(No Model.) 3 Sheets—Sheet 1.

N. P. OTIS.

GUIDE SHEAVE FOR ELEVATORS.

No. 507,157. Patented Oct. 24, 1893.

Fig. 1.

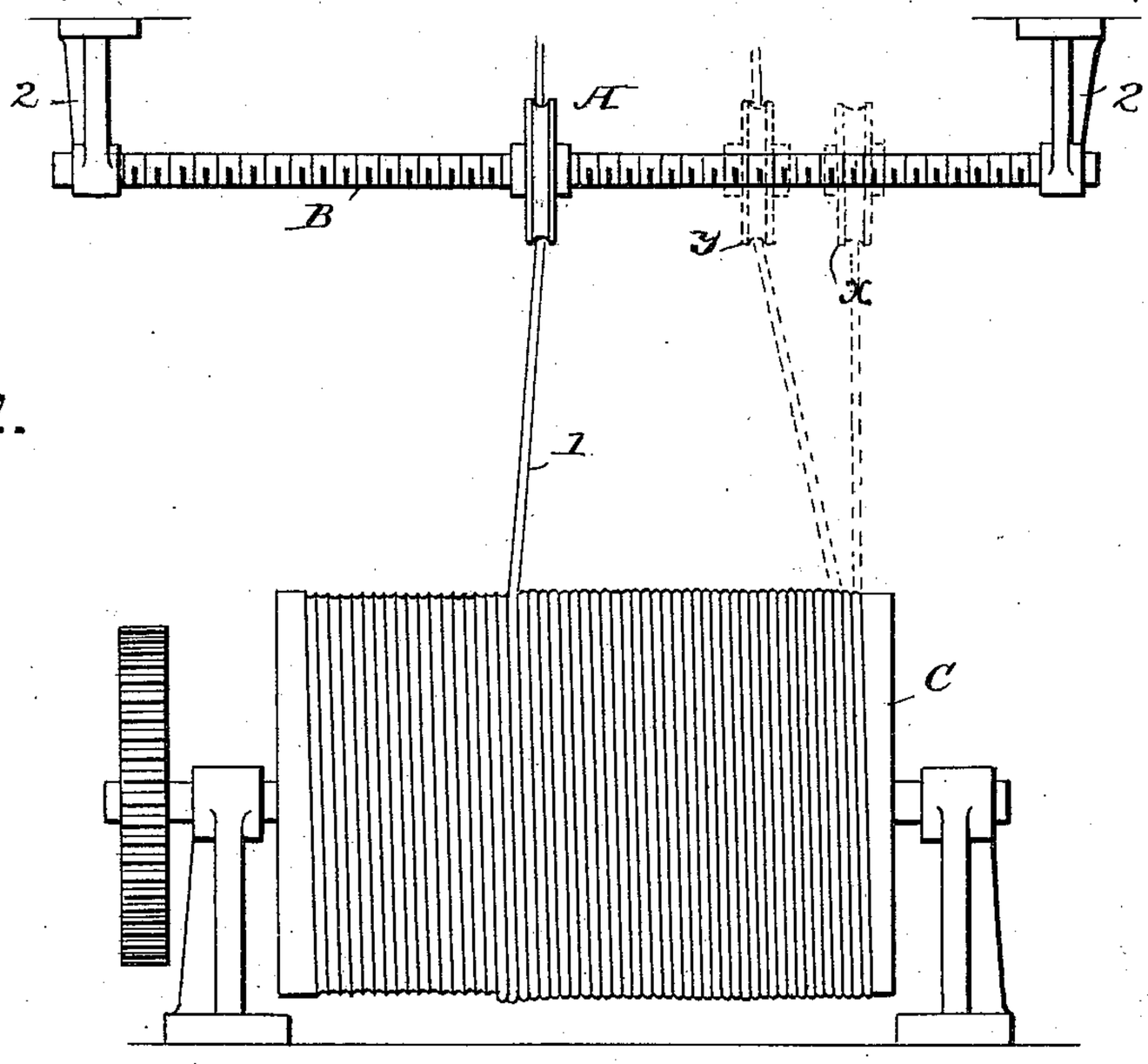


Fig. 4.

