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J. H. WATTS.

MEANS FOR TRANSMITTING POWER.

(Application filed Aug. 6, 1897.)

(No Model.)

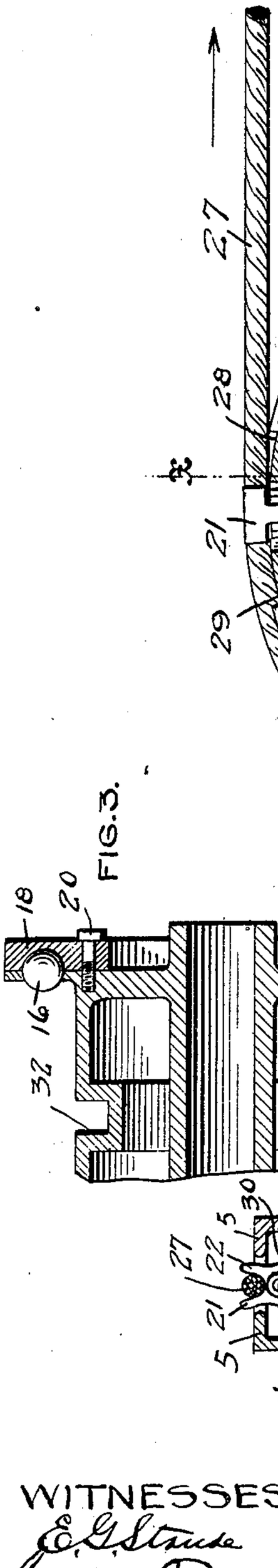

FIG. 3.

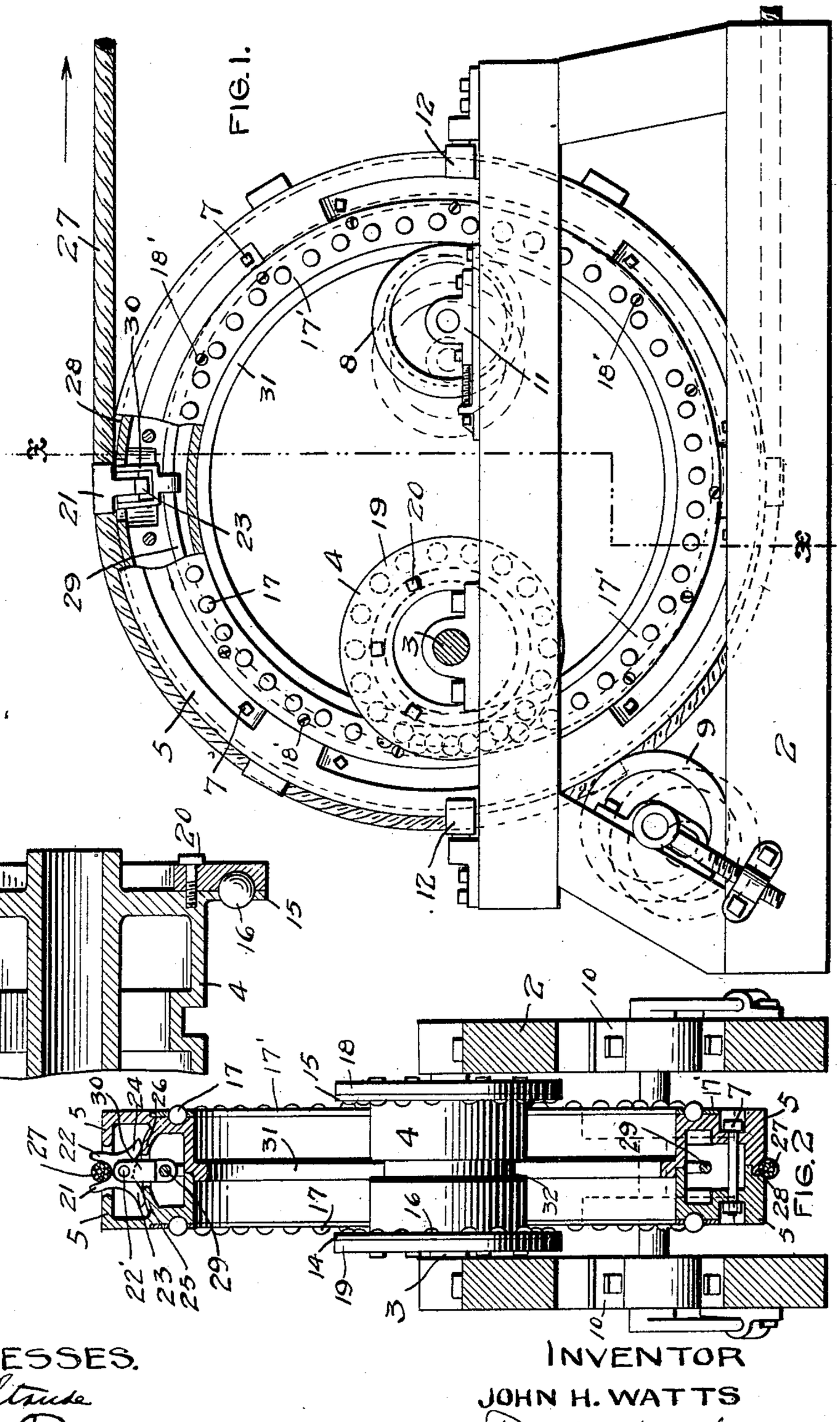

FIG. 2.

