No. 824,655. PATENTED JUNE 26, 1906.

J. A. HORTON.

WIRE DRAWING MACHINE.

APPLICATION FILED APR. 7, 1905.

3 SHEETS—SHEET 1.

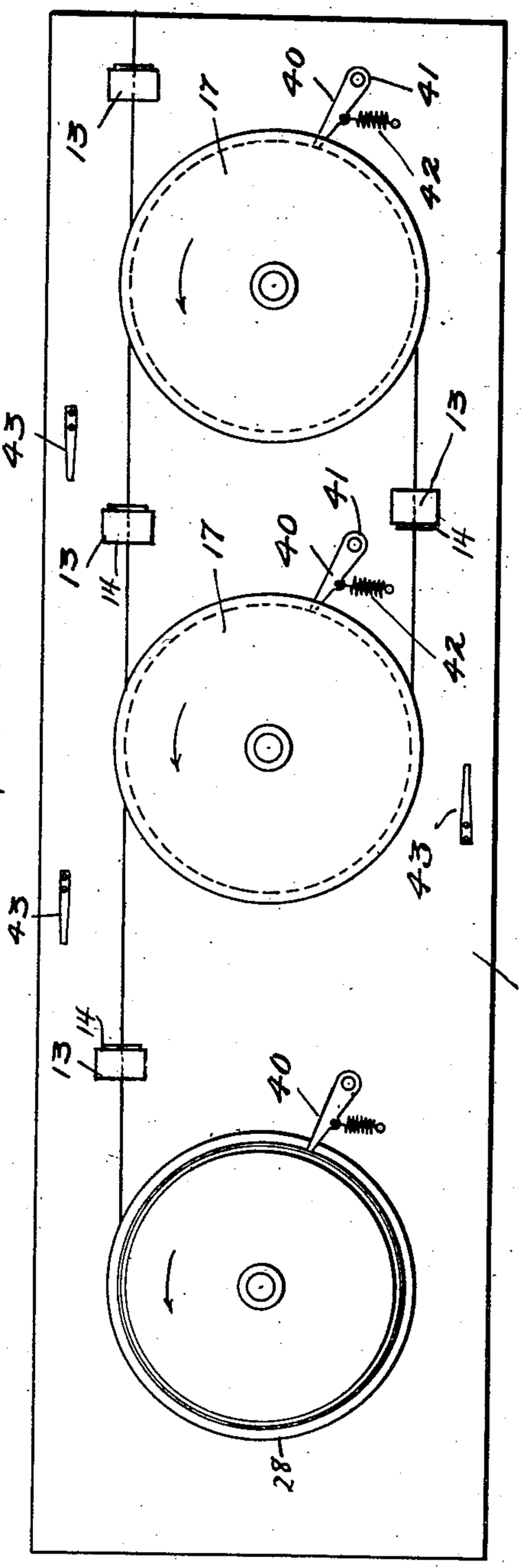

FIG. 1.