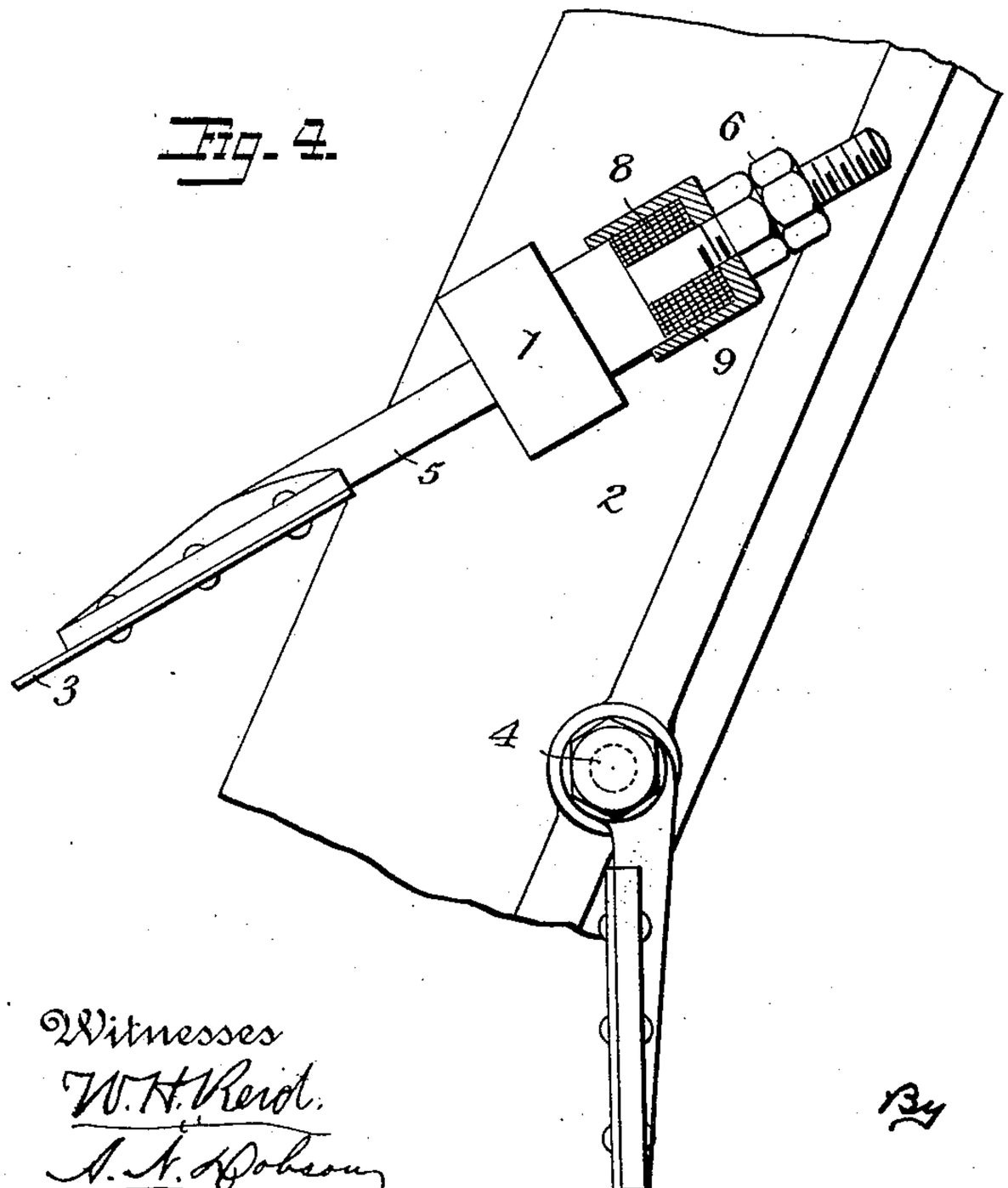
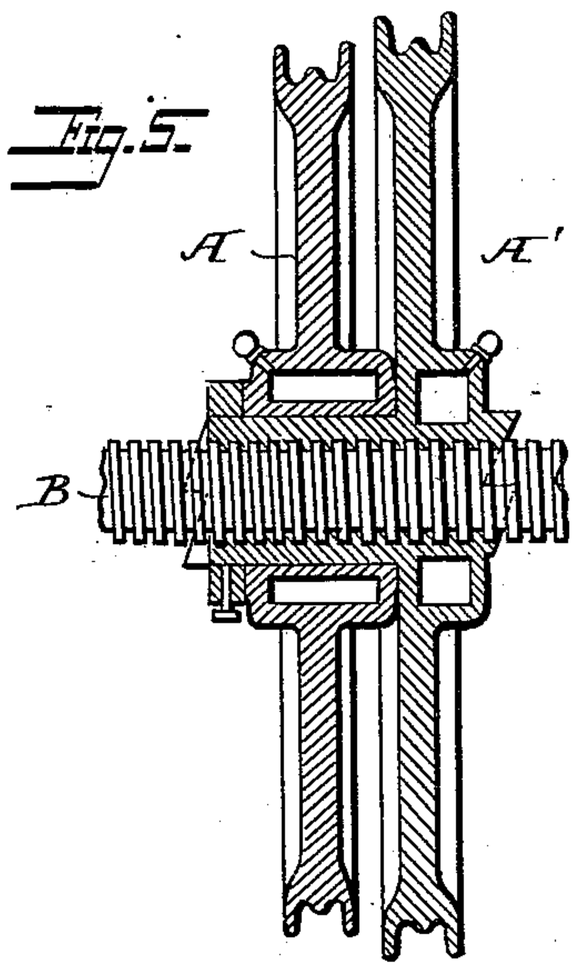


