No. 783,226. PATENTED FEB. 21, 1905.

J. E. SEELEY.

ARTIFICIAL LIMB.

APPLICATION FILED DEC. 2, 1901.

Fig. II

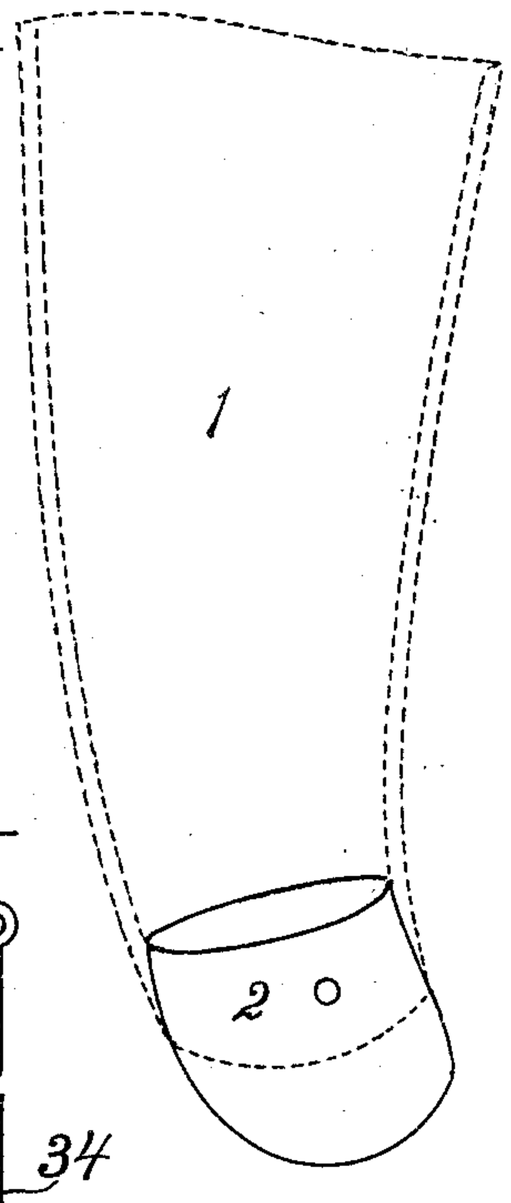


Fig. I

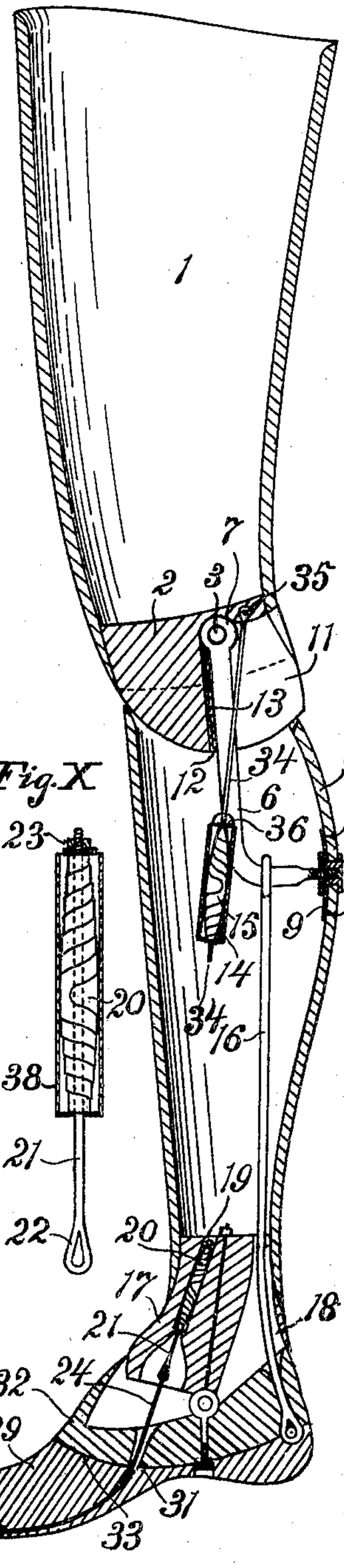


Fig. III

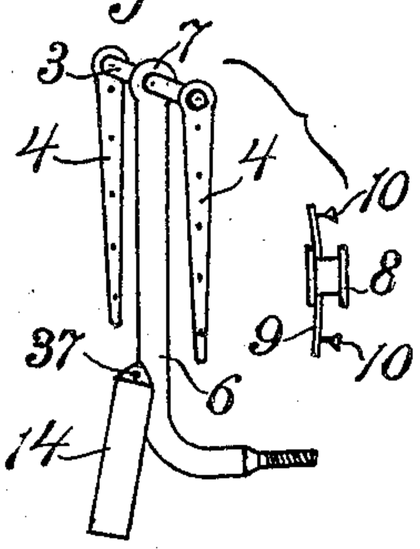


Fig. V

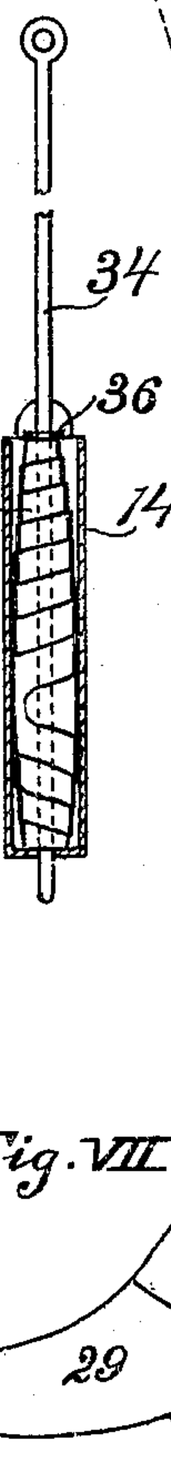


Fig. VI

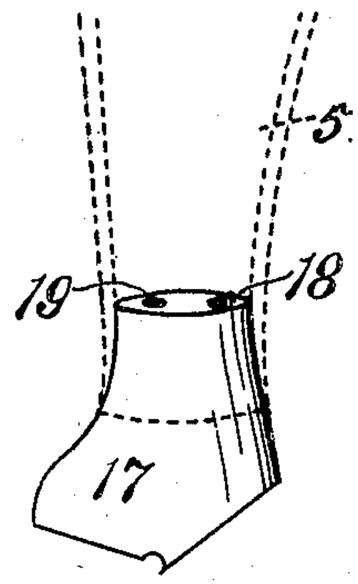


Fig. IV

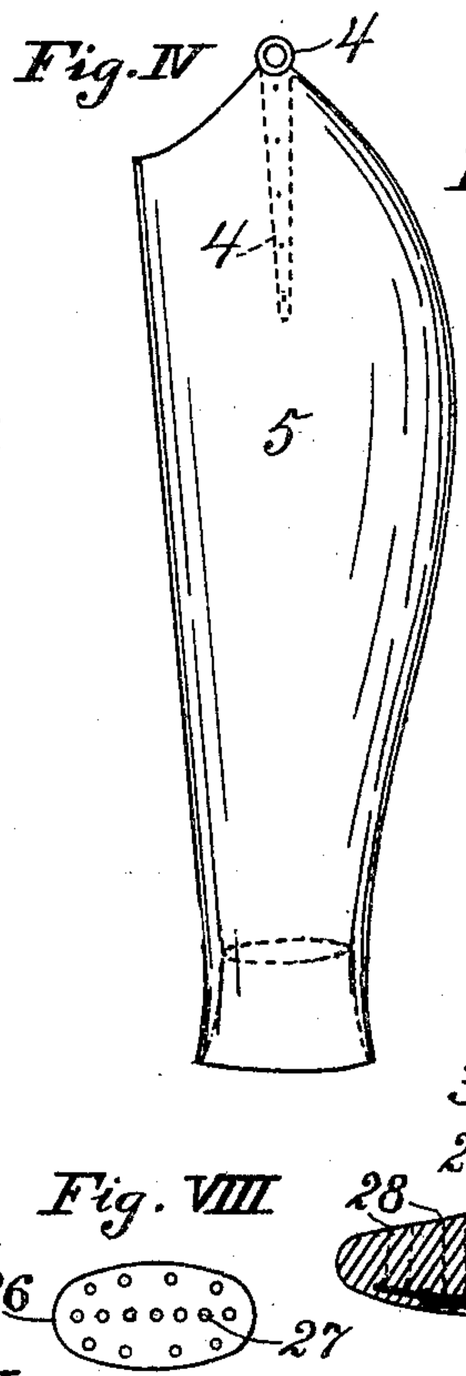


Fig. VII

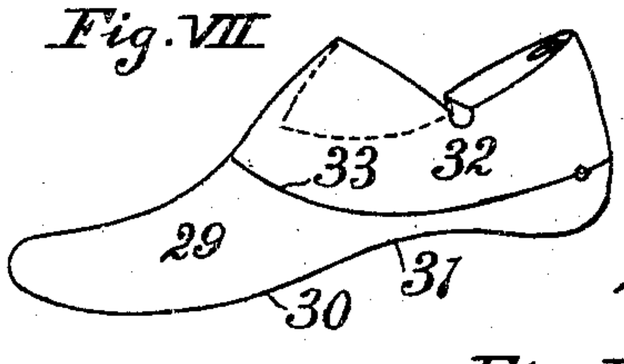
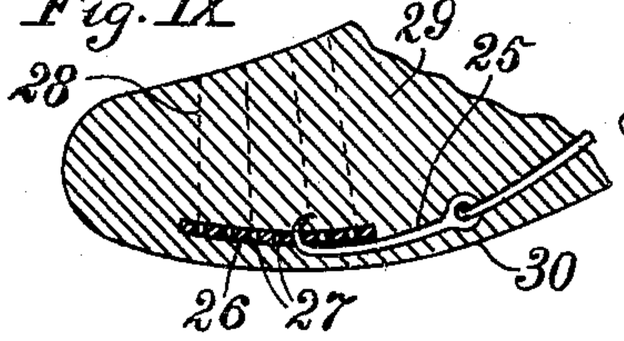


Fig. VIII

Fig. IX



Witnesses
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No. 783,226. Patented February 21, 1905.

UNITED STATES PATENT OFFICE.

JAMES E. SEELEY, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO W. W. SWEENEY CO:, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

ARTIFICIAL LIMB.

SPECIFICATION forming part of Letters Patent No. 783,226, dated February 21, 1905.

Application filed December 2, 1901. Serial No. 84,305.

To all whom it may concern:

Be it known that I, JAMES EDWARD SEELEY, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Artificial Limbs, of which the following is a specification.

The object of this invention is to provide an artificial limb which shall be improved in numerous particulars, among which are the following: first, extreme lightness and simplicity and cheapness of manufacture; second, improved resiliency and natural action of the toe and ankle articulation; third, an improved action in lifting the foot and in returning the toe to natural position as the foot is lifted, this being accomplished by a yielding connection between the lower foot-piece and the lower leg-piece constructed