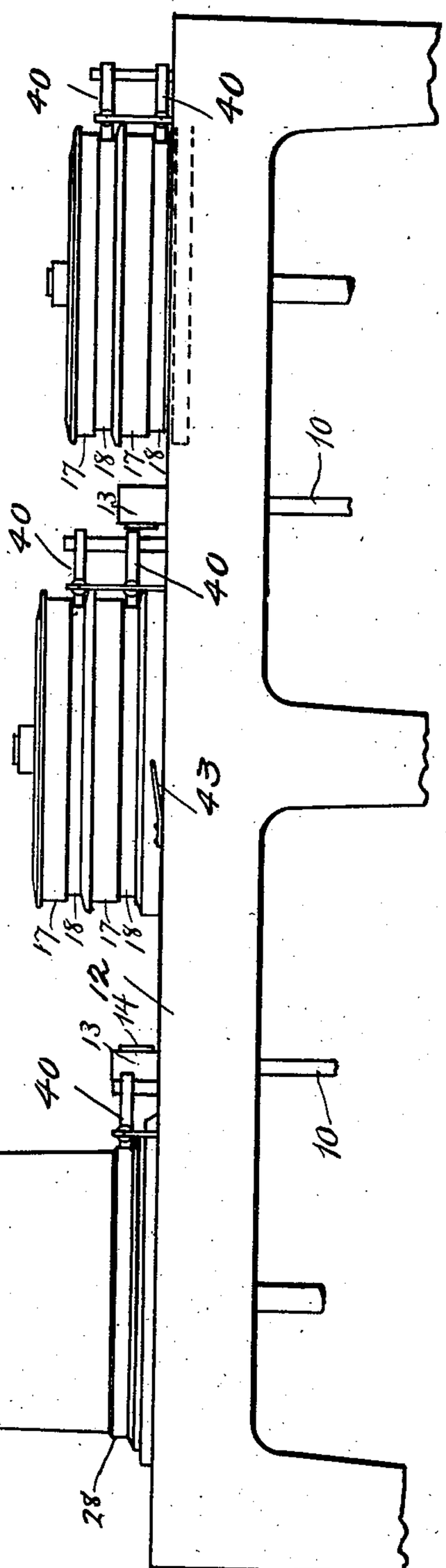

FIG. 2.

WITNESSES:
Rollin Abell.
Lawrence E. Kennedy.

INVENTOR:
J. A. Horton
BY Wright Brown Quinby
ATTYS.

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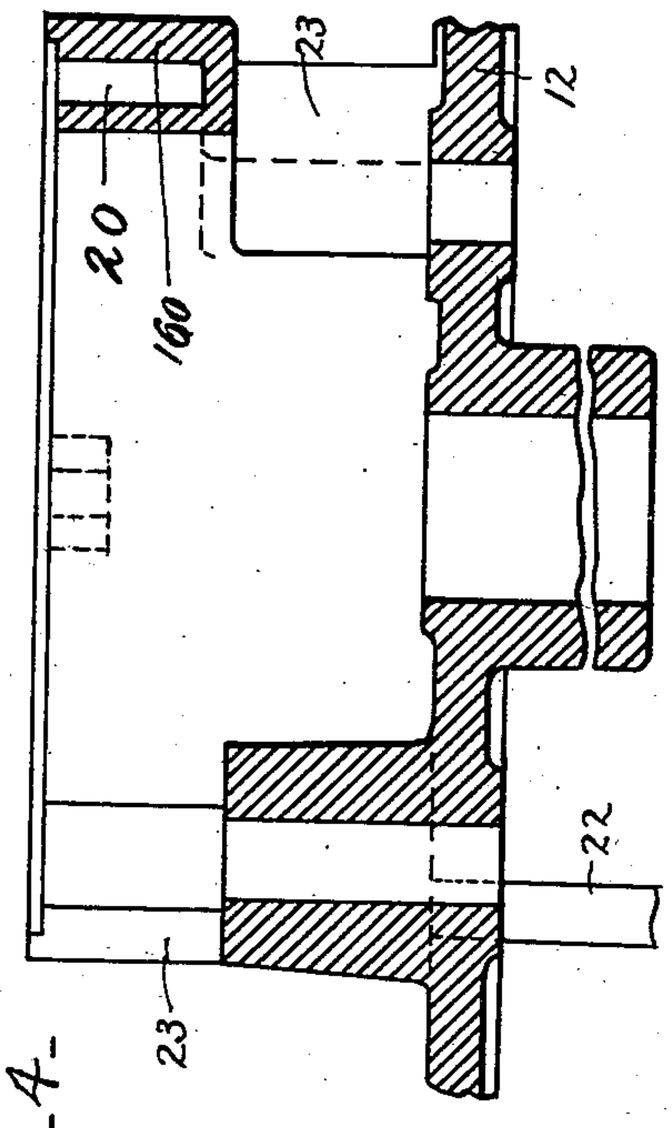

FIG. 4.

