(No Model.) 3 Sheets—Sheet 1.

A. E. NORRIS.

HOISTING ENGINE.

No. 590,587. Patented Sept. 28, 1897.

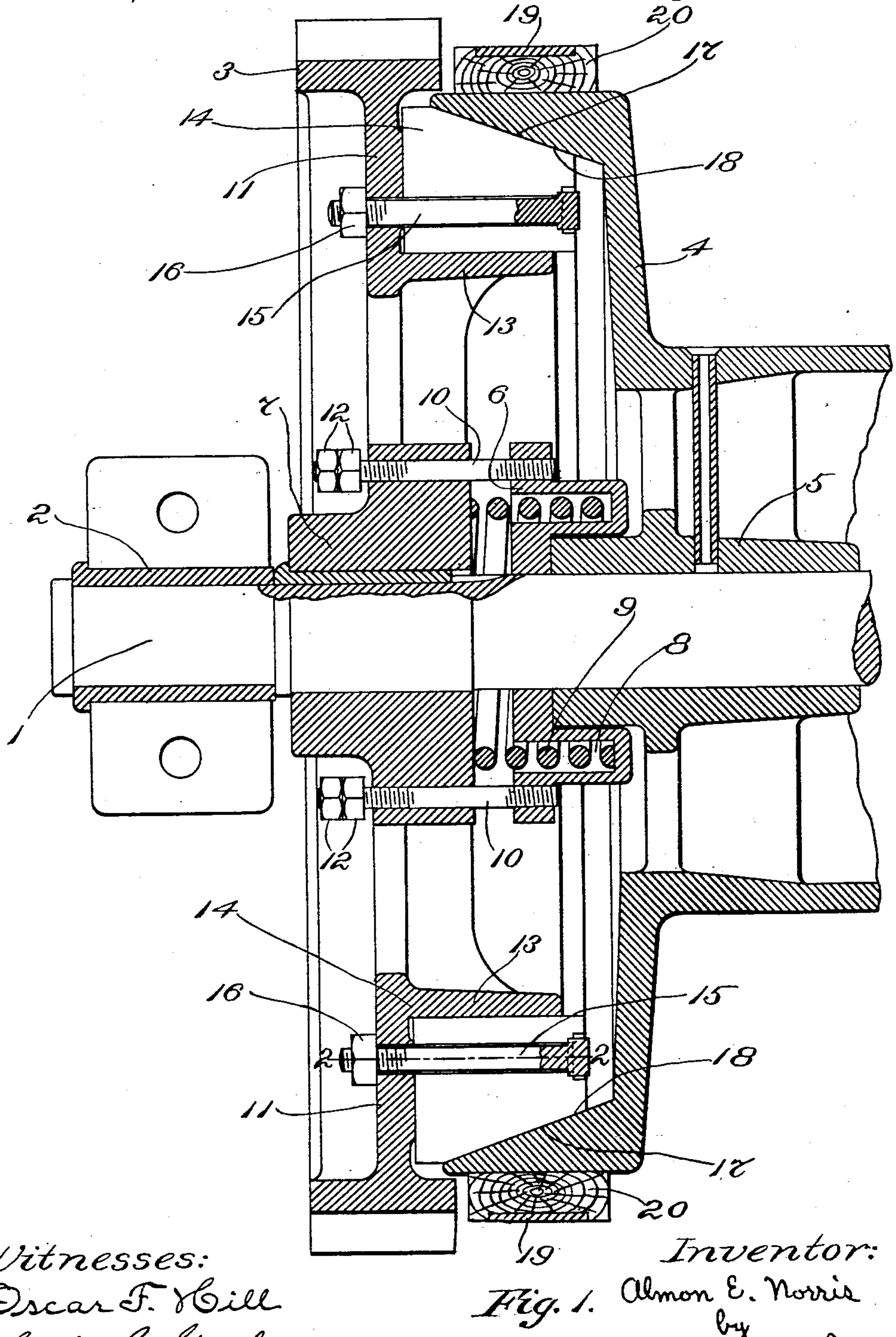

Fig. 1.

Witnesses:
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Saml G. Stephens.

Inventor:
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(No Model.)

