

J. & J. SMITH.  
Knitting-Machines.

No. 140,086.

Patented June 17, 1873.

FIG.1.

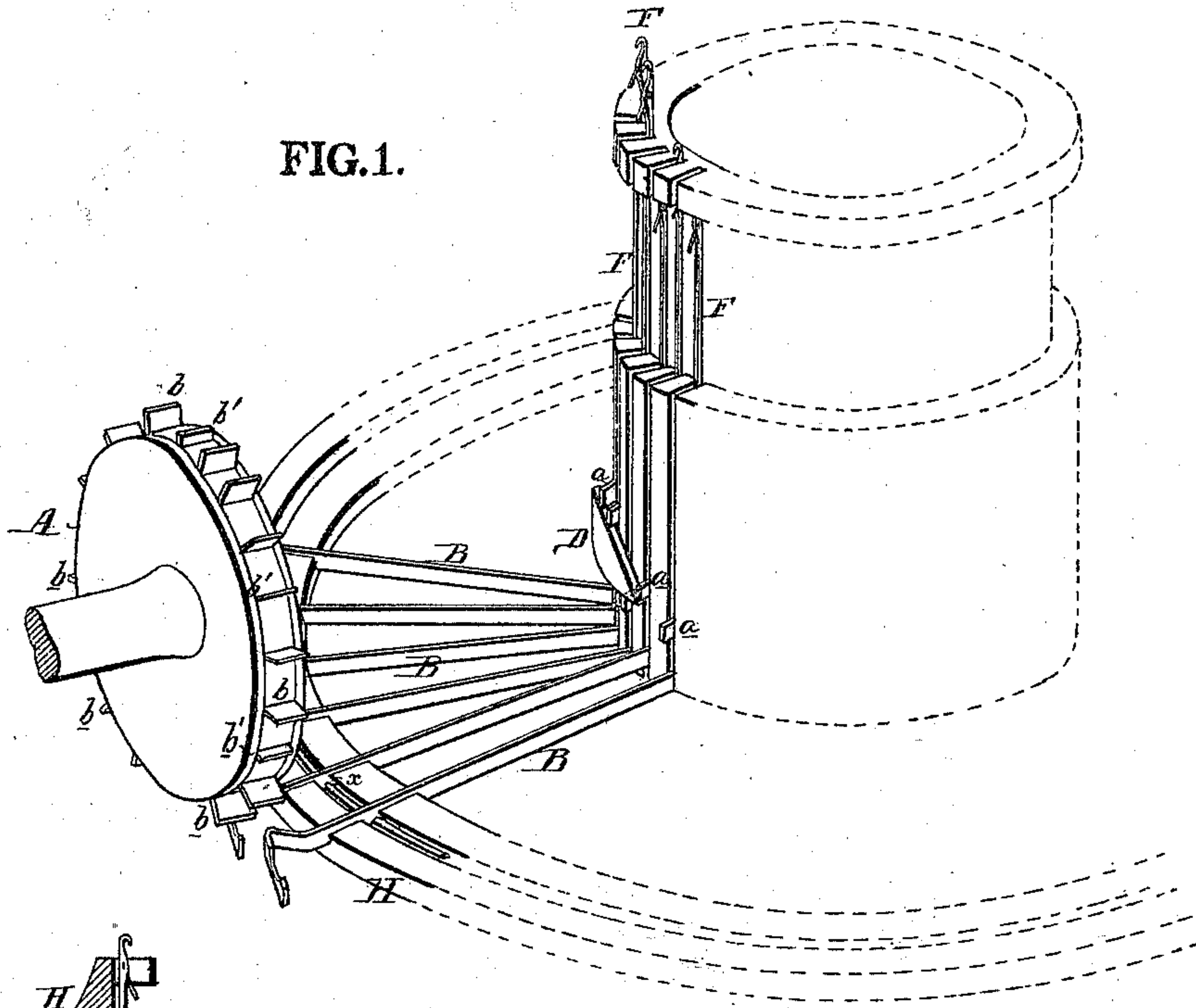


FIG.3.