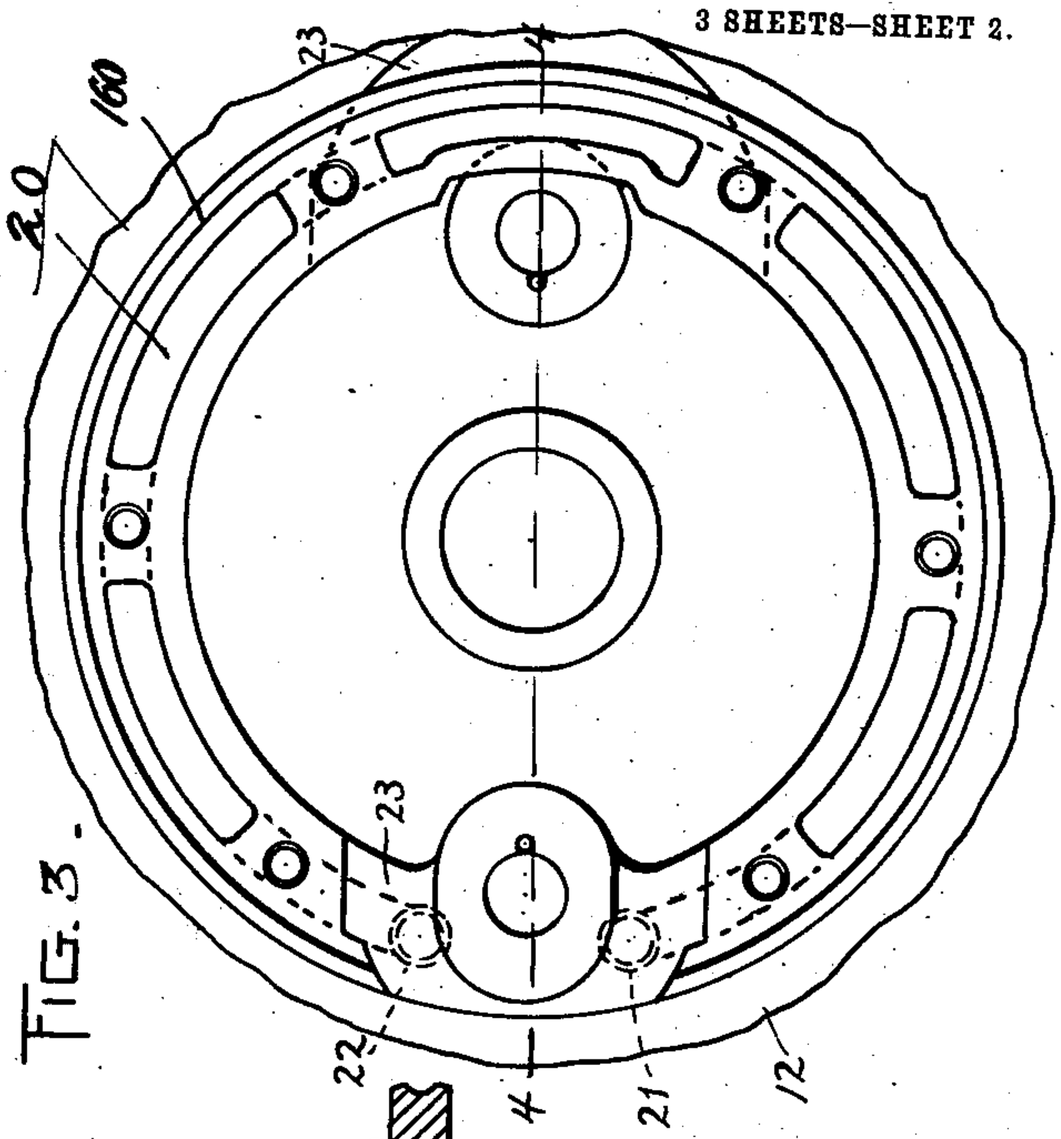

FIG. 3.

