

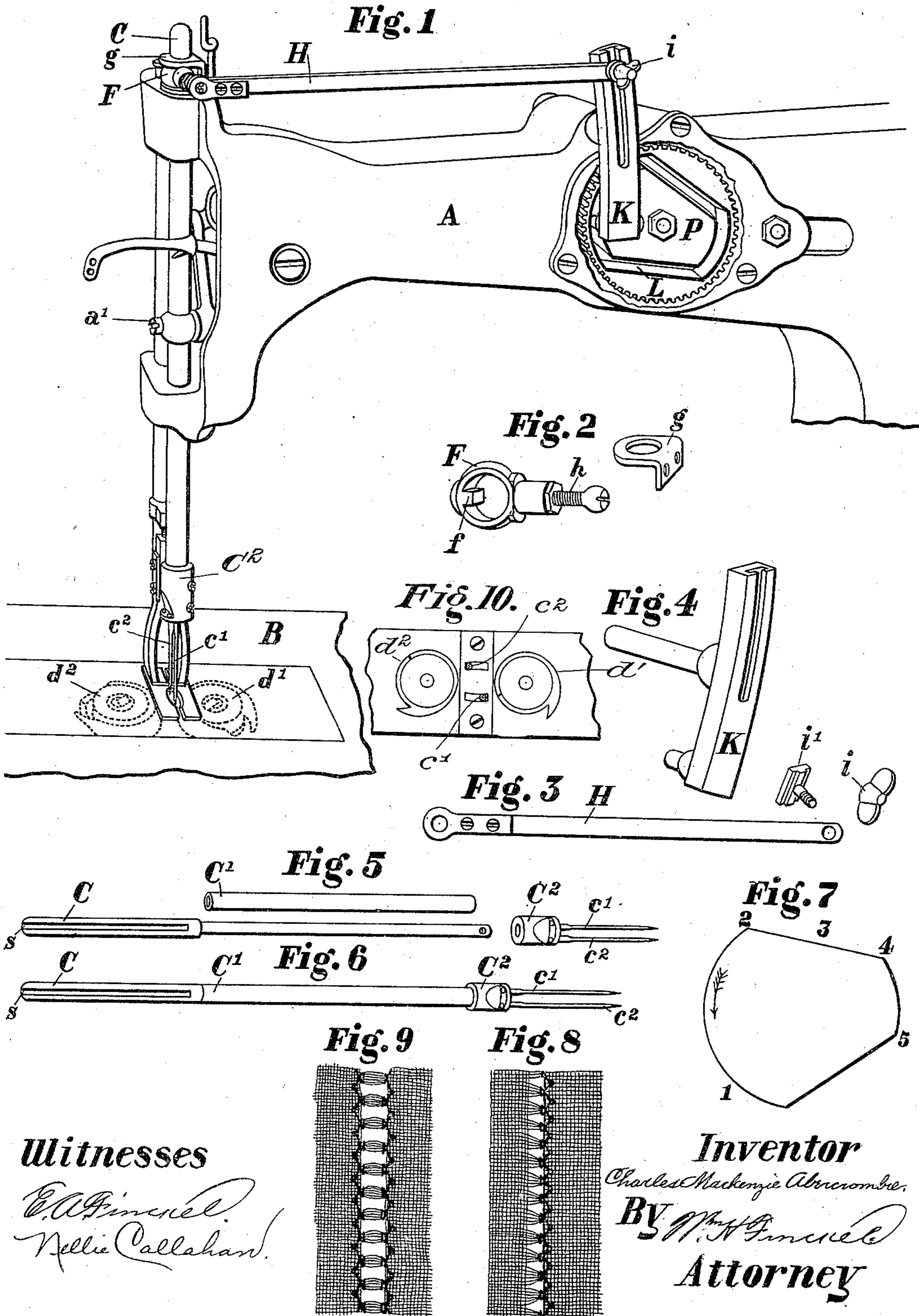
No. 653,192.

Patented July 3, 1900.

C. M. ABERCROMBIE.  
HEMSTITCH SEWING MACHINE.

(Application filed Aug. 26, 1899.)

(No Model.)



# UNITED STATES PATENT OFFICE.

CHARLES MACKENZIE ABERCROMBIE, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE WHEELER & WILSON MANUFACTURING COMPANY, OF SAME PLACE.

