No. 726,163. PATENTED APR. 21, 1903.

E. A. HIRNER.

NEEDLE FOR KNITTING MACHINES.

APPLICATION FILED MAR. 15, 1902.

NO MODEL.

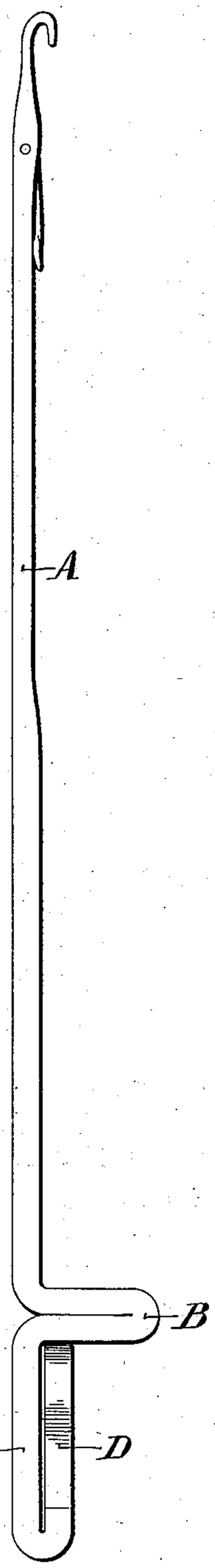

FIG. 1.

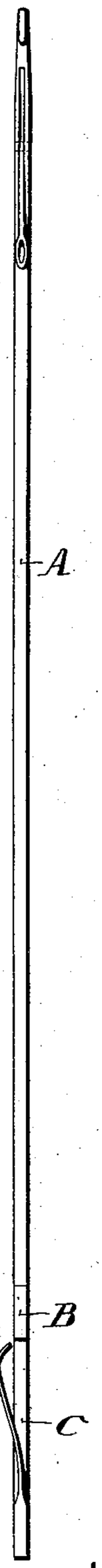

FIG. 2.

WITNESSES:

Arthur E. Paige

James H. Bell

INVENTOR:

Emil A. Hirner

by his attorneys

Foley & Paul.

UNITED STATES PATENT OFFICE.

EMIL A. HIRNER, OF ALLENTOWN, PENNSYLVANIA.

NEEDLE FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 726,163, dated April 21, 1903.

Application filed March 15, 1902. Serial No. 98,296. (No model.)

To all whom it may concern:

Be it known that I, EMIL A. HIRNER, a citizen of the United States, residing at Allentown, in the county of Lehigh and State of Pennsylvania, have invented certain new and useful Improvements in Needles for Knitting-Machines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to a knitting-machine needle provided with a laterally-operative spring, whereby the motion of the needles between the walls or "bars" of the needle-grooves is restrained sufficiently to prevent accidental motion of the needle; and it consists in the needle constructed as hereinafter described and claimed.

Figure 1 is a side view, and Fig. 2 a front view, on an enlarged scale, of a knitting-machine needle constructed in accordance with my invention.

A is the upper part of the shank of the needle.

B is the hub or butt.

C is the lower part of the shank below the butt, and D is the spring. The needle, except the latch and its pivot, is formed of one piece of metal or wire. The portion of the shank which is above the butt is constructed in the usual way, with the hook and latch at the upper end, and needs no further description. The butt is formed by the double bend of the wire also in the usual way. The lower part of the shank below the butt is formed by carrying the wire down in line with the upper part of the shank a distance of about twice the length of the butt. The wire is then turned forward and upward, terminating in front of the shank immediately below the butt. It will be noticed that the wire at C is permitted to complete its turn without any diminution of thickness, but that after the turn has been completed it is made thinner by reduction upon both sides. The thinned or reduced portion D is then bent first to one side and then to the other, so that the thinned end terminates almost immediately below the butt.

I am aware that needles have heretofore been made having formed upon them a laterally-operative spring. This has been done by a sidewise bend of the shank either above or below the butt. In my needles the entire shank above and below the butt is intact.

The objection to bending the shank above the butt is that it weakens the shank where it is exposed to the greatest longitudinal strain. The objection to bending the shank below the butt is that the needle loses the directive capacity of that portion of the shank which is most valuable for that purpose. It is of great importance that accurate guidance of the lower extremity of the shank should be retained. It is also advantageous to have at the very end of the shank a wider portion, which may afford a firm bearing to resist both lateral and rotative strain. By my invention I obtain all these advantages, and at the same time I am able to form the spring without the necessity of any extra metallic part being added to the needle, as the forwardly-turned-up end of the wire answers admirably for this purpose, while the turn of the wire at the bottom affords the extra bearing-surface required. I obtain an additional advantage in that the spring is located as near to the butt as possible, which is as it should be, and also that the end of the spring, which is sharp and liable to be caught or broken, is protected by the projecting part of the butt as by a guard. The spring is formed by a double curve of the thinned portion of the metal. This is an advantage over constructions in which the spring is given but one turn, which presses the extremity of the spring against the wall of the needle-groove, causing a marked difference in the facility with which the needle may be moved in one direction as compared with its movement in the other, due to the fact that in one direction the end is caused to scrape or plow against the side of the needle-groove.

In the construction which I have shown the needle is moved in either direction with equal facility. A spring of this character, formed as I have shown it by reduction of the metal on both sides, has more strength in proportion to its elastic pressure than one formed by thinning on one side only.

I am aware of United States Letters Patent No. 387,507, dated August 7, 1888, to Carl Freschl, in which there is described a needle formed by turning the wire which has formed the butt up instead of down, forming a spring

above the butt. This construction sacrifices the entire lower part of the shank, and I make no claim to such construction. I am also aware of United States Letters Patent No. 664,808, dated December 25, 1900, to Avery B. Dodge, in which there is described a needle which has a spring formed below the butt, but in which the end of the wire is not thinned to form the spring. This construction does not secure any of the additional advantages which I have just enumerated, and I hereby disclaim the same.

Having described my invention, I claim—

1. In a knitting-machine needle, the combination of a butt; a shank which extends both above and below the butt; a forward bend at the lower end of the shank; a turned-up portion terminating immediately below the butt; and a spring formed by thinning and bending laterally the end of the turned-up portion, substantially as described.

2. In a knitting-machine needle the combination of a butt; a shank which extends both above and below the butt; a forward bend at the lower end of the shank; a turned-up portion terminating immediately below the butt; and a spring formed by thinning and bending the end of the turned-up portion, said spring being curved laterally first in one direction and then in the opposite direction, substantially as described.

3. In a knitting-machine needle the combination of a butt; a shank which extends both above and below the butt; a forward bend of the lower end of the shank; a turned-up portion terminating immediately below the butt; and a spring formed by thinning and bending the end of the turned-up portion, the thinned portion being formed by an equal reduction of the metal upon both sides, substantially as described.

EMIL A. HIRNER.

Witnesses:
JAMES H. BELL,
E. REESE.