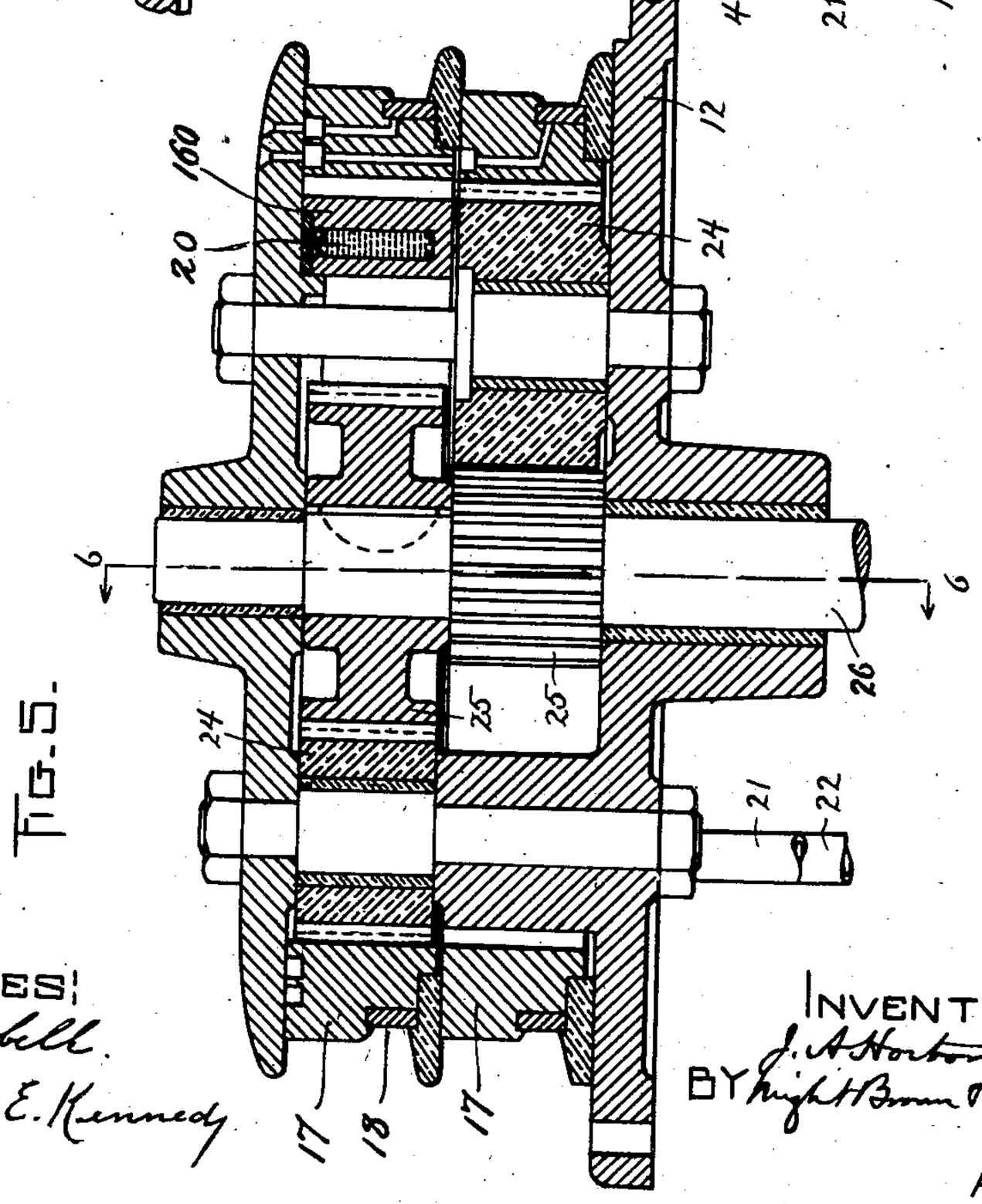

FIG. 5.