## HEMSTITCH SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 653,192, dated July 3, 1900.

Application filed August 26, 1899. Serial No. 728,614. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES MACKENZIE ABERCROMBIE, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented a certain new and useful Improvement in Hemstitch Sewing-Machines, of which the following is a full, clear, and exact description.

My invention has for its object to improve that class of sewing-machines which are employed for stitching ornamental seams consisting of predetermined designs or figures consecutively placed, and to illustrate my invention I have shown it as applied to the well-known Wheeler & Wilson vertical-hook sewing-machine.

My invention, as herein pointed out, has specifically to do with open-seam work—such, for instance, as is accomplished by drawing a number of threads out of the material and then sewing it, by hand or otherwise, so as to bind together a number of threads running transversely to the threads previously drawn, effecting an open seam—such, for example, as the hemstitching of drawn work.

In the employment of my improved construction I form the open-work seam without the employment of piercers, as commonly practiced, especially when operating upon undrawn work, and without giving to the material the hitherto necessary jogging movement substantially transverse to the line of feed for the formation of the overseam stitches and effect a proper and uniform registration of the needles and loop-takers for the formation of each successive lock-stitch without compelling the needles to be given a full or half revolution for properly presenting the loop to the loop-taker, as has been the practice when one or two needles are employed in connection with a single loop-taker, and, further, without a movement of the loop-taker corresponding to the change in vertical alignment of the needle or needles, as is commonly practiced in connection with the vertical operation of one or more needles when operated in two or more vertical alignments for the producing of ornamental seaming, thus avoiding the undesirable features of construction and operation of the means previously recited

as old for producing open or ornamental seaming—such difficulties, for instance, as the employment of piercers to penetrate the material outside of the penetration of the needle, making it impracticable for the needle to enter the previously-made piercer-opening in such manner as to bind in all of the stitches under the respective overseam stitches—and also avoiding such complicated forms of construction as demand a movement of the loop-taker corresponding to the changes in alignment of the vertical action of the needles.

In the accompanying drawings, which form a part of this specification, Figure 1 is a perspective view illustrating my invention with the overhanging arm broken out opposite the pattern-cam. Fig. 2 is a perspective view of the needle-bar yoke-lever and the yoke-lever collar. Fig. 3 is a plan view of the needle-bar and operating-link and a perspective view of the adjusting thumb nut and screw. Fig. 4 is a perspective view of the segment-lever. Fig. 5 is a perspective view of the parts of my compound needle-bar dismembered, the better to show their construction. Fig. 6 is a perspective view of the same parts assembled as in use. Fig. 7 is a diagram illustrating the central track or path of roller of segment-lever in the pattern-cam. Fig. 8 shows a section of single hemstitching, and Fig. 9 shows a section of double hemstitching. Fig. 10 is a plan view illustrating the relation of the needles and needle-holes.

Like parts are designated by similar letters throughout the different views.

In Fig. 1, A represents a portion of the bracket-arm, and B a portion of the bed-plate, of a hemstitch-machine of the well-known Wheeler & Wilson pattern. The operative parts of this machine, including the upper and lower driving-shafts, the take-up-operating cam, the tension devices, and the thread interlocking and feeding mechanism, are not shown, but may be of the usual construction. The vertical action of the needle-bar is of the usual character and accomplished by the usual mechanism; but I impart to the needle-bar an oscillating movement upon its axis while the needles are in the material, and this is an important feature of my invention.

Referring to Fig. 1, the needle-bar, with its needles  $c' c^2$ , operates in conjunction with two loop-taking devices, which in this case are "rotating" hooks (so called)  $d' d^2$ , which revolve upon perpendicular axes, as shown by dotted lines in said Figs. 1 and 10; but any of the well-known loop taking or interlocking devices, such as "rotating" hooks (so called) with horizontal axes, or "revolving," "oscillating," or "vibrating" shuttles, (so called,) may be employed without changing the character of my invention.

My compound needle-bar consists of three parts—a rod C, a portion of whose length is reduced in size, a sleeve C', and a needle-holder C<sup>2</sup>, all constructed as shown in Fig. 5. When in use the reduced portion of the rod is fitted with the sleeve C' and has affixed (by screws or otherwise) at its lower end the needle-holder C<sup>2</sup>, and since when thus assembled the needle-holder becomes a portion of the rod C and they constitute virtually one piece and perform the functions of a needle-bar I will designate them hereinafter as the "needle-bar." The larger end of the rod C is in size identical with the outer diameter of the sleeve C', and the two when joined as described pass through the needle-bar bearings or guideways in the bracket-arm A and the so-called "needle-bar" collar of the sewing-machine and are held within the latter by means of the set-screw  $a'$ , and when so inserted it will be seen that the compound needle-bar will be actuated by the needle-bar-operating mechanism of the machine in the ordinary manner, while the parts which constitute the needle-bar are still free to turn upon their own perpendicular axes.