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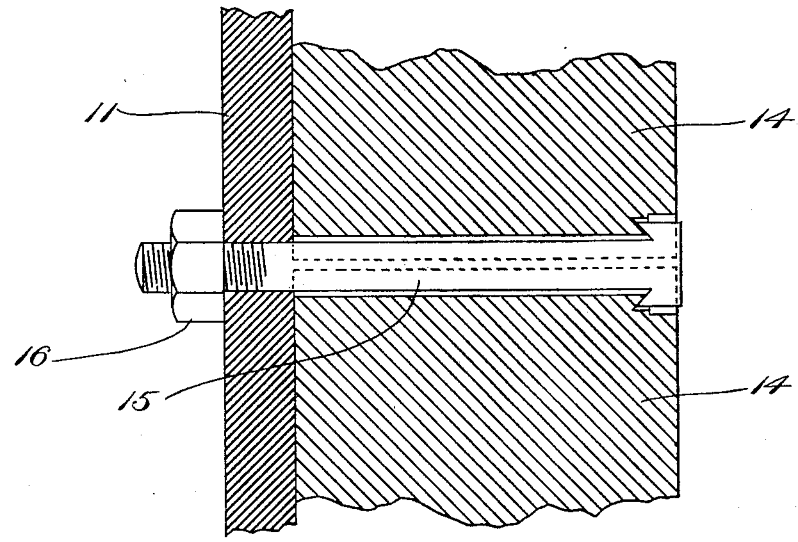

Fig. 2.

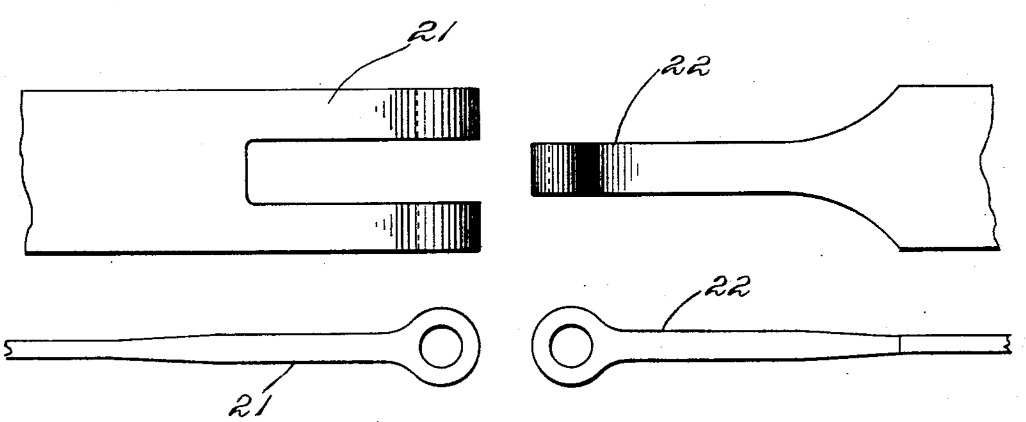

Fig. 4.

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(No Model.)

3 Sheets—Sheet 3.

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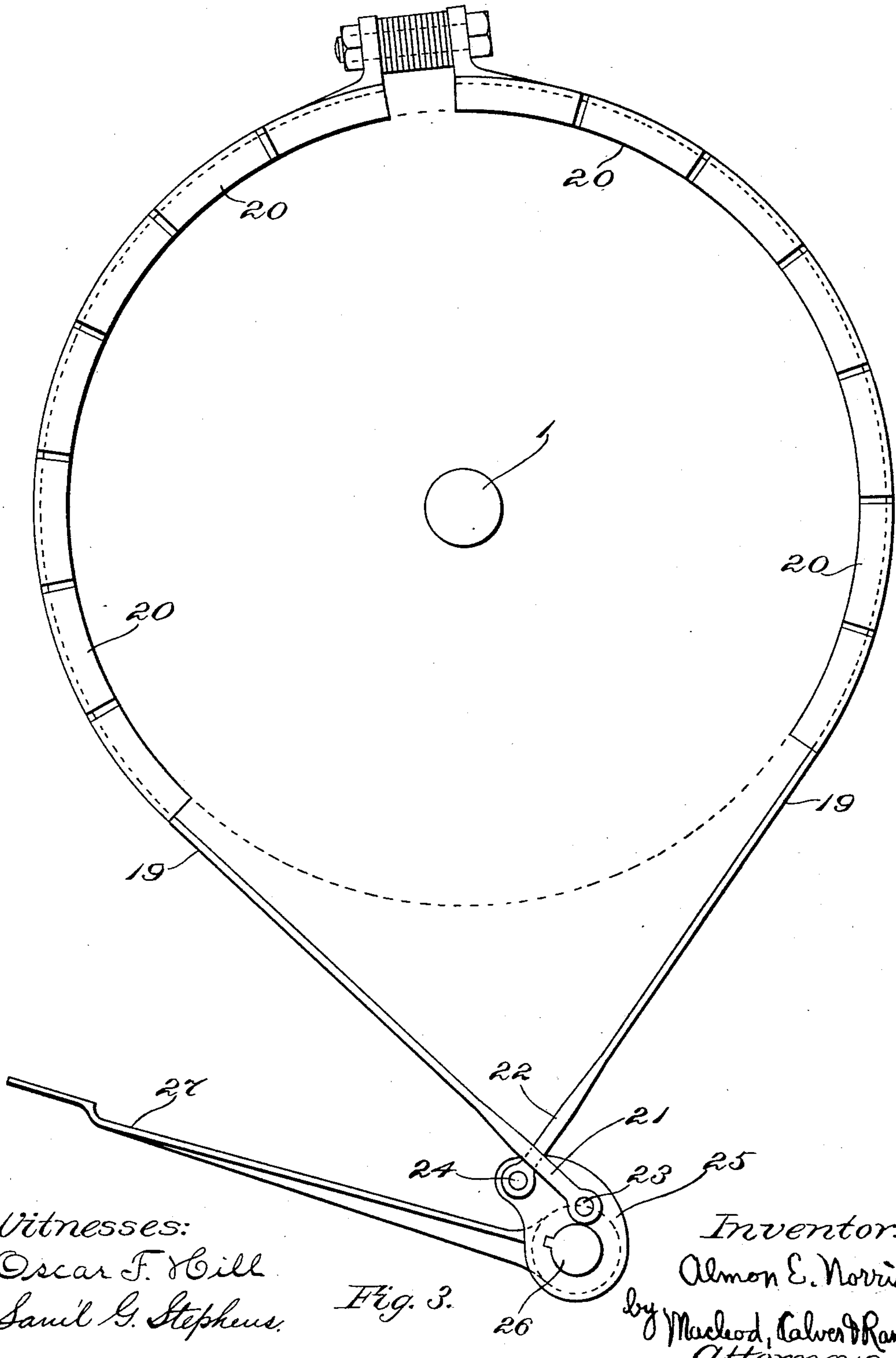