and arranged to draw down the toe and to draw up the front of the lower foot-piece; fourth, an improved arrangement for limiting the forward swing of the lower leg-piece; fifth, an improved adjustment for said arrangement; sixth, improved elasticity and durability of the foot. To attain this latter object, the contacting surfaces of the lower and upper foot-pieces are inclined upward at the front approximately at an angle of forty-five degrees, the lower foot-piece being a cushion, whereby the weight of the person in walking is received by the cushion in lines of direction which are at right angles to the contacting surfaces of the cushion and the part which rests thereon.

The accompanying drawings illustrate my invention.

Figure I is a longitudinal section of a limb for leg amputation above the knee-joint. Fig. II is a perspective view of the knee-joint piece, dotted lines indicating the connection of the stump-socket or upper leg-piece therewith. Fig. III is a detail of the knee-joint bolt and straps and the knee-stop and swivel-nut with plate therefor and the pivoted support for the knee-spring whereby said spring is connected with the knee-stop. Fig. IV is an elevation of the lower leg-piece. Dotted lines indicate the socket for the lower leg-piece. Fig. V is a fragmental detail of the knee-spring rod and the knee-spring and its case, which latter is shown in axial section. Fig. VI is a perspective view of the ankle-piece. Dotted lines indicate a portion of the lower leg-piece scoped thereon. Fig. VII is a view of the foot detached. Fig. VIII is a view of the toe-plate by which the yielding means for holding the toe down and drawing