A groove is formed in the upper end of the needle-bar, as seen at  $s$ , and the bar is surrounded by the yoke F, the hole in which is provided internally with a tongue or key  $f$ , which enters the groove  $s$  in the needle-bar and prevents it from turning except with the yoke, while the perpendicular action of the bar is not thereby impeded. The yoke F rests upon the top of the bracket-arm A and is held from rising by the yoke-cap  $g$ , which surmounts it and is secured to the arm A by screws through its depending angle; but said yoke is not thereby held from turning with the needle-bar C when desired. Of course the groove might be in the collar and the tongue or key on the bar.

The yoke F is extended outward by the insertion of the screw  $h$  or otherwise, which constitutes a lever and has a spherical head, as in Fig. 2, to fit a corresponding socket in the operating-link H to form a ball-and-socket joint between these two members.

The T-shaped segment-lever K is pivotally attached to the bracket-arm A of the sewing-machine, as seen in Fig. 1, and has a stud-roller in its depending end which travels in the groove L of the face cam-wheel P, which cam-wheel I term the "pattern-cam." This

cam is operated by gear-wheels within the bracket-arm A, which connect it with the main driving-shaft of the sewing-machine, and these gears are so proportioned that the pattern-cam will make but one revolution while the main driving-shaft makes three and the machine proper makes three stitches; but as these wheels and the segment-lever K are of the usual construction I need not further describe them.

The operating-link H, whose socket-bearing end embraces the ball upon the yoke-lever F, as stated, is at its other end pivotally and adjustably attached to the upper end of the lever K by means of the nut  $i$  engaging the screw-stem of the slide-block  $i'$ , which is fitted to the undercut groove in the face of the lever K. By this construction it will be seen that as oscillating movement is given to the segment-lever K upon its horizontal axis by the contour of the groove in the pattern-cam P a like oscillating movement will be imparted to the needle-bar by turning it back and forth upon its perpendicular axis and that the extent of such movement may be controlled by setting the pivoted end of link H higher or lower upon the segment-lever K. In order that this oscillating action shall have the desired effect upon the needles, the latter are located in line with the feed movement of the machine; but needle  $c'$  is placed some distance forward—i. e., toward the operator—and needle  $c^2$  the same distance back of the perpendicular axis of the needle-bar C, and when so located it will be seen that if the needle-bar be slightly turned back and forth upon its vertical axis during its perpendicular vibrations the needles will, in addition to their perpendicular action, describe a path which, though a slight arc, will be practically across or at right angles with the movement of the feed.

For a complete understanding of the functions and operation of the needles I will consider them in connection with the diagram Fig. 7, which represents the center of the track traversed by the roller on segment-lever K while making one circuit of the groove in the pattern-cam P. If the machine be now so turned that the roller-center will stand, say, at 1, it will be seen that the contour of the cam is concentric with its axis, and hence that the lever K will remain inoperative while the pattern-cam is progressing from 1 to 2. During this period suppose the needle  $c'$  descends in a perpendicular line, delivers its loop of thread to the loop-taker, and the machine completes one stitch. After the needle has withdrawn from the fabric and before its point has descended to the fabric for the second stitch the pattern-cam advances to 3 and through the action of the lever K and its connecting parts so turns the needle-bar upon its axis as to carry the needle over and cause it to pierce the fabric on a line some distance to the left of its first puncture. After the

needle has penetrated the fabric in the continuation of its descent the advance of the pattern-cam in its progress to 4 sweeps the needle again to the right, restoring it to the path of its first entrance into the fabric and in the same relation to the rotating hook  $d'$  for the delivery of its loop in the formation of the stitch and allows it to rest laterally while rising out of the fabric as the cam progresses from 4 to 5. As the action in the formation of the next stitch is the same as in the last, the description need not be repeated; but during the operation the pattern-cam advances to the starting-point 1 and the cycle is completed. By this action it will be seen that the pattern-cam P causes the needle to puncture the fabric in two distinct lines, making two punctures in the left to each one in the right hand row. As the needle  $c^2$  is located the same distance back that  $c'$  is forward of the pivotal center of the needle-bar, it follows that its lateral movement and the resulting figure of the stitching will be reversed; but being in all other respects identical its action need not be further explained.