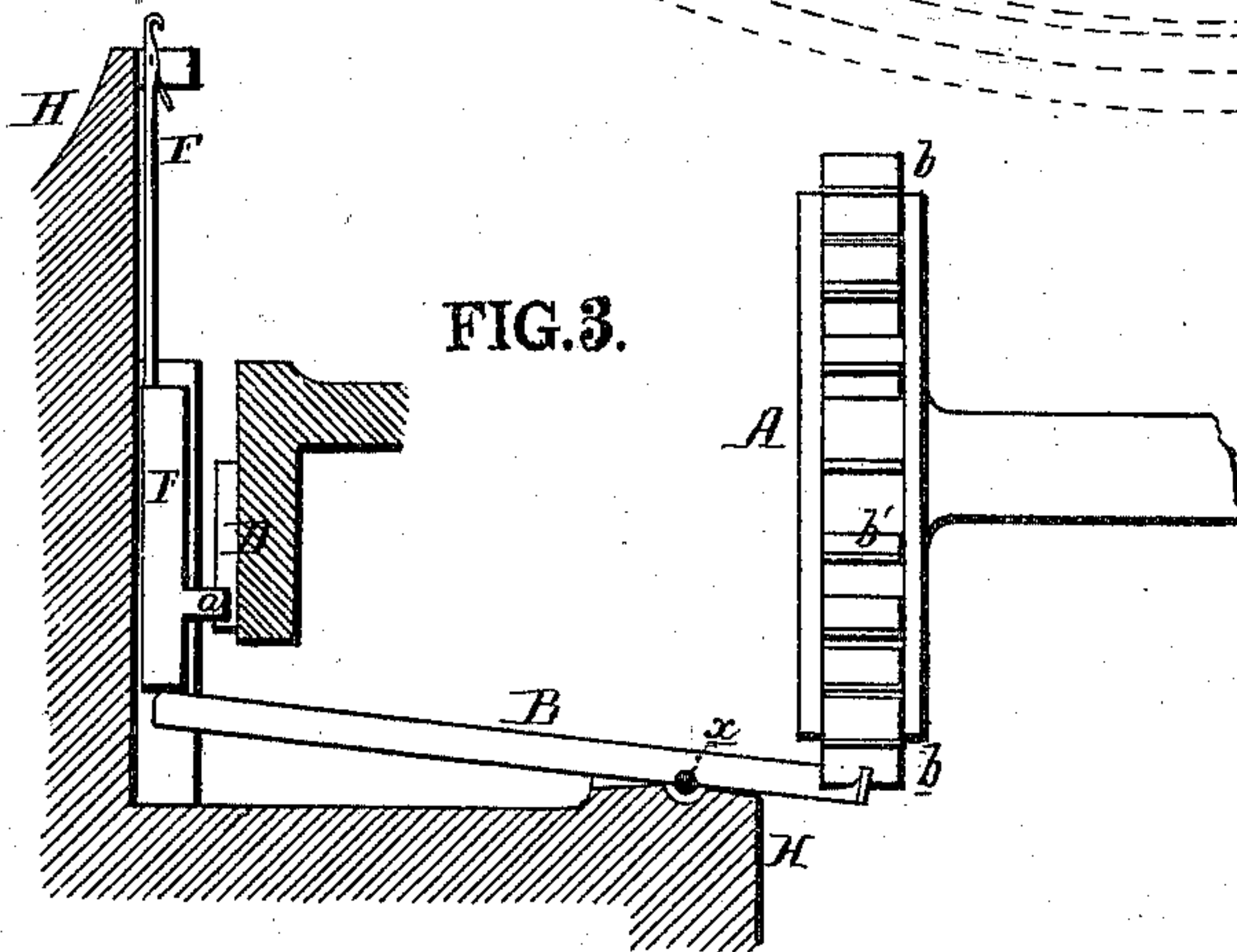
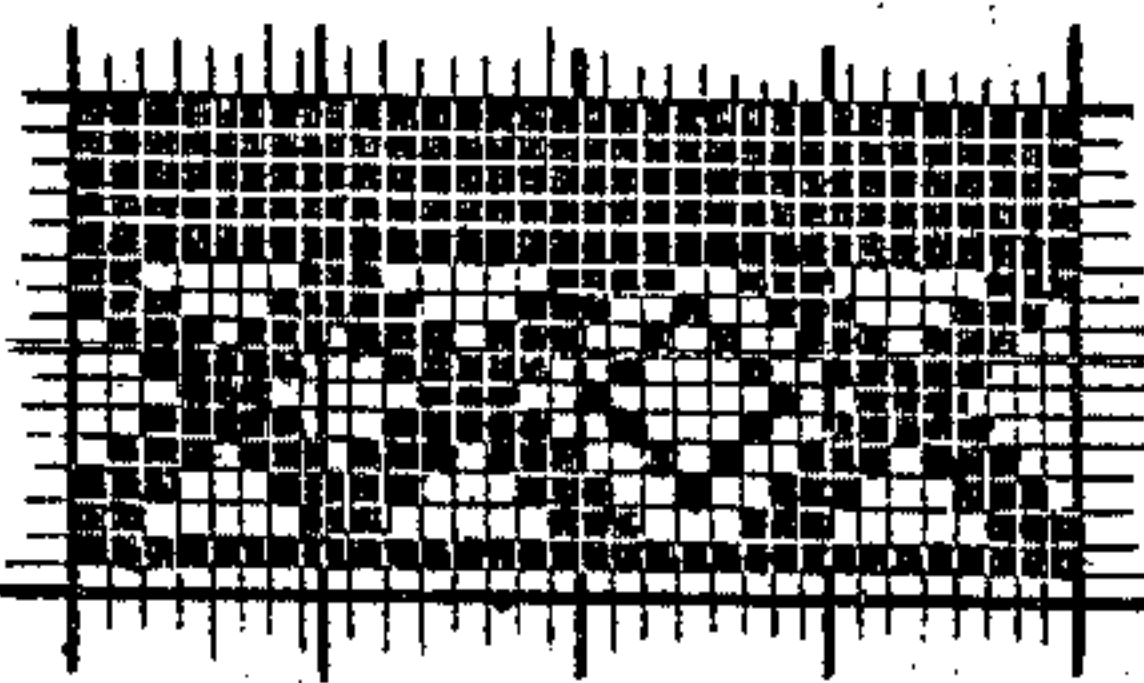