the foot up may be attached to the lower foot-piece. Fig. IX is a fragmental detail of the lower foot-piece with the toe-plate hook and flexible connection embedded therein. Fig. X is a detail of the spring and its case for operating the toe connection to draw the toe down and hold the foot up.

The upper leg-piece comprises a stump-socket 1 and a joint-piece 2. Said joint piece or member may be made from solid yucca or any other suitable material to constitute a knee-piece over which the thigh-socket is telescoped.

3 designates a knee-joint bolt passing through the knee-piece 2 and the stump-socket 1 in the usual manner.

4 designates hinge-straps which may be riveted or otherwise fastened to the lower leg-piece 5 and into which the joint-bolt 3 is screwed fast in the usual manner. (Not shown.)

6 designates a knee-stop hinged to the knee-piece by the knee-bolt 3. The knee-stop is preferably L-shaped and may be made of flat tool-steel or any other suitable material and of any suitable dimensions—say one-eighth of an inch thick and three-fourths of an inch wide, or heavier or lighter, as the size of the leg may require—and furnished at its upper end with an eye 7, through which the joint-bolt 3 passes. Said knee-stop 6 may be bent at a right angle and the end thereof made round and threaded to receive a nut 8, which is swiveled to a plate 9, that is fastened by screws 10 to the inside of the lower leg-piece 5, so that by turning the nut the knee-stop 6 may be adjusted toward and from the axis of the lower leg-piece. The knee-piece 2 is furnished with a slot 11, which terminates below the bolt 3 in a seat or abutment 12 for the knee-stop 6.