The distance which the needles shall be apart is governed by the length of stitch to be taken. For stitches, say, one-sixteenth of an inch apart the needles are placed any multiple thereof from the pivotal center of the needle-bar in order that the punctures of the needle  $c^2$  may match or coincide with those of needle  $c'$ , and, in fact, enter the same apertures for its right-hand row of stitches in which needle  $c'$  has placed its left-hand row of stitches, and thereby further enlarge the apertures.

The lateral movement of the needles across the path of the vertical axial movement of the needle-bar is therefore an important feature of my invention, as the needles are thereby not only brought to correct position for delivering the loop of thread to their respective loop-takers and the missing of stitches avoided, but by this movement while in the fabric the threads of the latter are displaced and forced beneath the overlapping hem, where they are secured and held by the other row of stitches made by the same needle.

From the foregoing it will be understood that my improved construction, as herein described, employs a slight rotation of the needles—first, to enlarge the needle-openings in the material; second, properly to present the loop of the needle-thread to the loop-taker, such mode of operation insuring that all of the threads will be bound under their respective overseam stitches, and, third, such form of construction and mode of operation simplify the elements of construction and insure a better and more desirable production.

If but one needle is used, the production will be as illustrated in Fig. 8, while if both are employed the result appears as in Fig. 9; but in either case the apertures are slightly free from extraneous threads and the produc-

tion is the nearest approach to handwork (in which threads are previously withdrawn by hand) which to my knowledge has been produced.

What I claim is—

1. In a sewing-machine for open-seam work, a stitch-forming mechanism, including a needle-carrying bar provided with two eye-pointed needles having movements in the arc of a circle about the vertical axis of the needle-bar as a center, and complementary loop-taking mechanism therefor, in combination with means to cause the needles to penetrate the material in one vertical plane, and to be withdrawn in a different vertical plane, with respect to the plane of the material, substantially as described.

2. In a sewing-machine for open-seam work, a stitch-forming mechanism having a vertically-reciprocated needle-bar, provided with two eye-pointed needles, a pattern-cam, and connections interposed between said needle-bar and cam whereby the needles are caused to penetrate the material in one vertical plane and are then moved about the vertical axis of the needle-bar and withdrawn in a different vertical plane with respect to the plane of the material, and means to change the degree of such movement about the vertical axis of the needle-bar, substantially as described.

3. In a sewing-machine for open-seam work, the combination of vertically-mounted rotary loop-takers, with a vertically-reciprocated needle-bar, provided with two eye-pointed needles, a pattern-cam, and connections interposed between said needle-bar and cam whereby the needles are caused to penetrate the material in one vertical plane and are then moved about the vertical axis of the needle-bar and withdrawn in a different vertical plane with respect to the plane of the material, and means to change the degree of such movement about the vertical axis of the needle-bar, substantially as described.

4. In a sewing-machine for open-seam work, a reciprocating needle-bar, provided with two eye-pointed needles, means to impart to said needles vibratory movements in the arc of a circle during the formation of a stitch, and complementary stitch-forming mechanism, said needle-bar comprising a main portion reduced at one end and provided with a loose sleeve upon such reduced portion to be engaged by a reciprocating medium, a needle-holder fixed to said reduced portion, and a portion to be engaged by said vibrating means, substantially as described.

5. In a sewing-machine for open-seam work, a reciprocating needle-bar, a loose sleeve thereon, a needle-holder fixed to said needle-bar and carrying two eye-pointed needles, and complementary stitch-forming mechanism, in combination with a pattern-cam, and an adjustably-connected operating-link interposed between the needle-bar and cam for moving the needles about the vertical axis of

the needle-bar after they have penetrated the material, and causing their withdrawal from the material in a different vertical plane from that by which they entered it, and for controlling the degree of such movement of the  
5 needles about the vertical axis of the needle-bar, substantially as described.

In testimony whereof I have hereunto set my hand this 25th day of August, A. D. 1899.

CHARLES MACKENZIE ABERCROMBIE.

Witnesses:

E. A. FINCKEL,

W. B. ACKER.