Witnesses:
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Fig. 3.

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UNITED STATES PATENT OFFICE.

ALMON E. NORRIS, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO THE RAWSON & MORRISON MANUFACTURING COMPANY, OF SAME PLACE.

HOISTING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 590,587, dated September 28, 1897.

Application filed April 3, 1897. Serial No. 630,563. (No model.)

To all whom it may concern:

Be it known that I, ALMON E. NORRIS, a citizen of the United States, residing at Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Hoisting-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to hoisting-engines, and more particularly to that class of the same in which the hoisting-rope is wound upon a drum which is formed or provided with one member of a friction-clutch, such member usually consisting of an inclined interior surface on the drum, the drum being mounted loose upon a shaft upon which is fast a gear that is formed or provided with the other member of the friction-clutch, such member consisting usually of a ring-shaped series of blocks having the outer surface thereof inclined to fit within the interior inclined surface aforesaid on the drum. Through suitable operating connections the gear is driven uniformly from the engine, and when the drum is to be revolved and the rope wound upon it in the process of hoisting mechanism at one end of the drum is operated so as to shift the drum endwise into engagement with the gear. When the pressure is relieved, the drum is disengaged automatically from the gear by the recoil of a spring which was put in a state of tension by the pressing together of the friction-surfaces.

The first of my improvements relates to the spring just mentioned and to the means and manner of arranging the same and connecting it with the adjacent parts. The said spring usually is spiral, it encircling the shaft on which both the drum and gear are mounted and usually being confined between the hub of the gear and the end of the hub or sleeve of the drum. The difficulty with this arrangement has been found to be that unless the spring recoils entirely when the drum assumes the disengaged position thereof it will bear against the drum and render difficult the overhauling of the same by hand in slacking off the hoisting-rope, and yet if the spring is allowed thus to recoil completely the very limited extent of the motion lengthwise of the shaft which is intended to be given to the drum in order to throw it into engagement with the gear will not be sufficient to compress the spring enough to store therein sufficient power to force the drum and gear apart to disengage the drum. In order to obviate this difficulty, it has been proposed heretofore to confine the spring within a box or check composed of two disks mounted upon the shaft and connected by bolts passing loosely through one of the same and thereby limiting the recoil of the spring, so that when the end of the hub of the drum as the drum is being thrown into engagement presses against the movable disk of the box it finds the spring already compressed enough to furnish sufficient recoil to effect the subsequent disengagement. I have found that such a contrivance, while it facilitates the overhauling of the drum when disengaged, is open to serious objections, and my present invention obviates those objections.

I have found that in the disengagement of the drum the friction of the drum upon the box containing the spring retards the box and it cuts and wears the shaft. I have found also that the space which the box and spring occupy upon the shaft deprive the drum and gear of support upon the shaft in the very zone in which exists the peripheral strain due to the friction-surfaces and to the brake which passes around the drum.