WITNESSES:
Rollin Abell.
Laurina E. Kennedy

INVENTOR:
J. A. Horton
BY Wright Brown Quinby
ATTYS.

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3 SHEETS—SHEET 3.

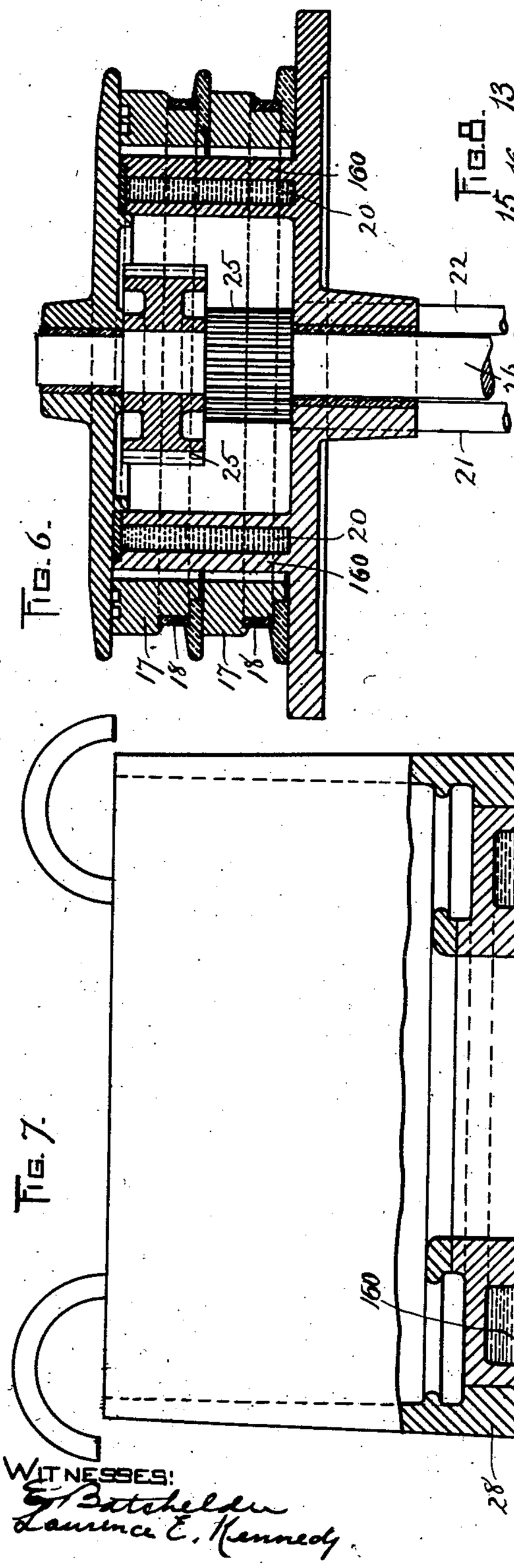

FIG. 6.