WITNESSES.

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MEANS FOR TRANSMITTING POWER.

SPECIFICATION forming part of Letters Patent No. 669,275, dated March 5, 1901.

Application filed August 6, 1897. Serial No. 647,341. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. WATTS, a citizen of the United States, residing at St. Thomas, in the county of Pembina and State of North Dakota, have invented certain new and useful Improvements in Means for Transmitting Power, of which the following is a specification.

This invention relates to means for transmitting power; and the invention consists generally in an internal-ring gear without a fixed center and adapted to be driven by a belt, rope, or cable arranged upon its periphery and a pinion having a driving connection with the driving-surface of said ring and driven therefrom, said ring being adapted to swing about its point of connection with the pinion as a center.

The invention consists, further, in the constructions and combinations hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation. Fig. 2 is a cross-sectional elevation, on the line $x\,x$ of Fig. 1, of the power-transmission ring and gearing with my improvements arranged therein. Fig. 3 is an enlarged cross-section of the rim of the pinion.

This invention is applicable to many kinds of machinery; but for the purpose of illustration I have shown it applied to an apparatus for transmitting power by cable or rope, in which 2 represents the framework, upon which is mounted the main shaft 3, carrying a drum or friction-pinion 4, adapted to run against the interior of the ring, as shown. This ring 5, as here shown, is formed of two parts or halves bolted together at intervals by bolts 7 and adapted to be supported by idler-pulleys 8 and 9, the idler-pulleys being supported upon the frame 2 by adjustable boxes 10 and 11, so that the pulleys may be kept in proper adjustment in said ring. The idler-pulleys support the ring when the device is not in operation; but when the belt, rope, or cable passes around the ring the ring, which has no fixed center and lies within the turn of the belt, rope, or cable, is free to swing in the plane of the belt, rope, or cable about its point of connection with the pinion as a center, and thus to act as an automatic tightener for the belt. When the ring is arranged in a vertical plane, the weight of the ring also causes the ring to swing about its point of connection with the pinion as a center, and the ring lies within the belt, rope, or cable, with its weight carried mainly thereby, and there is sufficient friction between the pulley and the belt, rope, or cable to keep the belt, rope, or cable tight and to cause said rim to be turned from said belt, rope, or cable without permitting any slipping of the belt, rope, or cable upon the ring. Side-bearing idler-pulleys 12 will also be mounted upon the frame 2 to bear against the sides of the ring 5 to prevent any side motion of the latter. By this means the ring is retained in place, while at the same time left free to revolve upon and between the idler-pulleys. The pinion 4 is formed with the flanges 14 and 15, which project past the inner edges of the sides of the ring 5 and are provided with a series of balls 16, projecting through the flanges and adapted to coact with a series of corresponding balls 17, inserted into the edges of the ring 5, so that the two sets of balls intermesh to perform the same work as ordinary gear-teeth. The balls are left free to revolve, while at the same time they are held in place in the ring and pinion.

In Fig. 3 is shown one manner of securing the balls 16 in the flanges in the pinion, consisting in forming recesses in the outer sides of the flanges, into which the balls are inserted from the outside and project through the flanges 2 little less than one-half their diameter, so that they will not pass entirely through the recesses, and are retained in place by rings 18 and 19, having recesses to receive the outward halves of the balls, as shown, the rings being retained in place by bolts 20. By this simple means the balls 16 are firmly held in position, being at the same time left free to revolve. The opposing balls 17 are inserted into recesses in the edges of the driving-ring 5 and are secured in place by a metal ring 17′ and screws 18′ or any other suitable means which will hold the balls in place, while permitting them to revolve freely. The balls 16 and 17 may be of hardened steel, which will render them very durable and consequently longer lived than ordinary gear-teeth. The parts forming the driving-ring 5

or the pinion 4, or either, may be of wood, but will preferably be of metal.

While I have shown the ball-gearing applied to operate the pinion 4 by the driving-ring 5, it will of course be understood that the ball-gears are applicable to any form of mechanism and may be employed anywhere in place of ordinary toothed gearing. At suitable intervals in the rim of the driving-ring 5 I may arrange opposite gripping-jaws 21 and 22 in pairs and pivoted at 22′ and each jaw provided with an angularly-arranged projection 23 and 24, adapted to rest in contact with correspondingly-angular plates 25 and 26 or housings formed in the ring 5 at points opposite the jaws 21 and 22. By this arrangement if the jaws be drawn inward toward the center of the ring the projections 23 and 24 will be distended by contact with the plates 25 and 26 and cause the jaws 21 and 22 to be compressed upon the driving-cable 27, which passes around the ring between the jaws. The ring 5 is provided with a groove 28 (see Fig. 2) to receive the cable.

