(No Model.)

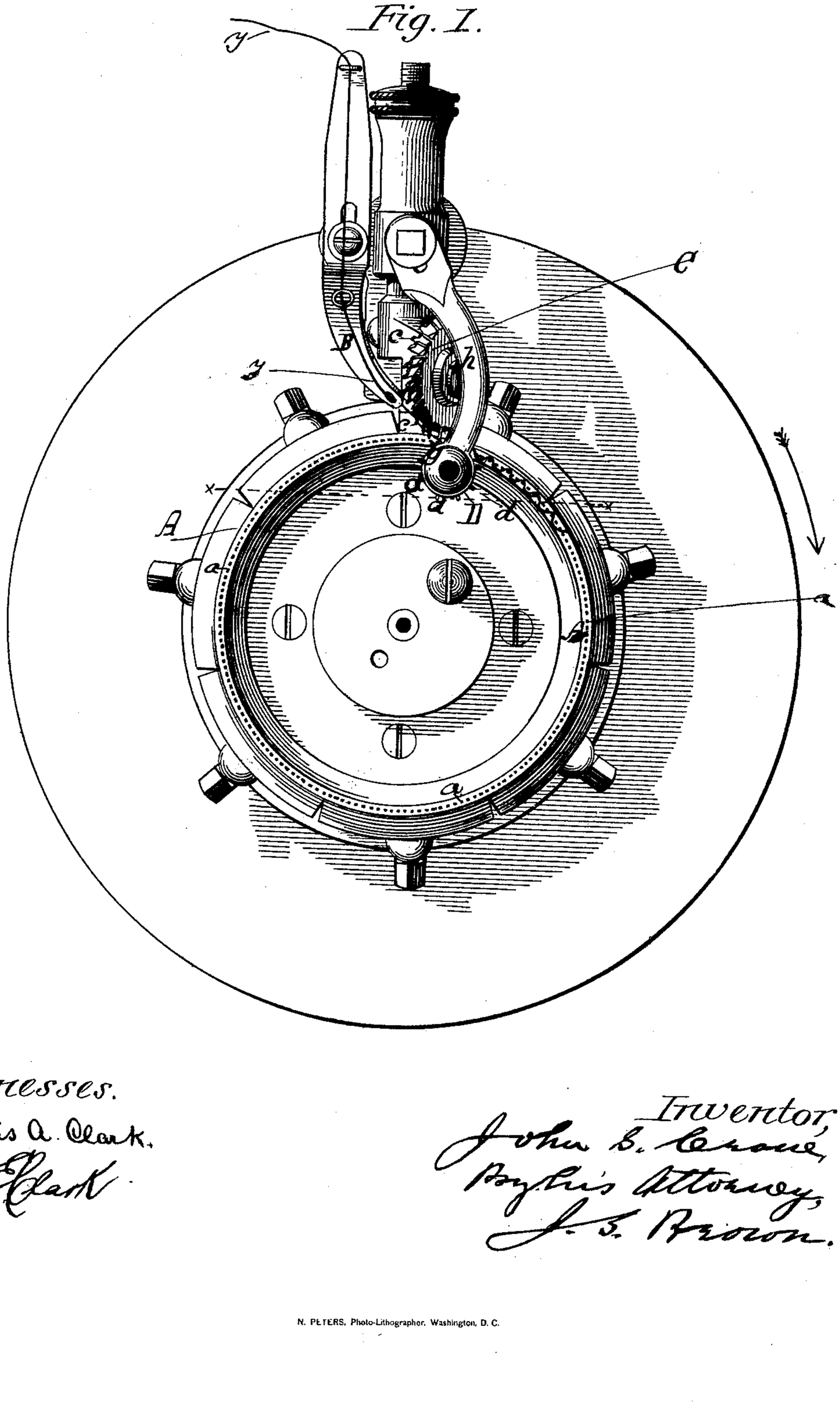
2 Sheets—Sheet 1.

J. S. CRANE.

KNITTING MACHINE.

No. 410,495. Patented Sept. 3, 1889.

Fig. 1.



Witnesses.
Norris A. Clark.
J. Clark

Inventor,
John S. Crane,
By his Attorney,
J. S. Brown.

(No Model.)

2 Sheets—Sheet 2.

J. S. CRANE.

KNITTING MACHINE.

No. 410,495. Patented Sept. 3, 1889.

Fig. 2.