Fig. 5.



Witnesses
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(No Model.) 3 Sheets—Sheet 2.

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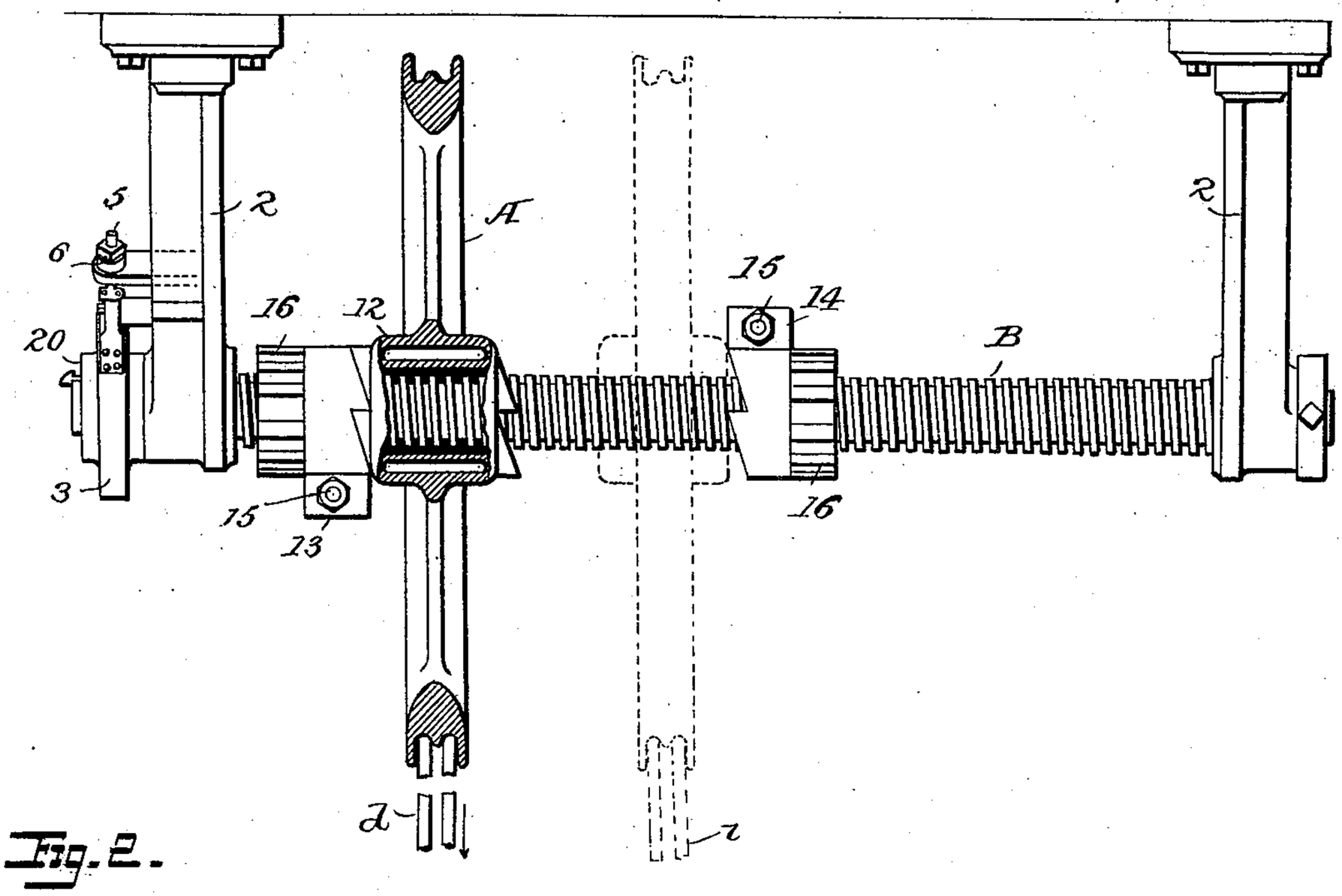
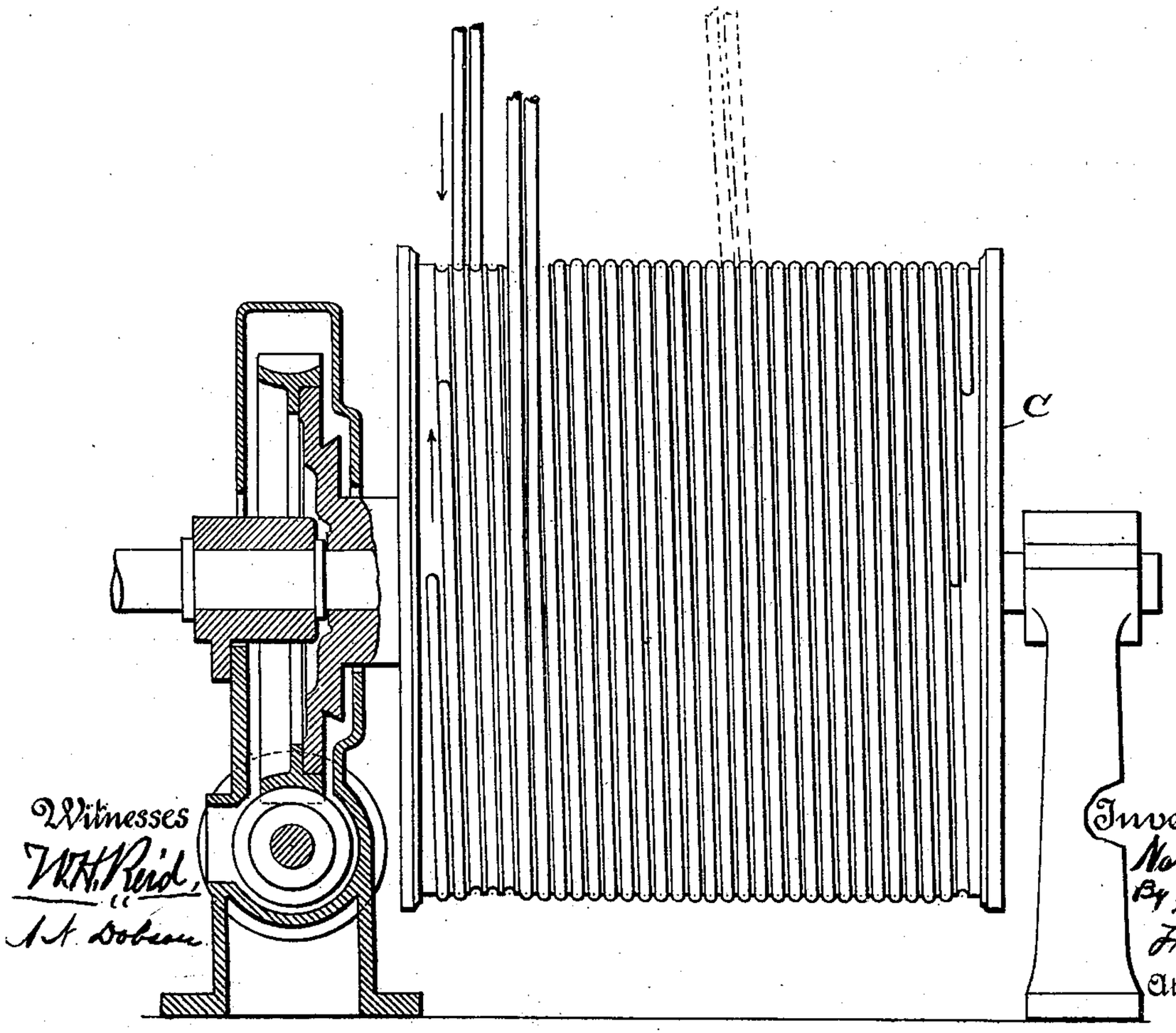