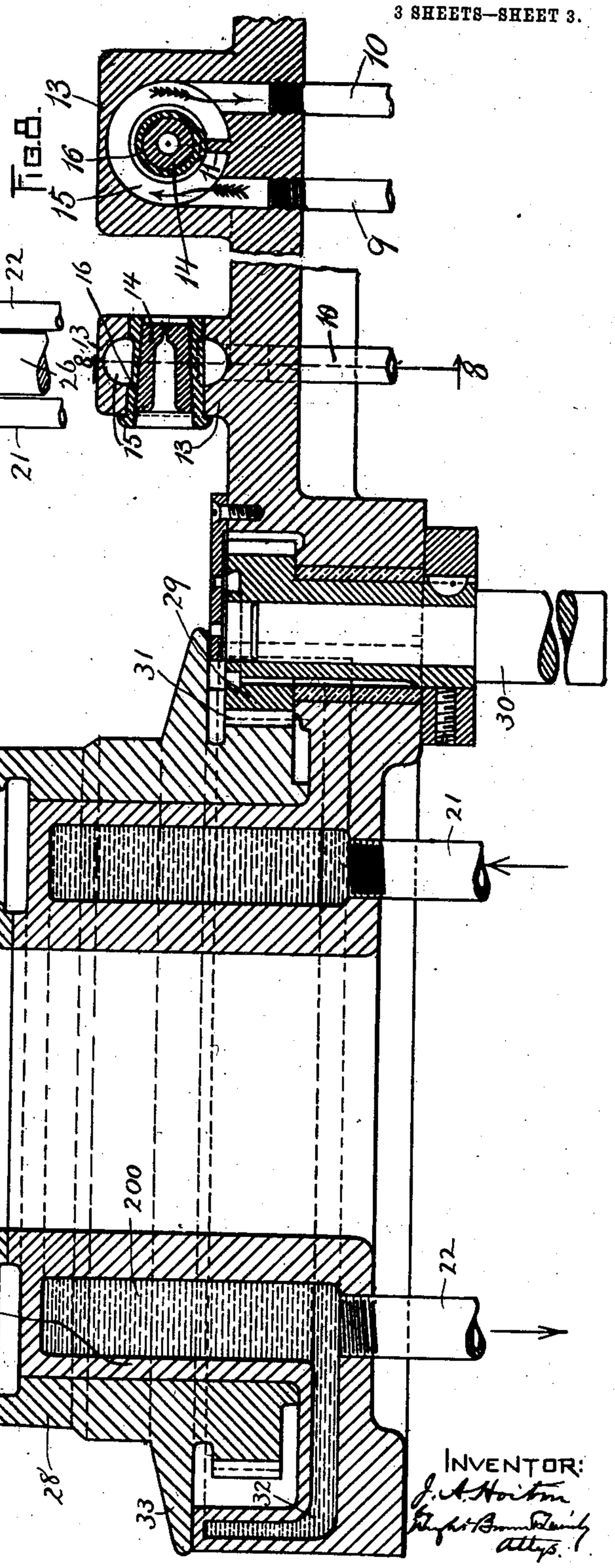

FIG. 8.

FIG. 7.

WITNESSES:
E. Batchelder
Laurence E. Kennedy.

INVENTOR:
J. A. Horton
by Wright Brown Quinby & Otis
Attys.

UNITED STATES PATENT OFFICE.

JAMES A. HORTON, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO IROQUOIS MACHINE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

WIRE-DRAWING MACHINE.

No. 824,655. Specification of Letters Patent. Patented June 26, 1906.

Application filed April 7, 1905. Serial No. 254,333.

To all whom it may concern:

Be it known that I, JAMES A. HORTON, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Wire-Drawing Machines, of which the following is a specification.

This invention relates to wire-drawing machines employing wire-drawing dies and drawing-drums adjacent to the dies and adapted to draw the wire through the dies, provision being made for rotating the drums at different speeds as required by the elongation of the wire in the several dies.

One object of the invention is to enable the wire to be drawn in a dry condition—that is to say, without having the dies and the wire passing through them immersed in liquid—and at the same time to prevent excessive heating of the dies and the wire.

Another object of the invention is to prevent the convolutions of the wire passing around the drums from springing outwardly by the resilience of the wire when the rotation of the drum ceases or in case of breakage of the wire, the result aimed at being to prevent the wire from dropping downwardly from one drum of a vertical tier to a lower drum in the same tier.

A third object of the invention is to provide convenient means for engaging and holding the bight of the wire at a point adjacent to the drum during the operation of threading the wire through a succeeding die, the wire being prevented from unwinding or loosening on the drum during the threading operation.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a diagrammatic plan view of a wire-drawing machine embodying features of my invention. Fig. 2 represents a diagrammatic elevation of the parts shown in Fig. 1. Fig. 3 represents a plan view of one of the cooling-chambers for the wire-drawing dies. Fig. 4 represents a section on line 4 4 of Fig. 3. Fig. 5 represents a sectional view of the cooling-chamber as shown in Fig. 4 and a tier of drawing-drums operatively related thereto. Fig. 6 represents a section on line 6 6 of Figs. 3 and 5. Fig. 7 represents a sectional view showing a winding or storing drum and a cooling-chamber operatively related thereto. Fig. 8 represents a section on line 8 8 of Fig. 7.