The first difficulty, that of the wearing and cutting, I obviate by dispensing with one of the disks of the check-box and confining the spring between a single disk and the hub of the gear, the said disk being connected with the gear by bolts tapped into the disk and passing outward through the hub, such bolts being set up by check-nuts to proper tension. This construction has the further advantage of allowing the tension of the spring to be accurately adjusted from the outside without taking the engine apart.

The second difficulty, that connected with the space occupied by the box and spring on the shaft between the gear and the drum, I obviate by forming the check-disk with an annular channel or offset projecting over the hub or sleeve of the drum. In this channel the spring will be received and will play, one end of it resting on the bottom of the channel and the other end against the hub of the gear. I am therefore enabled to use a spring of adequate length, while at the same time the only space that is required to be left between the hub of the gear and the end of the hub of the drum is that required for the flat part of the check-disk plus that for the longitudinal play of the drum. This space required for the play of the drum is exceedingly small. The main idea will be seen to be the arranging of this spring and the hub or sleeve of the drum so as to overlap, and consequently bringing the support afforded by the said hub or sleeve into the zone of stress.

My second improvement relates to the wooden blocks forming the interior member of the friction-clutch, and more particularly to their attachment to each other and to the supporting-disk therefor. I provide this disk with a lateral flange. Heretofore a flange has been used and the blocks have been seated thereon and mortised thereinto, projecting portions of the blocks passing inward through corresponding holes in the flange and being secured by pins. In such an arrangement, however, shrinking of the blocks loosens them, and there is no way to set them up. It has been proposed to arrange the blocks with their faces resting in an annular undercut channel cut in the surface of the gear-disk and to tighten them by forcing or wedging them apart from one another. Such wedging acts to throw the blocks outward and increases the circumference of the circle which they form, it forcing the outer edges of the blocks into the outer angle of the channel in which they are set.

In my present improvement there is no channel with an outer angle, and inasmuch as no portion of the blocks fits under an overhanging portion of the disk the full extent of the outer or wearing face of the block is available for use as a friction-surface. I form the blocks adjacent to their meeting surfaces with recesses having reëntrant bevels, which latter are engaged by reëntrant bevels on a bolt with a T-shaped head, the stem of which passes outward through the disk of the gear and is set up by a nut against the outer face of the disk. One such bolt is placed between each two meeting ends of the blocks. The setting up of the bolts draws the blocks of wood together by the interaction of the beveled surfaces on the blocks and those on the bolts, and thus contracts the circumference of the circle which they form, this acting to reduce the diameter as well of such circle, and thus seats them firmly upon the flange of the disk. The bolts therefore perform the double function of binding the blocks against the disk of the gear by their direct operation and by their indirect operation of seating the blocks upon the flange.

It will be understood that when the drum is thrown into engagement with the gear the blocks are forced inward, and if the strain of the bolts normally threw them outward, as in the former arrangements above referred to, there would be a certain degree of lost motion as well as a direct inward strain upon the bolts, and, again, when the disengagement of the drum takes place there would be a degree of lost motion and a springing outward of the blocks. It is moreover of the greatest importance that the lateral motion of the drum should be a minimum in order that with a reasonable turn of the operating-lever at the other end of the drum the greatest power may be obtained. It will be perceived that with my arrangement in case of shrinkage of the wood the diameter of the circle which the blocks form will be contracted, and the blocks will be all the more firmly held instead of becoming loosened. All the strain occurring in the engagement and disengagement of the drum is taken directly by the flange of the gear against which the blocks are seated, and there is no racking of the bolts which secure the blocks.

My third improvement relates to the brake which is applied to the outer surface of the friction portion of the drum. Heretofore a differential band-brake has been employed, but it has been necessary, in order to get the differential action, that the operating-treadle should project in the same direction as that in which the hoisting-rope runs off the drum. It will be understood that the hoisting-rope often runs off the drum on one side, while the cylinders of the engine are placed at the other side. The engineer naturally stands on the cylinder side of the drum in order to be near all the regulating mechanism. If, therefore, the brake-treadle projects in the same direction as the hoisting-rope, it projects away from the natural position of the engineer. My improvement consists in passing one end of the band of the brake through a slot formed at and near the other end and attaching the two ends thus crossed to pins upon a rocker mounted on the shaft to which the treadle is affixed. This enables me to project the brake-treadle in the opposite direction to the hoisting-rope—namely, toward the engine. The operation of this brake will be more clearly understood upon reference to the description in connection with the drawings, but it may be here said that on release of the treadle the pin to which one end of the brake-band is attached comes against the other end of the brake-band and forms an automatic stop for the treadle. The engineer therefore always knows just where to find the treadle without the necessity of looking or reaching for it, and he consequently has the engine under much better control.

