

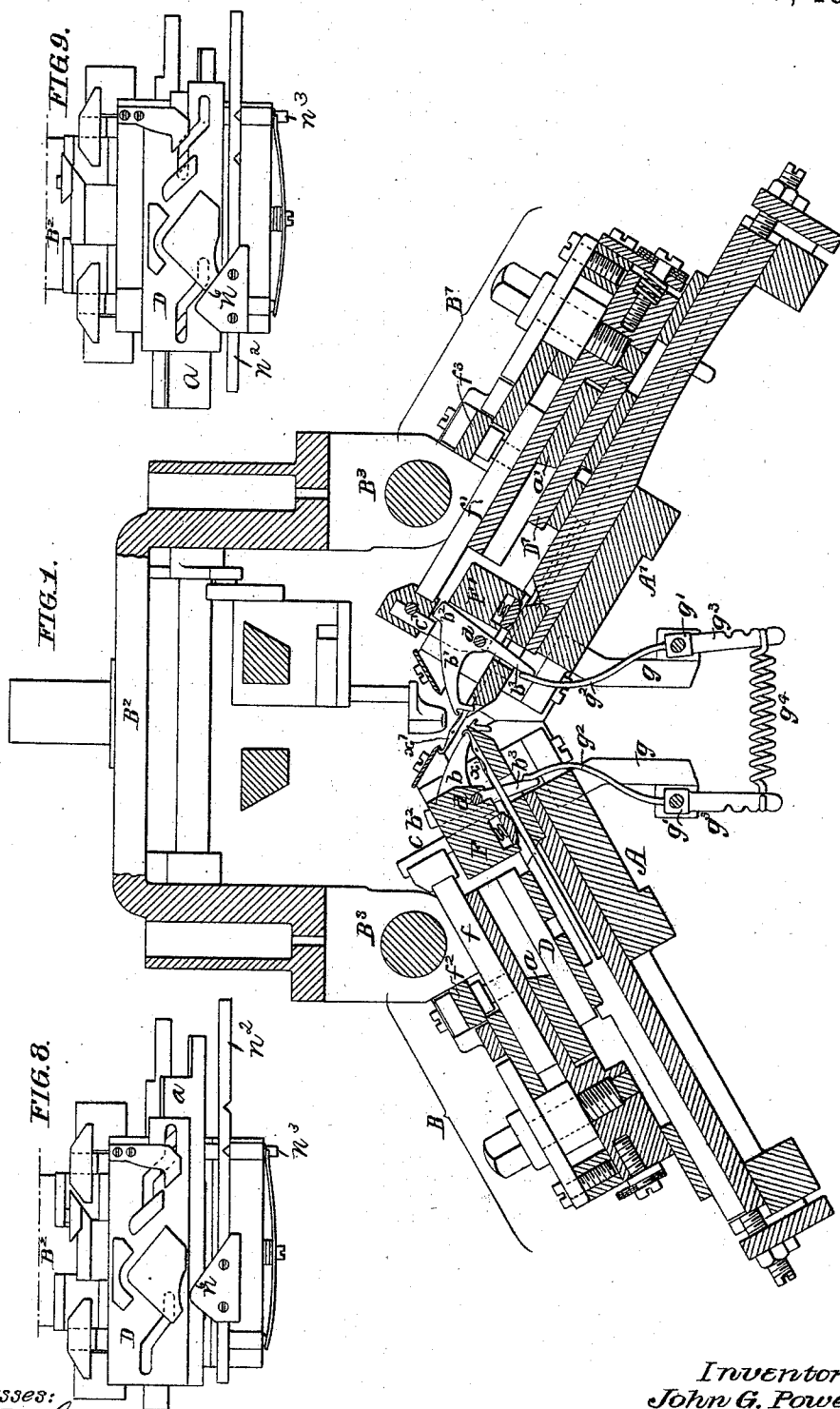
(No Model.)

3 Sheets—Sheet 1.

J. G. POWELL.
KNITTING MACHINE.

No. 570,335.

Patented Oct. 27, 1896.