13 designates a cushion which may be formed

of rubber and felt or any other suitable material to form a cushion-seat against which the knee-stop 6 presses when the lower leg-piece and knee-stop are in upright position.

The knee-stop 6 contacts with the seat and takes the place of the knee-cord and also by its adjustment stops the lower leg-piece at the appropriate place.

Heretofore it has been very difficult to give the lower leg-piece the proper adjustment relative to the stump-socket, and by this improvement I am able to substantially obviate this difficulty.

In practice it is found impossible to tell by measurement how much forward knee motion will be required by the wearer to prevent the leg from folding up under him; but by this arrangement of knee-stop the forward knee motion can be adjusted to any degree by simply turning the adjuster formed of the swivel-nut 8. The knee-stop 6 also serves as a solid foundation on which to fasten the receiver or seat 14 for the knee-spring 15 and on which to hang the heel-cord 16. The lower leg-piece 5 is preferably a volute of yucca veneer made over a form and telescoped over the ankle-piece 17, the whole being covered with cloth or rawhide in the usual manner, (not shown,) so as to produce a smooth surface on which to enamel. The ankle-piece 17 is chambered at 18 in the bottom and rear to receive the foot in the usual manner and to allow the heel-cord 16 to pass through and is chambered at 19 in the top and front to seat the toe-spring 20 and to allow the connection 21 for the foot and toe to pass through.

The connection 21 may be a small rod furnished with an eye 22 and passed through the compression-spring 20 from below and held by a nut 23, which rests on the top of said spring. 24 designates a catgut cord passed through said eye 22 and connected by a hook 25 to an aluminium plate 26, which is provided with perforations 27 to adjustably fasten the hook 25 and is embedded in the lower foot-piece 29 and secured by stitches 28 or any other desired means. The toes and lower portion 29 of the foot are made of the usual resilient material, preferably felt, and the lower portion of the connection between the toe-plate 26 and the spring 20 is embedded in the material of the lower foot-piece 29 and extends along the sole 30 to the instep 31 and thence up to the top of the spring 20, by which it is supported and drawn upward, thereby to serve the double purpose of lifting the foot when in the act of stepping forward and preventing the toes from turning up, thus avoiding a serious fault heretofore found with the felt foot.

I have found that while the felt in common use for the lower foot-piece of artificial limbs is not subject to permanent change of dimensions from compression of the wearer it is subject to such change by stretching and that the turning up of the toes of felt foot-pieces results from stretching along the sole of the foot. This difficulty is substantially avoided in this invention by means of the resilient connection arranged between the toe and a solid portion of the limb to draw the toe backward, thus counteracting the tendency to stretch.

32 designates the upper foot-piece, which may be made of a solid piece of yucca covered and enameled in the usual way, as above explained with regard to the lower leg-piece.

The contacting-faces between the felt lower foot-piece 29 and the upper foot-piece 32 are bent up at the front, as shown at 33, to extend upward approximately at right angles to the lines of direction in which the weight is applied to the toes in the act of walking, whereby any tendency of said contacting faces to slip upon each other is avoided. Said faces are cemented together in the usual way. The felt lower portion of the foot is thus constructed to support the upper portion of the foot against forward slip in the act of walking.

34 designates a rod pivoted by a pin 35 to the joint-piece 2 and furnished with a shoulder 36, which rests on the compression-spring 15 to be acted upon thereby, whereby the spring is adapted to push the knee-stop 6 forward, this to hold the upper leg portion and knee-stop in extended position. (Shown in Fig. I.) The case 14 for the knee-spring 15 is pivoted to the knee-stop 6 by a pivot 37.

38 designates the case for the toe and foot spring 20, which is seated in and supported by the ankle-piece.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. An artificial limb comprising a lower leg-piece and a knee-piece appropriately hinged together, a knee-stop hinged to the knee-piece at one end and adjustably connected with the lower leg-piece at the other end, a connection suspending the heel from the knee-stop, and yielding means connected with the knee-piece and lower leg-piece to hold said lower leg-piece forward.

2. The combination of a knee-piece, a lower leg-piece hinged thereto, a knee-stop hinged to the knee-piece and fastened to the lower leg-piece, and yielding means connected with the knee-piece and knee-stop to hold the lower leg-piece forward.