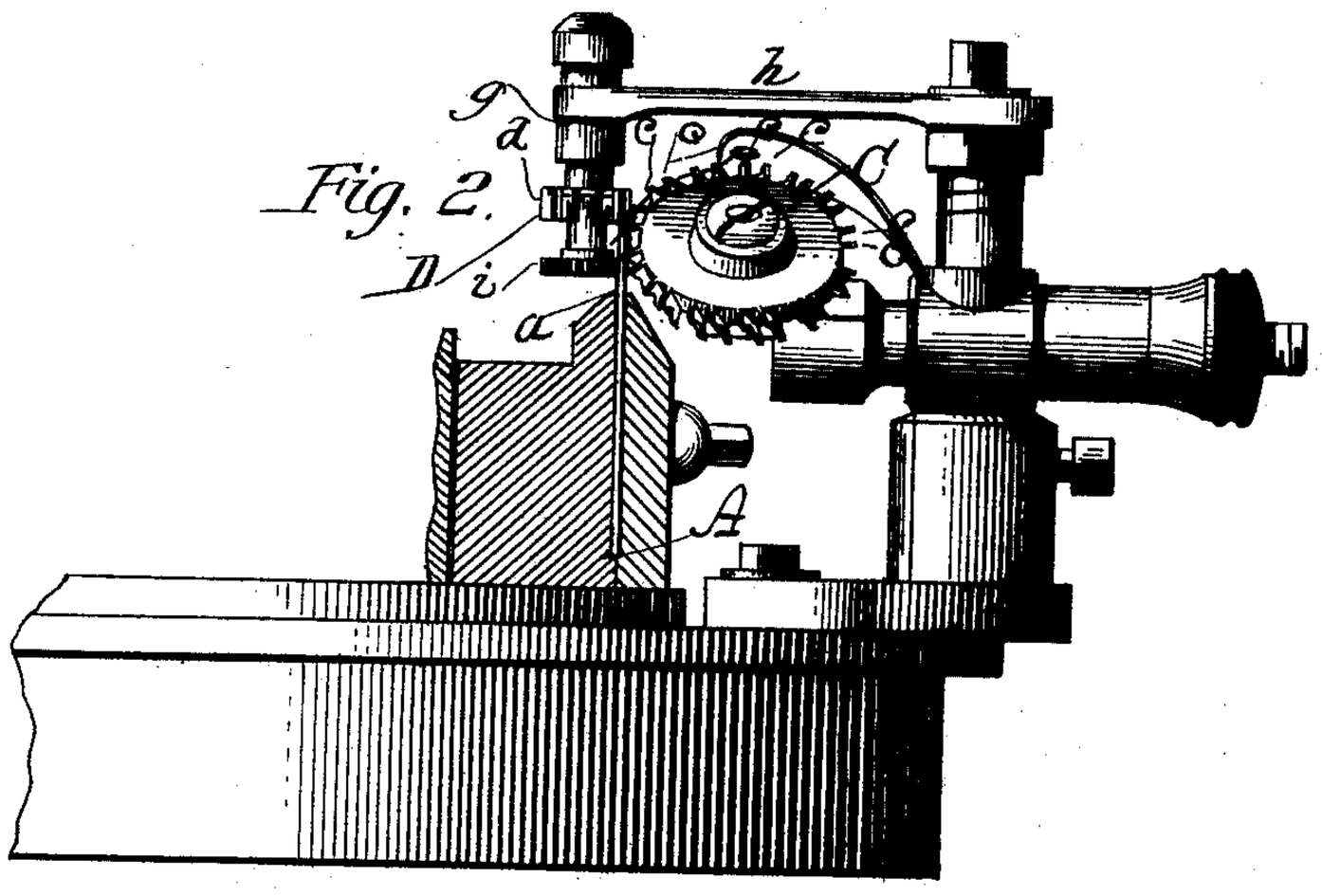


Fig. 3.