Witnesses:

F. D. Goodwin
Hamilton S. Turner

Inventor:
John G. Powell
by his Attorneys

Howell & Howson

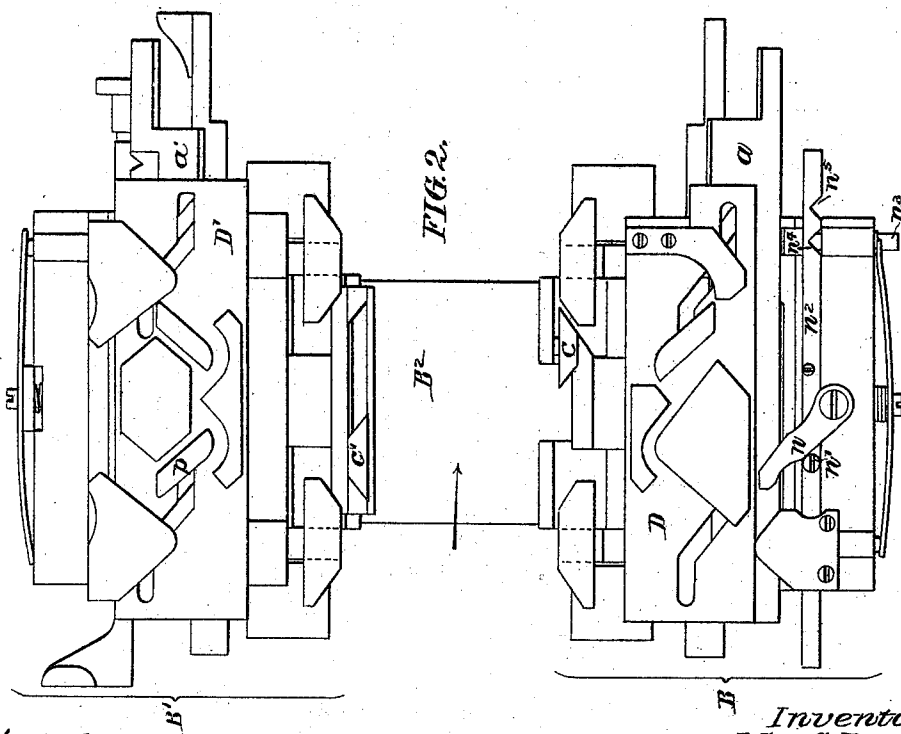
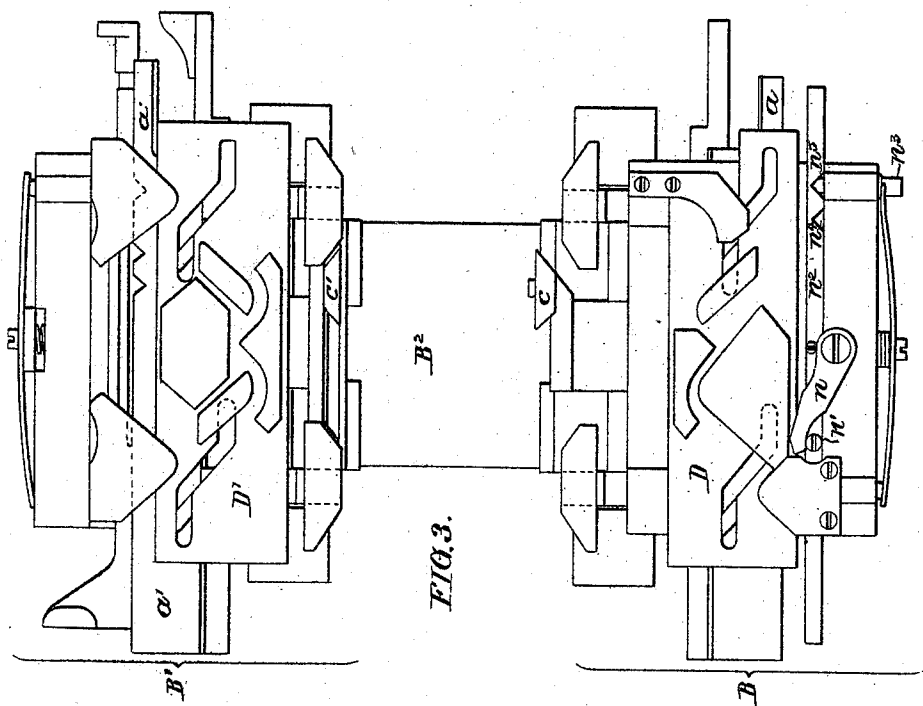
