided with two series of rack teeth 16, 16', one above the other and preferably extending divergently, and the respective lower and upper series of tractor wheels 9, 9' engaging with these teeth are inclined to one another, the lower tractor wheels 9 being inclined upwardly and inwardly toward the center of the machine and the upper tractor wheels 9' being inclined downwardly and inwardly toward the said center of the machine in such manner that the cable 3 is located at the point of intersection of the median planes of the tractor wheels. Each tractor wheel 9 is carried by a shaft 18 journaled in a longitudinal frame member 20, and tractor wheels 9' are similarly mounted on shafts 18' on said frame members 20, there being a frame member 20 on each side of the machine. The periphery of each tractor wheel 9 or 9' is formed with gear

teeth 19 for engaging the respective rack teeth 16 and on each side of these gear teeth the tractor wheel is formed with a smooth circular periphery portion 21 running on a smooth track portion 22 of the gripping jaw 4. Frame members 20 are carried by side bars 20'.

The tractor wheels are operated by a plurality of series of bevel gears 24 carried by shafts 25 extending longitudinally of the machine and journaled in frame members 26, said bevel gears 24 engaging bevel gears 28 on the respective tractor wheel shafts 18, 18'. The several shafts 25 are connected to operate in unison by gear wheels 30, 31, and the other shaft 25 at each side of the machine is connected by a universal joint 32, shaft 33 and universal joint 34 to driving shafts 35 mounted in bearings 36 on the frame 1 and carrying gear wheels 38 driven by a central pinion 39 on the shaft 40 of a driving motor 41. The frame members 20 which carry the shafts 25 are provided in duplicate on the two sides of the machine, and are mounted to slide in ways 23, so that each frame member 20 is movable laterally with respect to the cable and is moved to and from the cable by controlling means as hereinafter set forth.

The means for bringing the gripping jaws into and out of coöperative relation with the cable comprises a spring 42 at each side of the machine connected to the main frame 1 and to the movable frame 20, so as to tend to draw the movable frame and the tractor means and gripping jaws away from the cable, and control means for forcing said frame and the parts carried thereby toward the cable, said control means consisting, for example, of wedges 44 mounted to move in guides 45 on the frame 1 and engaging with wedge faces 46 on the respective members 20, said wedge means 44 being connected by a link 48, see Fig. 5, to a lever 49 pivoted at 50 on the frame 1 and connected by link 51 to the controlling lever 52. Said controlling lever is provided with a locking latch 53 and with a releasing handle 54 therefor and with handle means 55 for manual operation of the lever. Wearing plates 47 are provided for guides 45, and said guides are pivotally mounted on pivots 45'.

In order to properly guide the gripping jaws at the forward and rear ends of the machine spreader plates or guide rails 57 are provided which spread sufficiently in upward direction to cause the gripping jaws to separate as they pass upwardly, so as to release the cable and to bring the jaws together as they pass downwardly; it being understood, however, that the actual forcing of the gripping jaws on the cable is accomplished not by these guide means, but by the positive compression of the tractor wheels 9. A guide wheel 60 is

provided at the front portion of the machine, the top of this wheel being nearly in line with the cable grooves or runways 8 in the jaws 4.

The operation is as follows: The cable 3 being assumed to be in proper position and supported so as to stand the strain of draft of the tractor, the tractor is brought over the cable and by means of a suitable hook, or otherwise, the cable is lifted over the wheel 60 and the cable at the rear of the machine is then lifted and stretched, so as to lie within the gripping jaws and the controlling lever 52 is then operated to force the frames 20 inwardly, causing those gripping jaws which are in engagement with the tractor wheels 9 to come into engagement with the cable and grip the same. It will be noted that a part of the gripping jaws at each end of the machine is not in engagement with any tractor wheel 9 and is therefore not forced into engagement with the cable, thus allowing of free movement of the gripping jaws in entering on and leaving the cable. The motor 41 being started in operation, the tractor wheels 9 are rotated through the gearing 24, etc., causing the tractor wheels 9 to run along the respective gripping jaws 4 and thereby advance or propel the machine. In this operation, inasmuch as the gripping jaws remain stationary on the cable by reason of their frictional grip therewith, the tractor wheels 9 will advance relatively to the series of gripping jaws and the forward sets of tractor wheels 9 will pass onto the next gripping jaw 4 in advance, thereby pressing it down onto the cable and gripping it therewith and at the same time the rearmost sets of tractor wheels will pass off of a pair of gripping jaws at the rear releasing said gripping jaws from the cable and allowing them to be spread from the cable by the operation of the spreading or guide means 57 in the subsequent movement of the machine. As the machine progresses in this manner, successive pairs of gripping jaws are brought into coöperation with the tractor wheels and at the same time successive pairs of gripping jaws at the rear of the machine are released from the tractor wheels and the entire series of gripping jaws moves around with the supporting chain 5, passing over the upper run of said chain in the separated condition and being brought together again in the lower run. The forward draft of the gripping members by their pull on the cable causes the members 45 to swing forwardly on their pivots 45' and thereby draws the side bars 20' and members 20 toward the cable, causing the gripping jaws to pinch the cable more tightly.