Fig. 2.



(No Model.) 3 Sheets—Sheet 3.

N. P. OTIS.

GUIDE SHEAVE FOR ELEVATORS.

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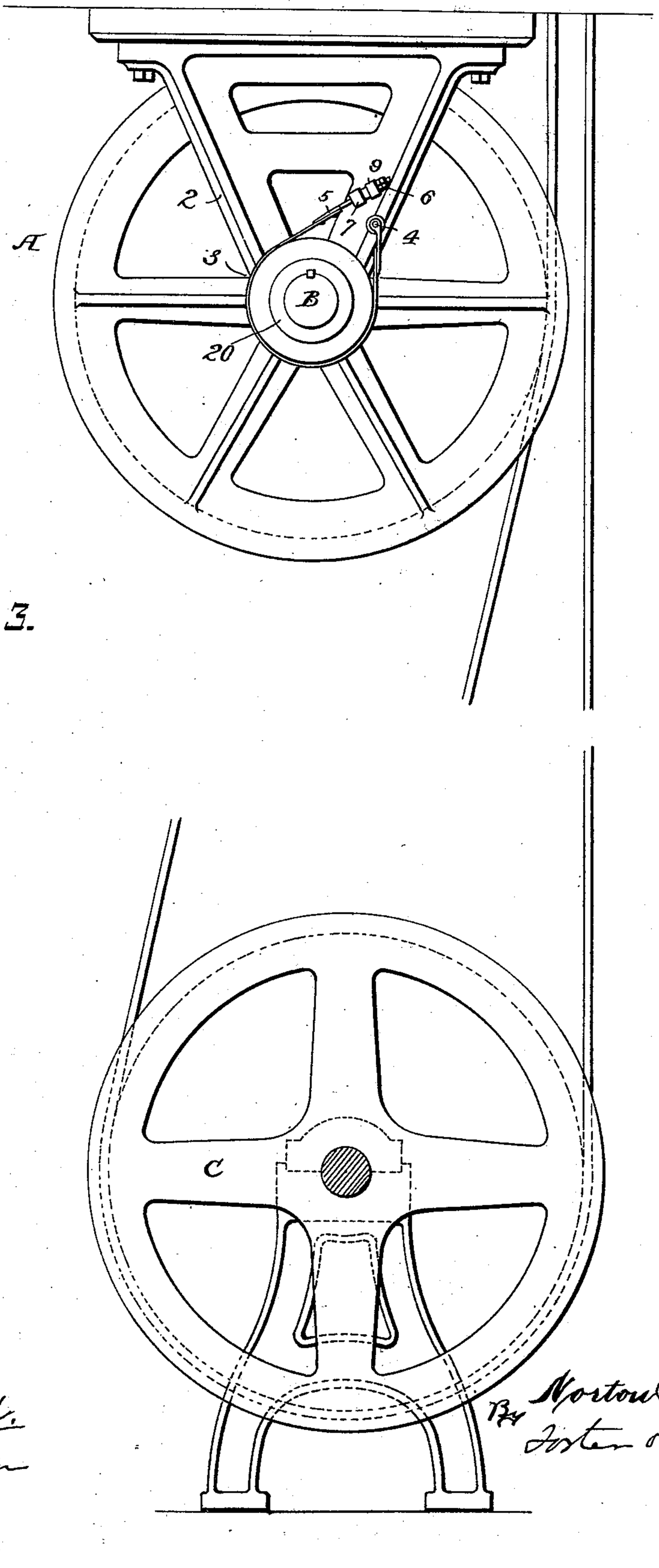

Fig. 3.