The same reference characters indicate the same parts in all the figures.

In the drawings, 12 represents the base or bed of a wire-drawing machine which is provided with a series of die stations or holders 13, each having a chamber 15, adapted to receive and circulate a cooling fluid, the chamber having a heat-conducting fluid-guiding wall 16, which is substantially continuous and preferably circular, its inner surface constituting a tapered socket adapted to fit the correspondingly-tapered external surface of the die 14. The substantially continuous external surface of the die is opposed to the wall 16, the latter being cooled by the medium in the chamber 15 and absorbing heat from the die. The wall 16 is surrounded by the chamber 15, the said wall being preferably a tubular bushing driven with a tight fit into an opening formed for its reception in the holder 13. A cooling medium is caused to circulate through the passage 15. Said medium may enter the passage through a supply-pipe 9 and leave the passage through an outlet-pipe 10, the passage being preferably subdivided by a partition 11 between said pipes. The said bushing may be composed of a suitable heat-conducting material, such as copper, and should be made relatively thin. The tapered form of the inner surface of the wall 16 and of the external surface of the die enable the die to be held against the wall 16 by the pull exerted on the die by the wire, the die being removable from the larger end of the wall 16. If the wire breaks and the die is forced outwardly by the recoil of the wire, the wall 16 prevents the escape of the cooling medium from the passage 15 and its contact with the wire. The cooling medium absorbs sufficient heat from the die-supporting surface and from the die to prevent injurious heating of the die and wire.

The drum 17, which draws the wire through the die, is provided with a suitable annular wire-forwarding surface 18, on which several convolutions of the wire are wound. Adjacent to the wire-forwarding surface is a cooling-chamber 20, having a substantially con-

tinuous extended wall 160, adapted to guide a cooling medium, said wall being substantially parallel with and in close proximity to the inner surface of the drum, the latter being of annular form. The cooling medium therefore absorbs heat from the wire-forwarding surface, thus keeping the latter and the wire engaged therewith in a cool condition, so that the wire passes to the succeeding die at a minimum temperature. The chamber 20 has suitable inlet and outlet connections 21 and 22, through which the cooling medium may be caused to circulate by any suitable means. As here shown, the chamber 20 is arranged to coöperate with a plurality of drums 17, arranged one above another in a tier, substantially as shown in my application for Letters Patent of the United States, Serial No. 161,567, filed June 15, 1903, the height of the chamber corresponding with the height of the tier of drums. The continuity of the chamber is interrupted at suitable intervals to form openings 23, accommodating the intermediate gears 24, which connect the internal gear-teeth on the drums with the driving-gears 25, affixed to the driving-spindle 26, the gearing being proportioned to drive the drums at different speeds, as shown in the above-mentioned application.