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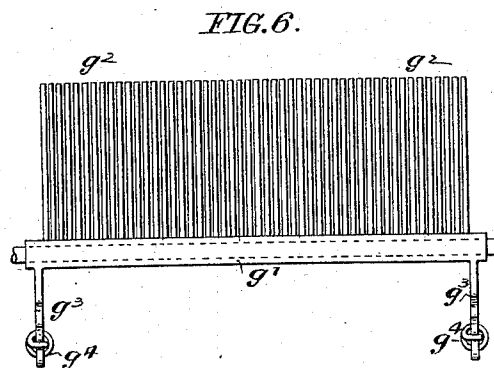
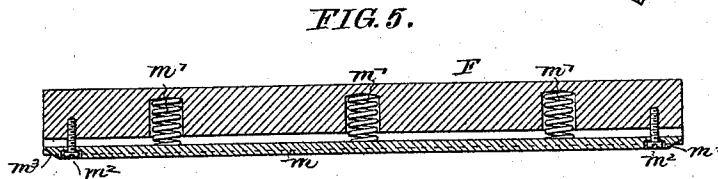
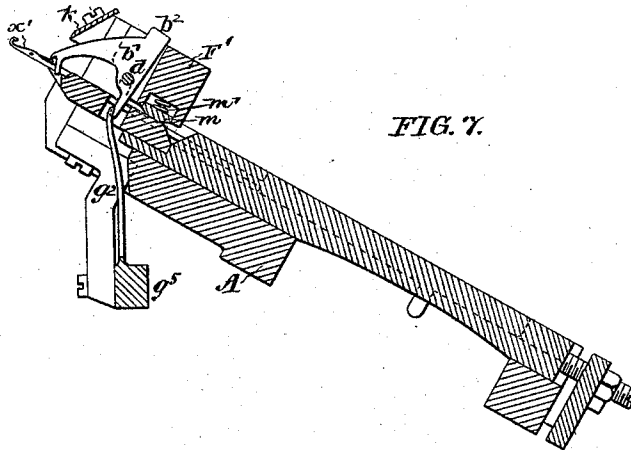
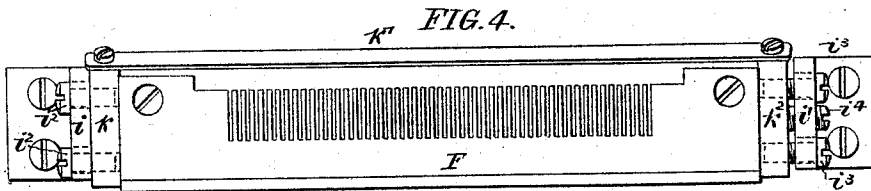
(No Model.)