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UNITED STATES PATENT OFFICE.

NORTON P. OTIS, OF YONKERS, NEW YORK.

GUIDE-SHEAVE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 507,157, dated October 24, 1893.

Application filed February 1, 1893. Serial No. 460,504. (No model.)

To all whom it may concern:

Be it known that I, NORTON P. OTIS, a citizen of the United States, and a resident of Yonkers, Westchester county, New York, have invented certain new and useful Improvements in Guide-Sheaves for Elevators, &c., of which the following is a specification.

My invention relates to that class of elevating apparatus in which the cable or cables from the winding drum must be deflected in passing from the drum to the pulley at the top of the well, and in which a traveling sheave is used for supporting the cable at its bend, and my invention consists in means fully set forth hereinafter whereby to automatically maintain the traveling sheave and that portion of the cable between the sheave and the winding drum always in substantially the same vertical plane.

In the accompanying drawings, Figure 1, is a diagrammatic view illustrating the ordinary arrangement of the drum, sheave and cable and sheave support. Fig. 2, is a front elevation in part section, of the drum, sheave support, sheave and cable embodying my invention. Fig. 3, is a side elevation. Fig. 4, is an enlarged detached view showing part of the friction device for the sheave shaft. Fig. 5, is a view illustrating an arrangement when two traveling sheaves are employed.

In those cases in which it is necessary to deflect the cables that pass from the winding drums in an elevator apparatus to the pulley at the top of the well and thence downward to the cage, it has been customary to make use of a traveling sheave sliding upon a shaft or bearing parallel to the axis of the drum. Where the said shaft is a plain shaft with the sheave sliding and revolving freely thereon, any unusual friction will result in lost motion, so that the sheave does not fully accompany the cable in its lateral travel, and the cable gradually acquires an angle to the sheave and to the winding drum, causing it to slip from the sheave, or overlie the coils of the winding drum.

In some cases, as illustrated in the diagram, Fig. 1, the sheave A, turns and travels upon the stationary threaded shaft B, as the cable 1, is wound upon, or from the drum C. It has been found that the use of such a threaded shaft does not remedy the evil, and that owing to slips and resistances which cannot be prevented, the cable will be wound upon the drum to the full capacity of the latter, before the sheave A, reaches the position indicated by the lines *x*, Fig. 1, so that at the completion of the winding, the sheave will be in the position indicated by the lines *y*, Fig. 1, with the cable at the angle shown, so that when the drum reverses its motion and the cable unwinds, imparting rotation to the sheave A, the latter travels toward the opposite end (the left in the case illustrated) ahead of the plane in which the cable leaves the drum, and the sheave reaches the end of its travel before the cable is completely unwound from the drum, after which the cable can only travel over the sheave by friction.

The object of my invention is to insure such a travel of the sheave A, that it will always be substantially in the same vertical plane, as that in which the cable travels from the drum, and to this end I provide means whereby the said sheave may, if it gets out of position, automatically turn the screw shaft B, to such an extent as will insure the proper relative positions of the cable and sheave at the starting of the next return motion.

As illustrated in Figs. 2 and 3, the screw shaft B, is supported in suitable bearings, as hangers 2, 2, so as to turn therein, but sufficient friction is applied to prevent the turning of the said shaft, except when the sheave A, is out of adjustment as hereinafter described.

One means of securing a frictional resistance of the turning of the shaft consists of a drum 20, keyed to one end of the shaft, and a friction strap or brake 3, preferably a steel brake band, passing around the drum, connected at one end to a stationary pin 4, and provided at the other end with a threaded rod 5, that extends through a hollow bearing 7, and carries one or more nuts 6.

In order to secure an elastic pressure of the band upon the disk, I interpose a yielding washer between the bearing 7, and the nut,

preferably in the form of a cup 9, through which the rod passes, and containing a hollow cylinder of rubber 8. By turning the nut, any desired pressure may be applied to hold the shaft normally from turning. Upon the shaft turns the traveling sheave A, having one or more peripheral grooves according as the cable is single or double, and with an expanded hub 12, containing a threaded bushing adapted to the threads of the screw shaft B.