In Fig. 8 I show a cooling-chamber 200 cooperating with the winding or storing drum 28, which receives the completed or reduced wire and stores it in a coil. In this case the drum is or may be driven by means of a gear 29 on a driving-shaft 30, meshing with an external gear 31, affixed to the drum. The cooling-chamber is shown in Fig. 7 extended outwardly at 32 into close proximity with the flange 33 at the base of the drum 28 to enable the fluid to conduct heat from the said flange and from the base of the coil resting thereon. In this embodiment of the invention the heat-absorbing fluid-guiding wall 160 of the cooling-chamber is or may be in contact with the inner surface of the drum, the cooling-chamber constituting the support or bearing on which the drum rotates. When the drums are arranged in a tier on a vertical axis, as in this case, expansion of the coils or convolutions of the wire on the forwarding-surface of any drum above the lower one will cause the expanded convolutions to drop onto the next lower drum, thus causing confusion and difficulty. To prevent this difficulty, I provide for each drum an arm 40, which is pivoted to a fixed support 41 adjacent to the drum and has a swinging end which is yieldingly pressed against the wire on the wire-forwarding surface by means of a spring 42. The arm is arranged so that it is nearly radial with the drum, so that it is adapted to act as a strut to resist outward pressure of the wire against its swinging end. In other words, an imaginary straight line intersecting the pivot of the arm and the wire-engaging end of the arm and continued into the drum would be located slightly at one side of the axis of rotation of the drum. Outward pressure of the wire against the arm, caused either by breakage of the wire or by the effort of the convolutions to expand, will be directed substantially lengthwise of the arm. Hence a light spring holding the arm against the wire is sufficient, the resistance to the outward pressure of the wire being due mainly to the arrangement of the arm and not to the stress of the spring.

My invention relates mainly to a wire-drawing machine adapted to draw the same wire through a series of dies, there being a corresponding series of drums. To enable the wire to be more conveniently threaded through the dies, a series of wire-engaging cleats or clamps 43 are affixed to the bed of the machine at points adjacent to the drums and dies, the cleats being formed and arranged so that a bight of the wire passing from a drum can be engaged and securely held by a cleat, the wire between the cleat and the drum being thus held tight, while the wire between the cleat and the die is loose and can be freely manipulated by the operator.

The cleat or clamp 43 as here shown constitutes an upper jaw coöperating with the portion of the bed over which it is located, said portion constituting a lower jaw. The clamp as a whole may therefore in this embodiment of my invention be considered to be the part 43 and the corresponding part of the bed. The mouth of this clamp is directed toward the die, so that when the leading end of the wire has been threaded through the die and is being pulled forward the pull of the wire will draw the portion engaged with the clamp from the delivering end of the latter, the clamp being adapted to deliver the wire toward the die. The operator therefore is not required to disengage the wire from the clamp, the disengagement being effected by the pull on the leading end of the wire.

I claim—

1. In a wire-drawing machine, the combination of a body having a fluid-containing chamber one wall of which is composed of heat-absorbing material, with a separate wire-engaging member having a surface for engaging the wire and another surface in parallel juxtaposition to the external surface of the heat-absorbing wall of the said fluid-containing chamber, substantially as described.

2. In a wire-drawing machine, the combination of a body having a cooling-chamber one wall of which is circular in section, a separate member having a wire-engaging surface adapted to become heated by the friction of the wire, and another surface seated against the outer surface of the wall of the cooling-chamber, substantially as described.

3. In a wire-drawing machine, the combination of a body having a fluid-containing

chamber one wall of which is composed of heat-absorbing material, with a separate wire-engaging member having a surface for engaging the wire and another substantially continuous extended surface in contact with the external surface of the heat-absorbing wall of the said fluid-containing chamber, substantially as described.

4. In a wire-drawing machine, the combination of a body having a fluid-containing chamber one wall of which is composed of heat-absorbing material, with a separate wire-engaging member having a surface for engaging the wire and another substantially continuous extended surface in contact with the external surface of the heat-absorbing wall of the said fluid-containing chamber, said heat-absorbing wall being composed of a relatively thin soft metal, substantially as described.

5. In a wire-drawing machine, a tier of drawing-drums on a substantially vertical axis, and pivoted fingers yieldingly pressed toward the wire-forwarding surfaces of the drums, whereby the dropping of a convolution of wire from one drum to another is prevented.

6. In a wire-drawing machine, a drum, a die, and a wire-clamp adjacent to the path of the wire passing from the drum to the die and adapted to engage and hold a portion of the wire during the operation of threading the leading end of the wire through the die, said clamp having its mouth directed toward the die, whereby it is adapted to deliver the wire toward the die.

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

JAMES A. HORTON.

Witnesses:
C. F. BROWN,
E. BATCHELDER.