3. The combination of a knee-piece having a seat or abutment for a knee-stop, a lower leg-piece hinged to said knee-piece, a knee-stop hinged to the knee-piece and fastened to the lower leg-piece, a compression-spring, and a rod to compress said spring connected with said knee-piece and knee-stop respectively to yieldingly hold the knee-stop forward against its said seat.

4. The combination of a knee-piece, a lower leg-piece hinged thereto, a knee-stop hinged

to the knee-piece at one end, and revoluble means seated in the lower leg-piece adjustably engaging with the other end of said knee-stop, said means being accessible from the exterior of the leg.

5. The combination of a knee-piece having a seat against which a knee-stop operates, a lower leg-piece hinged to the knee-piece, a knee-stop hinged to the knee-piece and extending into and fastened to the lower leg-piece, a spring, a receiver for said spring, means for fastening said receiver to said knee-stop, and a member connected with the knee-piece and arranged to compress the spring to yieldingly hold the lower leg-piece forward.

6. The combination of a knee-piece having a seat for a knee-stop, a lower leg-piece hinged to the knee-piece, a bent knee-stop hinged to the knee-piece and extending into the lower leg-piece and fastened thereto, a seat or receiver on the stop for a spring, a spring on said seat, and a member connected with the knee-piece and arranged to compress the spring to yieldingly hold the lower leg-piece forward.

7. The combination of a knee-piece, a lower leg-piece hinged thereto, a knee-stop hinged to the knee-piece and adjustably fastened to the lower leg-piece, yielding means tending to swing the knee-stop forward, and means limiting forward movement of the knee-stop.

8. An artificial limb comprising a knee-piece having a slot and a seat for a knee-stop, a stump-socket telescoped over the knee-piece, a lower leg-piece, hinge members fastened to said lower leg-piece, a bolt passed through the knee-piece and hinge members, a knee-stop hinged on said bolt and extending through said slot into the lower leg-piece, a nut swiveled to the lower leg-piece and screwed on the knee-stop to adjust the same toward and from the slot, and means yieldingly holding the knee-stop against the seat therefor.

9. The combination of a joint-piece having a journal for a bolt and a slot terminating below said journal and extending rearwardly therefrom, a lower leg-piece hinged on said bolt, a knee-stop hinged on said bolt and extending through the slot into the lower leg-piece and there bent rearwardly, a nut screwed on the knee-stop and swiveled in the lower leg-piece, and means connected with the joint-piece and with the knee-stop to yieldingly hold the knee-stop against the end of the slot.

10. An artificial limb comprising a slotted knee-piece, a lower leg-piece hinged thereto, a bent knee-stop pivotally secured in said slot at one end and adjustably secured to the lower leg-piece at the other, and yielding means for straightening the leg, said means operatively connected with the knee-piece at one end and with the intermediate portion of the knee-stop at the other.

11. An artificial limb comprising a slotted knee-piece, a lower leg-piece hinged thereto and provided with a hinged foot, a bent knee-stop pivotally secured in said slot at one end and adjustably secured to the lower leg-piece at the other, yielding means for straightening the leg, said means engaging the knee-stop intermediate its ends, and a connection pivoted on the bent end of the knee-stop and to the heel of the foot.

12. In an artificial limb, a foot hinged to the leg and furnished with a flexible toe and a perforated plate; a yielding connection adjustably secured to said plate and extending through the foot and fastened to the lower portion of the toe; and a heel connection connecting the heel with a support.

13. In an artificial limb, the combination with a knee-piece, of a knee-bolt, hinge-straps pivoted thereon, a leg portion supported by said hinge-straps, a knee-stop pivoted on said knee-bolt, a seat on said knee-piece against which said knee-stop operates, the lower end of said knee-stop adjustably secured in said leg portion by revoluble means capable of exterior operation, yielding means operatively connected with said knee-piece and knee-stop and adapted to yieldingly hold said leg portion forward, a foot portion, and a pivotal connection between the heel thereof and the lower end of said knee-stop, substantially as described.

14. The combination of a knee-piece, a lower leg-piece hinged thereto, a knee-stop hinged to the knee-piece and fastened to the lower leg-piece, yielding means tending to swing the knee-stop forward, and means limiting forward movement of the knee-stop.

15. The combination of a knee-piece, a lower leg-piece hinged thereto, a knee-stop hinged to the knee-piece and fastened to the lower leg-piece, a seat on said knee-piece against which said knee-stop operates, and yielding means connected with the knee-stop and knee-piece to hold the lower leg-piece forward.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, California, this 26th day of November, 1901.

J. E. SEELEY.

Witnesses:
JAMES R. TOWNSEND,
JULIA TOWNSEND.