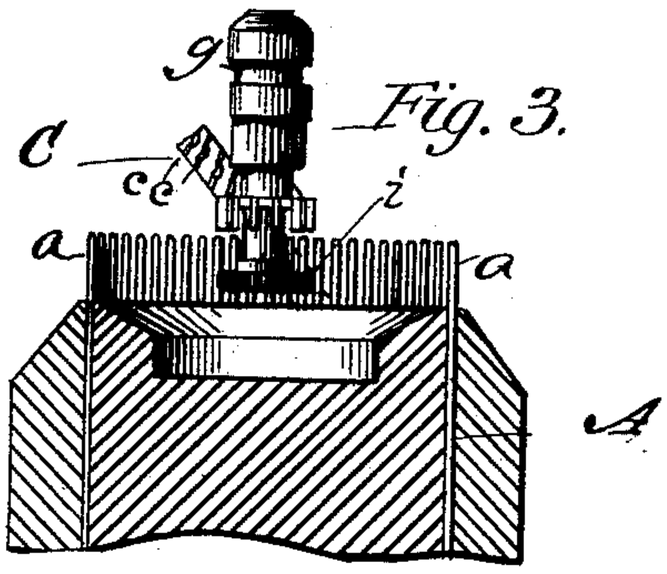
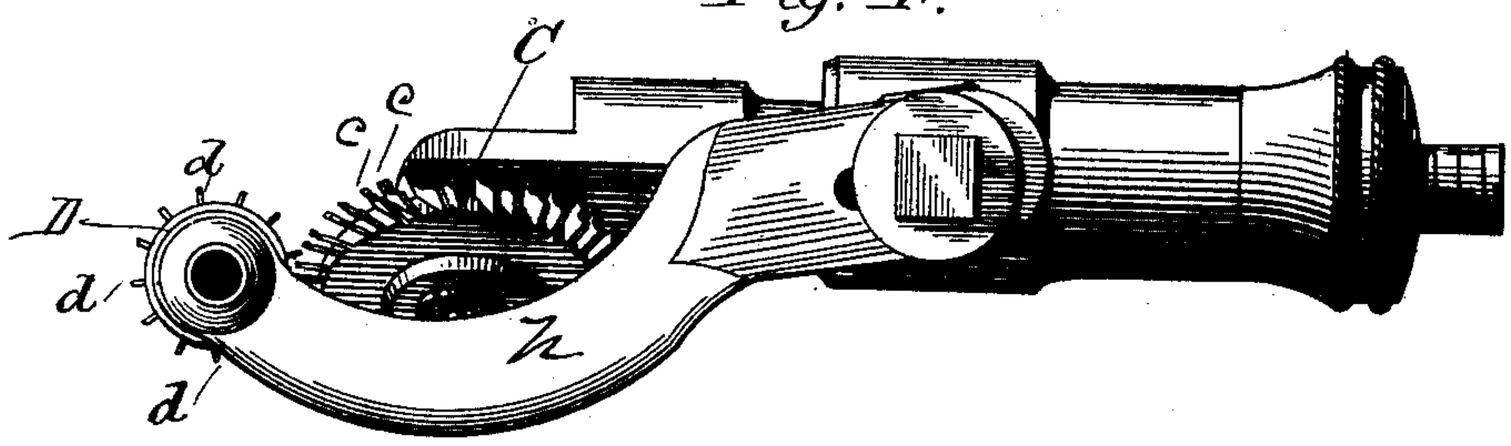


Fig. 4.



Witnesses.

Norris A. Clark.

O. E. Clark

Inventor,
John S. Crane,
By his attorneys,
A. S. Brown.

UNITED STATES PATENT OFFICE.

JOHN S. CRANE, OF LAKE VILLAGE, NEW HAMPSHIRE, ASSIGNOR TO J. S. CRANE & CO., OF SAME PLACE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 410,495, dated September 3, 1889.

Application filed January 25, 1887. Serial No. 225,454. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. CRANE, a citizen of the United States, residing in Lake Village, in the county of Belknap and State of New Hampshire, have invented an Improvement in Knitting-Machines; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, making part of this specification.

My improvement belongs to the class of knitting-machines in which a weft-thread is introduced into the knit fabric—as, for instance, when a plush-surface is to be formed on one side of the knit articles. In such work the weft-thread is ordinarily passed inside of two, three, or four needles, then outside of a single needle, then inside of the same number of needles again, then outside of another single needle, and thus on alternately around or across the whole web. The effect is to present most of the thread on the inside of the fabric where the plush is to be formed and to show very little of the thread on the outside of the fabric. In thus inserting the thread alternately outside and inside of the set of needles usually either the needles inside of which the thread is to be introduced are pressed outward beyond the general line of the needles, or the needles outside of which the thread is to be laid are pressed inward beyond the general line of the needles, or both ways together are employed.

The purpose of my invention is to avoid the springing of the needles and the consequent breakage which frequently results from the repeated bending of the needles in thus introducing the weft-thread.