What I claim is:

1. In a tractor, a frame, two series of

gripping jaws provided with cable engaging means on their inner faces, said gripping jaws being mounted to move longitudinally of the frame, two members movable laterally on the main frame, traction wheels on said members engaging the gripping jaws to press said jaws together to grip the cable and to propel the machine forwardly by the engagement of said traction wheels with the jaws, and means for driving such traction wheels, said traction wheels comprising an upper set on each side of the machine inclined inwardly and downwardly, and a lower set on each side of the machine inclined inwardly and upwardly.

2. In a tractor, a frame, two series of gripping jaws provided with cable engaging means on their inner faces, said gripping jaws being mounted to move longitudinally of the frame, two members movable laterally on the main frame, traction wheels on said members engaging the gripping jaws to press said jaws together to grip the cable and to propel the machine forwardly by the engagement of said traction wheels with the jaws, and means for driving such traction wheels, said traction wheels and gripping jaws being provided with inter-engaging teeth.

3. In a tractor, a frame, two series of gripping jaws provided with cable engaging means on their inner faces, said gripping jaws being mounted to move longitudinally of the frame, two members movable laterally on the main frame, traction wheels on said members engaging the gripping jaws to press said jaws together to grip the cable and to propel the machine forwardly by the engagement of said traction wheels with the jaws, and means for driving such traction wheels, said traction wheels and gripping jaws being provided with inter-engaging teeth, and said traction wheels comprising an upper set on each side of the machine inclined inwardly and downwardly, and a lower set on each side of the machine inclined inwardly and upwardly, said gripping jaws on each side being provided with upper and lower series of teeth for engaging the respective traction wheels.

4. In a tractor, a frame, two series of gripping jaws provided with cable engaging means on their inner faces, said gripping jaws being mounted to move longitudinally of the frame, two members movable laterally on the main frame, traction wheels on said members engaging the gripping jaws to press said jaws together to grip the cable and to propel the machine forwardly by the engagement of said traction wheels with the jaws, and means for driving such traction wheels, and said traction wheels comprising an upper set on each side of the machine inclined inwardly and downwardly, and a lower set on each side of the machine in-

clined inwardly and upwardly, said gripping jaws on each side being provided with upper and lower series of teeth for engaging the respective traction wheels, and said gripping jaws being provided with smooth track portions, and the traction wheels being provided with smooth peripheral portions for engaging said track portions.

5. A tractor comprising a frame, wheels on which said frame is mounted, an endless chain, and supporting wheels therefor, whereby the chain is mounted to move longitudinally of the machine, two series of gripping jaws connected to said chain, each gripping jaw having pivotal engagement with the chain and provided with cable engaging means on its inner face, members movable laterally on the main frame with respect to the chain, wheels carried by said members and engaging the gripping jaws to force them together, and means for driving the said wheels.

6. A tractor comprising a frame, wheels on which said frame is mounted, an endless chain, and supporting wheels therefor whereby the chain is mounted to move longitudinally of the machine, two series of gripping jaws connected to said chain, each gripping jaw having pivotal engagement with the chain and provided with cable engaging means on its inner face, members movable laterally on the main frame with respect to the chain, wheels carried by said members and engaging the gripping jaws to force them together, means for driving the said wheels, spring means for drawing the supplementary frames apart, and manually controlled means for forcing said frames toward one another.

7. A tractor comprising a frame, wheels on which said frame is mounted, an endless chain, and supporting wheels therefor, whereby the chain is mounted to move longitudinally of the machine, two series of gripping jaws connected to said chain, each gripping jaw having pivotal engagement with the chain and provided with cable engaging means on its inner face, members movable laterally on the main frame with respect to the chain, wheels carried by said members and engaging the gripping jaws to force them together, means for driving the said wheels, spring means for drawing said members apart, manually controlled means for forcing said members toward one another, said controlling means comprising wedges operating on said members, and a controlling lever connected to said wedges.

8. In a tractor, a frame, two series of gripping jaws provided with cable engaging means on their inner faces, said gripping jaws being mounted to move longitudinally of the frame, members pivotally mounted on the frame, side bars carried by said pivotally mounted members to swing toward and

from the center of the machine, traction wheels carried by said side bars and engaging said gripping jaws to force the same toward the cable in the swinging movement of
5 said members caused by the draft on the cable, and means for driving said traction wheels.

In testimony whereof, I have hereunto set

my hand at Riverside, California, this 11th day of October, 1909.

DAVID C. BOYD,
Administrator.

In presence of—
LYMAN EVANS,
J. B. DOWNS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