In the drawings, Figure 1 is a horizontal section of that end of the drum which forms the friction member and the corresponding friction member of the gear, together with the spring and check-disk mechanism. Fig. 2 is a vertical section on the line 2 2 of Fig. 1, showing the operation of the bolts which attach the blocks to the disk of the gear. Fig. 3 is a side elevation of the band-brake and treadle. Fig. 4 shows details of the ends of the band-brake.

1 is the shaft. 2 is one of the bearings in which the said shaft runs, there being of course a similar bearing at the other side of the engine.

3 is the gear mounted fast on the shaft 1. 4 is the drum mounted loose on the shaft 1 by its hub or sleeve 5.

6 is the check-disk mounted loose on the shaft 1 between the end of the hub or sleeve 5 and the hub 7 of the gear 3.

8 is the annular channel in the check-disk.

9 is the spring confined between the hub 7 and the bottom of the channel 8 and lying mostly in the said channel.

10 10 are the bolts tapped into the check-disk 6 and passing through the hub 7 of the gear 3 and turned up by the check-nuts 12.

The surfaces of the check-disk 6 and hub 7 may be almost within one-eighth of an inch of each other, although a greater distance is indicated for in the drawings. Consequently when the hub or sleeve 5 bears against the check-disk 6 and tends to twist it relatively to the hub 7 the rigidity of the bolts 10 effectually resists such twisting.

13 is the flange of the disk 11 of the gear 3. 14 14 are the blocks seated on this flange.

15 15 are the bolts for contracting together the blocks. In Fig. 2 the operation of these bolts is more clearly illustrated.

16 16 are the nuts for setting up the bolts.

17 is the wearing-surface of the blocks. As before mentioned, the entire area of this surface is available.

18 is the corresponding friction-surface of the drum.

19, Figs. 1 and 3, is the band of the brake. 20 20 are wear-blocks introduced between the band and the periphery of the drum 4.

21 is the slotted end of the band. 22 is the other end, it passing through the slot.

23 24 are pins on the rocker 25, to which the respective ends of the crossed band are secured.

26 is the rock-shaft on which the rocker 25 is mounted.

27 is the treadle, extending, as before mentioned, into a position convenient to the engineer. The crossing of the ends 21 and 22 enables this construction to be secured, while preserving the differential action of the brake. Contact of the pin 24 with the slotted end 21 forms an automatic stop for the treadle 27.

What I claim is—

1. In combination, a shaft, a friction member fast thereon, a check-plate loose thereon, a spring concentric with the said shaft and confined between said fast member and said check-plate, bolts connecting said fast member and said check-plate to limit the recoil of said spring, whereby said shaft, fast member, check-plate and spring rotate together, and a loose friction member adapted to be shifted into engagement with said fast friction member and to be disengaged therefrom by said spring.

2. In combination, engaging members constituting a clutch, a spring tending to separate the same, a shaft on which the same are mounted, and a check-plate also mounted on said shaft, confining said spring and channeled to receive said spring, the channeled portion and spring therein overlapping the hub or sleeve of one of said engaging members, whereby the hubs or bearings of said members on said shaft may be brought close together.

3. In combination, a shaft, engaging members constituting a clutch mounted thereon, and a spring concentric with the said shaft interposed between the said members and having operative engagement therewith and serving for disengaging the same, the said spring overlapping the hub or sleeve of one of said members on said shaft, whereby the hubs or bearings of said members on said shaft may be brought closer together than the length of said spring.

4. In combination, a disk, a flange thereon, blocks arranged around said disk on said flange, and bolts passing through said disk and formed with reëntrant bevel faces engaging reëntrant bevel faces on the adjacent ends of said blocks and operating to draw said blocks together when turned up.

5. In combination, a hoisting-drum, a rock-shaft operated by a treadle, a rocker-arm on said shaft having two pins, and a band-brake passing around said drum and having the first end thereof slotted and attached to the first of said pins, and the second end thereof passed through the slot in the first end and attached to the second of said pins, the contact of the said first end with the said second pin, in the release of the brake, operating to automatically stop the said treadle at a predetermined point.

6. In combination, a disk, a circular series of blocks carried thereby constituting a friction-surface, and means connecting contiguous blocks to each other and adjustable to enable the proximate ends thereof to be drawn toward each other as required.

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

ALMON E. NORRIS.

Witnesses:
LEPINE HALL RICE,
JOHN G. MORRISON.