To the shaft B, are applied contact pieces, shown as two split nuts 13, 14, each with a tightening bolt 15, so that the nut can be set to any desired position upon the shaft, and then clamped thereto, and preferably a check nut 16, is then brought to bear upon and further secure the split nut.

The opposite ends of the hub 12, and the inner faces of the split nuts, are preferably provided with engaging devices as pins or projections, so that after the sheave A, is brought against either nut, or so that when the engaging devices of the sheave and either nut are brought in contact, the nut will turn with the sheave carrying with it the shaft B.

Assuming the parts to be in the position illustrated in Fig. 2, and that the drum begins to turn in the direction of the arrow, causing the portions *d*, of the cable that pass around the sheave in front to move upward, the sheave will be rotated, so as to travel toward the right, in proportion as the vertical plane of the cable also travels toward the right. If in the course of this travel there should be any slip whatever, the lower portion of the cable would travel in respect to the drum faster than the sheave travels in respect to the shaft B, so that when the full amount of cable is wound upon the drum, the sheave instead of being in full contact with the split nut, will occupy a position at the left with the cable in the inclined position shown by the dotted lines *w*. If, now, the motion of the drum is reversed, and the sheave travels back ahead of the unwinding of the cable, it will be brought in contact with the split nut 13, before the cable is completely unwound, so that as the cable is further unwound, and until the cable is in a vertical plane co-incident with that of the sheave, the shaft will turn with the sheave, so that there is no slipping of the cable upon the sheave. In case the lower end of the cable gains but little upon that portion in contact with the sheave, the latter on approaching the nut 14, will make contact with the said nut, and the nut and shaft will turn with the sheave until the full amount of cable is unwound so that there is no traveling of the cable upon the sheave. It will be seen that by this means at least once in each travel of the cable between the extreme points upon the drum, the cable and sheave will be brought into the same vertical plane, so that by these repeated corrections of any disarrangements, the parts are kept practically in alignment with each other, and that the said disarrangements can never be of any great extent.

Where it is desired to make use of two sheaves, one for guiding each portion of the cable, one sheave A′, may turn upon the hub 12, of the other sheave A, as shown in Fig. 4, both being carried together. Any other suitable means may be employed for causing the shaft B, to turn with the sheave when the latter is moved by the cable in advance of the lower portion of the cable, that shown being a simple and effective means for such purpose.

As the drums of elevator apparatus are generally of uniform size, but as the extent to which the cable is wound upon a drum will depend upon the height of the building, the devices for limiting the movement of the sheave independent of the shaft must be adjustable to permit the sheave to travel to a greater or less extent upon the shaft. This adjustment is secured by employing the adjustable nuts 13 and 14, with means for securing them in place after adjustment.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. The combination with the drum and cable of an elevator apparatus, of a threaded shaft, a sheave turning and traveling on the said shaft in contact with one portion of the cable, and means for automatically engaging the shaft with the sheave when the latter turns after reaching the limit of its traveling movement, substantially as set forth.

2. The combination, with the drum, cable and sheave, of a screw shaft upon which the sheave turns and travels, said shaft supported to turn in its bearings, means for applying a frictional resistance to the turning of the shaft, and means for automatically turning the shaft with the sheave when the latter turns after reaching the limit of its movement, substantially as set forth.

3. The combination of the drum, cable and sheave turning and traveling on the shaft, of bearings supporting the shaft to permit the same to turn therein, means for applying frictional resistance to the turning of the shaft, and nuts or contact pieces upon the shaft arranged to be in contact with the sheave as the latter reaches the limit of its movement in each direction, substantially as set forth.

4. The combination with the drum, cable, sheave and screw shaft, of contact pieces adjustably mounted on the shaft, means for securing the same after adjustment, and means for applying a frictional resistance to the turning of the shaft, substantially as set forth.

5. The combination with the drum, cable-

shaft provided with a friction device, of nuts or contact pieces upon the shaft provided with projections or shoulders for engaging projections or shoulders on the end of the sheave, substantially as set forth.

6. The combination with the drum, cable-shaft and traveling sheave of a friction device, consisting of a wheel upon the shaft, a friction strap or band encircling the wheel, adjusting nuts, a yielding washer between the nuts, and a bearing supporting the bands, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NORTON P. OTIS.

Witnesses:
HENRY L. BRANT,
WM. L. RICKARD.