3 Sheets—Sheet 3.

J. G. POWELL.
KNITTING MACHINE.

No. 570,335.

Patented Oct. 27, 1896.



Witnesses:
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Hamilton D. Turner

Inventor:
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UNITED STATES PATENT OFFICE.

JOHN G. POWELL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO EDWARD POWELL, OF SAME PLACE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 570,335, dated October 27, 1896.

Application filed September 24, 1894. Serial No. 523,935. (No model.)

To all whom it may concern:

Be it known that I, JOHN G. POWELL, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Knitting-Machines, of which the following is a specification.

My invention consists of certain improvements in the knitting-machine forming the subject of Letters Patent No. 440,389, dated November 11, 1890, and also of my Letters Patent No. 510,934, dated December 19, 1893, the objects of my present improvements being, first, to so construct the spring mechanism for operating the web-holders that the machine can be made of a finer gage than was possible with the former construction; secondly, to provide the machine with an efficient needle-guard and latch-opener which, while very thin, can yet readily be maintained in a condition of perfect rigidity; thirdly, to provide yielding means for retaining the needles in the needle-grooves, and, fourthly, to insure a positive outward movement of the needles of the inactive half of the machine at the point where the stitches are being drawn on the other half of the machine in forming the first knitting-course after the formation of the "setting-up" course. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a transverse section of sufficient of a knitting-machine of the character specified to illustrate my present invention. Fig. 2 is a view of the under side of the traveling yoke of the machine and of the cam-plates and cams carried thereby. Fig. 3 is a similar view, but showing the cams in different positions from those represented in Fig. 2. Fig. 4 is a view of part of the needle-bed of the machine, showing the needle-guard and latch-turner and its adjunctive devices. Fig. 5 is a longitudinal section of part of the machine, showing the yielding needle-retainer. Fig. 6 is a front view of one of the spring mechanisms for acting on the web-holders. Fig. 7 is a transverse section illustrating a modified form of spring mechanism

for the purpose, and Figs. 8 and 9 are views illustrating a modification of certain parts of the cam mechanism.

In Fig. 1, A A' represent the opposite inclined needle-beds of the machine, and B B' the opposite cam-slides, which are connected by a yoke B², suitably guided on longitudinal bars B³ and receiving a reciprocating motion from mechanism at one end of the machine, as usual.

The needle-bed A has grooves for the reception and guidance of needles *x*, and the needle-bed A' is provided with similar grooves for the reception and guidance of needles *x'*, the reciprocating movement to effect the knitting being imparted to the needles *x* by means of cams carried by a laterally-moving cam-plate D on the carriage B, a similar plate D' on the carriage B' having the cams for imparting the knitting movement to the needles *x'*.

The cam-plates D D' are under control of longitudinally-movable cam-bars *a a'*, respectively, which in the operation of the machine are struck first upon one end and then upon the other end by suitable stops, so that during the movement of the cam-slides B B' in one direction the cams of one slide will be depressed, as shown at the right-hand side of Fig. 1, so as to act upon the bits of the needles of one bed, while the cams of the other cam-slides will be raised, as shown at the left-hand side of Fig. 1, so as to fail to act upon the needles of the other bed, the position of the cams being reversed on the backward movement of the cam-slides, if tubular work is being produced, so as to form stitches first upon the needles of one bed and then upon the needles of the other bed, the needles of one bed remaining permanently out of action, however, while the heel or toe pocket is being formed upon the needles of the other bed.

The web-holders *b b'* consist of levers hung to a longitudinal rod or bar *d* upon each of the needle-beds, these web-holders having projecting tongues *b²*, which are acted upon by cams *c c'*, respectively, to raise the web-

holders, springs being relied upon to lower the web-holders when their tongues are released from the control of said cams $c\ c'$.

The cams $c\ c'$ are carried by laterally-movable cam-slides $f\ f'$, having cam-slots which are engaged by pins upon longitudinally-movable bars f^2 and f^3 , respectively, these bars being reciprocated by contact with suitable stops at the ends of the machine, so that either slide and its cams may be projected, as shown at the right-hand side of Fig. 1, to cause said cams to act upon the web-holders, or they may be retracted, as shown at the left-hand side of said Fig. 1, when it is not desired to operate the web-holders. This is fully set forth in my Patent No. 510,934, before referred to, the object being to render inoperative the web-holders on that side of the machine on which the needles are inoperative, so that they will not interfere with the proper projection of the operative needles upon the other side of the machine.

So far as described the machine possesses no feature of novelty as compared with the machines of prior patents, Nos. 440,389 and 510,934; but in the previous machines spiral springs were employed to act upon the web-holders $b\ b'$ in order to depress the same when their tongues were relieved from the influence of the cams $c\ c'$, and in machines of fine gage it has been found that there is not enough room for such spiral springs. Hence in the present machine I have discarded the same and have formed upon each web-holder a projecting tongue b^3 , extending downward through a slot in the needle-bed, and beneath each needle-bed I have hung in a bracket g a bar g' , having a series of upwardly-projecting spring-fingers g^2 , one for each web-holder, each bar having also, by preference, at each end a depending arm g^3 , notched for the reception of the end loop of a coiled spring g^4 , whereby the arms of the opposite bars g' are connected, each of the said arms having a series of notches for the reception of the loops of the spring, in order that the latter may be adjusted to different distances from the axis of the bar for the purpose of varying the tension upon the spring g^2 . While the spring g^4 , therefore, determines the general tension of the fingers g^2 , each of the latter is free to yield independently, if necessary, the general tension upon each set of web-holders, however, being the same, so that no greater pressure will be brought to bear upon the loops of one part of the web than upon those of another part of the same.