The relative positions of the jaws 21 and 22 and the cable-groove 28 in the ring are such that the tension of the cable moves the jaws inward on the tension side of the pulley, and thus causes the jaws to automatically compress the cable and prevent slipping. Means may be provided whereby the inward movement of the jaws upon the tension side to compress the cables reversely moves the opposite jaws, which have completed their work for that revolution, to release the cable. This is accomplished by means of a ring 29, passing around inside the ring and secured to each pair of the jaws 21 and 22 by a clip 30, so that the inward movement of any pair of the jaws by action of the ring distends the opposite pair of jaws and releases the cable on the opposite side of the ring. The ring 5 is shown with a rib 31, Fig. 1, around its interior, adapted to fit into a corresponding groove 32 in the pinion 4, to assist in supporting the ring and preventing lateral movement. The balls 16 and 17 may be inserted into any required portion of the surfaces of the driver or driven member, and one or both sets may be revoluble or stationary, as required.

It will be seen from the inspection of the drawings that the idler-pulleys 8 and 9 are designed mainly for supporting the ring when the belt, rope, or cable is not applied thereto. These pulleys, as above stated, are mounted on adjustable boxes, so that they can when desired be moved entirely away from contact with the ring, and then the ring is adapted to be supported entirely, except as to its engagement with the driven pinion, by the belt, rope, or cable that passes around said ring. It will be understood, therefore, that I do not limit myself to the use of the idlers for supporting the ring at any time. Where they are used they will only come into operation when the belt, rope, or cable permits the ring to drop down sufficiently to come in contact with said idlers. The weight of the ring will, however, be supported almost entirely upon the belt, rope, or cable itself. It will be understood, therefore, that I do not limit myself to any particular form of gear connection between the ring and the pinion arranged within the circumference of the ring. I have shown in the drawings suitable balls provided both in the ring and in the pinion and serving as teeth for such parts; but this construction may be departed from without departing from my invention.

In the construction illustrated herein it will be seen that the driving-ring is without a fixed center and that it is free to move in the plane of the belt, cable, or rope, the point of engagement between the ring and the pinion serving as a center, about which the ring turns or swings. Thus if the cable is driven in the direction of the arrow, Fig. 1, the strain of the cable on the ring tends to swing the ring against the other part of the cable, and thereby to take up any slack in the cable, and the greater the load and the harder the strain on the cable the tighter the cable will be held to the ring. Any slipping of the cable on the ring is thereby prevented. This power-transmitting device is therefore self-tightening, which is of great advantage over the usual construction of power-transmitting devices.

I do not limit myself to any particular form of gear or pinion or means for connecting or supporting them or position in which they are located or operated, as I believe myself to be the first to provide an internal-ring gear constructed in any form without a fixed center and a pinion with a belt passing around the ring and the ring being free to swing in the plane of the belt, and thereby to act as an automatic tightener for the belt. The belt may be an ordinary belt or a cable, chain, rope, or other equivalent device, and the ring may be in a horizontal position instead of vertical or in any intermediate angle.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A power-transmitter, comprising a ring, a smaller wheel therein, and a belt the pull of which holds said ring in working engagement with said pinion, substantially as described.

2. A power-transmitter, comprising a ring, a smaller wheel therein, a belt the pull of which holds said ring in working engagement with said pinion, and means determining the plane of rotation of said ring, substantially as described.

3. A power-transmitter, comprising a ring, a smaller wheel, a belt the pull of which holds said ring in working engagement with said pinion, and said ring being capable of movement about the pinion as a center, substantially as described.

4. The combination, with a suitable pin-

ion, of an internal driving-ring in engagement with said pinion, said driving-ring having no fixed center, and a belt, upon the periphery of said ring, substantially as described.

5. The combination, with a suitable pinion, of an internal driving-ring with which said pinion has a suitable driving connection, and a belt arranged upon the periphery of said ring and adapted to drive said ring, said ring being adapted to swing in the plane of said belt about its point of engagement with said pinion as a center, for the purpose set forth.

6. The combination, with a suitable pinion, of an internal driving-ring with which said pinion has a suitable driving connection, and a belt arranged upon the periphery of said ring and adapted to drive said ring, the weight of said ring being borne substantially by said belt, substantially as described.

7. The combination, with a suitable pinion, of a driving-ring within which said pinion is arranged and with which it has a driving connection, said ring being arranged to have a limited amount of vertical movement, and a driving-belt engaging the periphery of said ring, whereby said ring lies within said belt, and its weight is substantially borne thereby, substantially as described.

8. The combination, with a driving-ring and a belt arranged upon the periphery of said ring and by which said ring may be driven, said ring being capable of a limited vertical movement, whereby its weight is borne substantially by said belt, of a pinion arranged within and having a driving connection with said ring, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN H. WATTS.

Witnesses:
C. N. WOODWARD,
P. H. FISK.