My invention consists in a wing-wheel located on one side of the set of needles of a knitting-machine having a set of wings projecting from its periphery immediately over the needles which are to receive the weft-thread on the side opposite to the said wheel and having a positive revolving motion in unison with the needle-cylinder, so as always to have its wings in constant relative position to the same needles operating in connection with a weft-thread feeding-in wheel or burr situated on the other side of the set of needles from the said winged wheel, which feed-wheel lays the thread over the opposite side of the needles not covered or guarded by the wings of the wing-wheel.

In the accompanying drawings, Figure 1 represents a top view of a circular spring-needle knitting-machine with my improved weft-thread device applied thereto, the usual knitting appliances, except the needles, being removed, in order to show more clearly my invention; Fig. 2, a vertical radial section of one side of the knitting-cylinder and side elevation of my weft-thread device in position thereon; Fig. 3, an inside partial view, in vertical section, of the same, as in a plane designated by the line *x x*, Fig. 1; Fig. 4, a top view of the device.

Like letters designate corresponding parts in all of the figures.

The drawings show the revolving cylinder A of a circular-knitting machine provided with a set *a a* of spring-needles; B, a thread-guide for the weft-thread *y;* C, a feeding-in wheel or burr for this said weft-thread, and D my wing-wheel, operating in connection with the said feeding-in wheel or burr. The feeding-in wheel or burr C, being set in an oblique position and having a set of oblique feed-plates *c c*, notched in their outer edges to receive and hold the thread until it is laid around the proper needles at the proper depth between the same, has these plates arranged in pairs or groups, the plates of each pair or group being severally at the proper distance apart to embrace a single needle *a* in the space between each two plates, and between the adjacent pairs or groups of plates there is a space wide enough to receive one wing of the wing-wheel D, thereby causing the burr and wing-wheel to mesh with each other and to skip one intermeshing of the burr with the needles. The pairs or groups of plates thus embracing single needles in their intermediate spaces cause the feeding-in wheel or burr to be regularly and uniformly rotated by the revolution of the needle-cylinder. This feeding-in wheel or burr alone would not effect the purpose of this invention, for if used alone it would of course lay the thread inside of all the needles. Now, however, the wing-wheel D is so located that its wings *d d* severally mesh in between the adjacent pairs or groups

of the feeding-in wheel or burr and reach far enough between them to loop the thread around the outside of the needles which the pairs or groups of plates *c c* respectively skip, while the thread is free and in position to pass inside of all the other needles of the set. Thus the purpose is accomplished in a simple and a perfectly effectual manner without springing or moving the needles at all. The wing-wheel D is properly arranged with its axis in a vertical position, and its spindle is preferably held to revolve in a long bearing *g*, mounted in a fixed arm *h*, as shown, or otherwise in some convenient manner. The wing-wheel is thus suspended in its bearing. The wing-wheel meshing with the needles of the needle-cylinder, as above stated, would be caused to revolve by the rotation of the said needle-cylinder. To give it a more exact, even, and steady motion, however, it has a gear-wheel *i* on its spindle to mesh with the needles *a a* below the barbs thereof and near their points of insertion in the needle-cylinder and where they are comparatively rigid; hence the wing-wheel is not only rotated steadily, but the needles are not bent or sprung in the performing of the work of rotating the wing-wheel.

By the term "feeding-in wheel," used in connection with the wing-wheel herein set forth, I mean a counter wheel or burr having oppositely-acting plates or wings, in the manner herein specified, whether the said opposite wheel or burr performs the entire office of feeding in the weft-thread or not. It is to be understood that in thus bringing the weft-thread to the wing-wheel it performs, at least in part, the operation of feeding in the thread to the needles.

I claim as my invention—

1. A wing-wheel in combination with the needles of a knitting-machine, and an oppositely arranged or counter feeding-in wheel or burr, substantially in the manner and for the purpose herein specified.

2. The combination of the needles *a a* of a knitting-machine, a feeding-in wheel C, having plates *c c* in pairs, substantially as specified, and a wing-wheel D, having wings *d d*, meshing with the plates of the said feeding-in wheel or burr, substantially as and for the purpose herein specified.

3. The combination of the needles *a a* of a knitting-machine, a feeding-in wheel C, having plates *c c*, in pairs or groups, substantially as specified, a wing-wheel D, having wings *d d*, meshing with the plates of the said feeding-in wheel, and the gear-wheel *i* on the spindle of the wing-wheel and meshing with the needles of the needle-cylinder, substantially as and for the purpose herein specified.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN S. CRANE.

Witnesses:
THOMAS HAM,
BENJAMIN F. DRAKE.