While the construction of swinging bars and connecting-springs is preferred for this reason, the essential feature of this part of my invention may be embodied in a construction in which the bar carrying the spring-fingers g^2 is rigid, such rigid bar being represented at g^5 in Fig. 7.

At the opposite ends of the grooved portion

of each needle-bed are lugs or projections $i\ i'$, and to the lug i is secured, by means of set-screws i^2 , a block k , to which is secured one end of the plate k' , which serves as a needle-guard and latch-turner, the other end of said plate being secured to a block k^2 , having threaded openings for the reception of the stems of a set-screw i^3 , the heads of which bear upon the lug i' , a third set-screw i^4 being adapted to a threaded opening in said lug i and bearing upon the block k^2 .

The bar k' consists of a thin strip of sheet-steel or other available sheet metal which can be subjected to any desired degree of tension by slackening the set-screw i^4 and tightening the set-screws i^3 , so as to draw the block k^2 away from the block k , the parts being locked in position after adjustment by again tightening the set-screw i^4 . By this means the thin bar k' can be subjected to such tension as to render it perfectly rigid longitudinally, and it can be adjusted very closely to the advancing hooks of the needles, as shown in Fig. 1, without liability to sag or buckle, so as to strike the hooks.

The openings in the lugs $i\ i'$, through which the set-screws i^2 and i^3 pass, are elongated, as shown by dotted lines in Fig. 4, so as to permit of the adjustment of the bar k' in respect to the needles as desired.

Each of the bars $F\ F'$, carrying the web-holders $b\ b'$, is recessed on the inner side for the reception of a bar m , which bears upon the needle-bed and covers the needle-grooves therein, so as to prevent accidental rise of the needles from said grooves, the bar m , however, having a yielding backing provided by means of springs m' , let into recesses in the bar F or F' , so that said bar m can yield when either needle is lifted intentionally from its groove by the application of sufficient pressure thereto.

To prevent the escape of the bar m and springs m' from the bar F or F' when the latter is removed from the needle-bed, retaining-screws m^2 are provided at each end of the bar, as shown in Fig. 5, these screws offering no resistance to the upward movement of the bar m . Each end of the bar m is beveled, as shown at m^3 , so that the bar can be lifted bodily when desired by the projection of suitable wedges beneath the ends of the same.

In machines of the class to which my invention relates it is usual, as before stated, to set up the work by forming stitches upon both sets of needles and after this setting-up course is formed to retire from action the needles at one side of the machine and proceed with the formation of the toe-pocket upon the needles at the other side of the machine. For instance, in the machine shown in the drawings it may be supposed that the formation of the first course of the toe-pocket is being effected upon the needles of the head A' , the needles of the head A being out of action. In this case, however, it is advisable to impart a slight

lift to the needles of the head A at a point opposite that at which the needles of the head A' are drawing the stitch, so as to slacken the tension upon the setting-up stitches held upon the needles of the head A when they are subjected to the strain caused by the draft of the opposite needles, thus avoiding the cutting or breaking of said setting-up stitches by undue strain upon them. This object I accomplish by means of a special cam n , (shown in Figs. 2 and 3,) this cam being hung to the carriage B and being acted upon by a pin n' upon a slide n^2 , which, upon the completion of the setting-up course, is struck by a suitable stop at the end of the machine and moved to the position shown in Fig. 2, so as to raise the cam n , the bar n^2 being retained in this position by the engagement of a spring-bolt n^3 with a notch n^4 in said bar.