FIG.2.



Witnesses,  
Harry Smith  
Thomas W. Swain

John Smith, and  
Joseph Smith  
by their Atty.  
Howson and Son.



# UNITED STATES PATENT OFFICE.

JOHN SMITH AND JOSEPH SMITH, OF PHILADELPHIA, PENNSYLVANIA,  
ASSIGNORS TO CONYERS BUTTON, OF SAME PLACE.

## IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. 140,086, dated June 17, 1873; application filed  
November 29, 1872.

*To all whom it may concern:*

Be it known that we, JOHN SMITH and JOSEPH SMITH, both of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Knitting-Machines, of which the following is a specification:

The object of our invention is to produce upon a circular-knitting machine fabrics of a much more intricate and elaborate pattern than can ordinarily be produced, and we accomplish this object in the manner plainly shown in the perspective view, Figure 1, of the accompanying drawing, by so combining a series of pattern-wheels, A, and a series of levers, B, with the fixed cams D and needles F of a circular-knitting machine, that the levers, which support the needles, and are operated by the pattern-wheels, in passing beneath the latter, shall either raise the projections *a* of their respective needles sufficiently to bring them within the influence of the cams, or permit them to pass beneath the cams and remain inoperative, according as the said levers are struck and raised by the long pins *b* of the pattern-wheels, or by the short pins *b'* of the same; the effect in the fabric, when the needle is raised and afterward lifted by the cam, being to form a new loop of thread, and to cause a pressed-off loop to appear upon the face of the fabric, while, when the needle remains depressed, no new loop is formed, but the thread is merely carried across the back of, without appearing upon the face of, the fabric.

In ordinary large circular-knitting machines this carrying of some of the threads to the back of the fabric, by causing some of the needles to remain depressed on passing a cam, and of bringing other of the threads to the face of the fabric, is produced by cutting or shortening the projections *a* of some of the needles, and by cutting away a portion of some of the cams, so that while needles, whose projections *a* are of full length, will be lifted by all of the cams, the cut needles will remain depressed on passing a cut cam, but will be raised by an ordinary cam.

The objections to this plan are that very little variety of pattern can be produced, as the cut needles must remain depressed on

passing every cut cam, while some of the needles must be removed and replaced by others, and the cams readjusted whenever it is desired to adapt the machine for the production of a different pattern.

These objections are entirely overcome in our improved machine, in which no change whatever is required in either the cams or needles, and the latter can be permitted to remain depressed either singly or in groups, or sometimes singly and sometimes in groups, on passing the cams either once or any desired number of times during a single revolution of the machine. In other words, the needles are entirely under the control of the pattern-wheels, of which there is one for every cam, so that various ornamental patterns, such, for instance, as that represented in Fig. 2, can be produced, and by adjusting the pins *b* and *b'* of the said pattern-wheels any required number of changes can be effected, to accord with the character of the pattern to be produced.

In the sectional view, Fig. 3, the action of the pattern-wheels upon the levers, and of the latter upon the needles, is clearly illustrated. The levers which rotate with the needles have their fulcrums at *x*, upon the movable portion H of the machine, and the pattern-wheels, which must remain opposite their respective cams, are hung to the fixed part of the machine, and are turned intermittently by the levers which pass beneath them.

We claim as our invention—

A rotary-knitting machine, having vertical needles with projections *a*, and fixed cams D, in combination with the radial levers B extending beneath but independent of the needles, and pattern-wheels A operating upon the levers so as to throw the needles into or out of action with the cams, as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN SMITH.  
JOSEPH SMITH.

Witnesses:

M. L. FINCKEL.  
GEORGE W. BECK.