As the cam-carriage moves in the direction of the arrow, Fig. 2, the bits of the needles of the head A will be acted upon by said cam n and the needles will be slightly projected at the same time that the needles of the head A' are being retracted by the draw-down cam p of the cam-carriage B', it being understood that at this time the needle-operating cams of the carriage B are raised, so as to be inoperative, as shown in Fig. 2. When the yoke B² with its cam-carriage reaches the end of its travel in the direction of the arrow, Fig. 2, however, the ends of the slide-bars a and n^2 are struck by a suitable stop at the end of the machine and are moved to the position shown in Fig. 3, so as to move the cam-slide D into operative position and at the same time permit of the depression of the cam n , so that it will be out of the way of the cams of said bar, the bar n^2 being retained in the position shown in Fig. 3 by engagement of the spring-bolt n^3 with a notch n^5 in said bar. By hanging the cam n to the carriage B and providing a pin upon the bar n^2 to act upon said cam I am enabled to provide for a quick projection or retraction of the cam and for giving said cam any desired amount of projection by simply varying the position of the pin n' upon the bar n^2 . My invention, however, is not limited to this method of construction of the cam n . For instance, in Figs. 8 and 9 I have shown a modified construction in which a cam n^6 , which takes the place of the cam n , is carried directly by the bar n^2 , said cam n^6 being moved to the position shown in Fig. 8, when the cam-slide D is moved to the inoperative position and to the position shown in Fig. 9, when said slide is drawn down to operative position, so that in the latter case it is out of the way of the cams of said slide.

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

1. The combination of the slotted needle-beds and their needles, with the web-holders having tongues projecting through the slotted needle-bed, cams for moving the web-

holders in one direction and spring-fingers located beneath the needle-bed and acting upon said tongues on the web-holders for moving them in the opposite direction, substantially as specified.

2. The combination of the slotted needle-beds and their needles, web-holders having tongues projecting through the slotted needle-bed, cams for acting upon said web-holders to move them in one direction, a bar having a series of spring-fingers for acting upon said tongues on the web-holders to move them in the opposite direction, and means for mounting said bar beneath the needle-bed, substantially as specified.

3. The combination of the slotted needle-beds and their needles, the web-holders having tongues projecting through the slotted needle-beds, cams acting on said web-holders to move them in one direction, rock-bars having spring-fingers acting upon said tongues on the web-holders to move them in the opposite direction, arms on said rock-bars, and springs connecting the arms of the opposite bars, substantially as specified.

4. The combination of the needle-bed and its needles, with a needle-guard and latch-turner consisting of a thin strip of sheet metal having a sharpened edge and placed flatwise above the needles and opposing the sharpened edge to the advancing latches, and means for imparting longitudinal tension to said strip, substantially as specified.

5. The combination of the needle-bed and its needles, with the needle-guard and latch-turner consisting of a strip of thin sheet metal, blocks carrying the same, and adjusting means for one of said blocks comprising adjusting-screws and locking-screws substantially as specified.

6. The combination of the needle-bed and its needles, the detachable web-holder bar, the needle-retainer bar carried thereby, springs for pressing said needle-retainer bar downward and set-screws for limiting said downward movement and preventing the detaching of the retainer-bar from its carrier, substantially as specified.

7. The combination of the needle-bed and its needles, with the spring-pressed retainer-bar extending over the needle-bed and serving to retain the needles in the grooves thereof, said bar having beveled ends, substantially as specified.

8. The combination of the cam-carriages having movable slides with knitting-cams thereon, with a supplementary cam on one of said cam-carriages movable into operative position when the knitting-cams of said slide are inoperative, and out of operative position when said knitting-cams are moved into action, said supplementary cam serving to slightly raise the needles when their stitches are subjected to the draft of the needles of the opposite bed.

9. The combination of the opposite needle-beds and their needles, the opposite cam-car-

riages having movable slides carrying the
knitting-cams, a supplementary needle-op-
erating cam pivoted to one of the cam-car-
riages, and a slide-bar having a pin for acting
5 upon said cam to move it into operative po-
sition or permit it to be moved out of oper-
ative position, substantially as specified.

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

JOHN G. POWELL.

Witnesses:

FRANK E. BECHTOLD,

JOSEPH H. KLEIN.