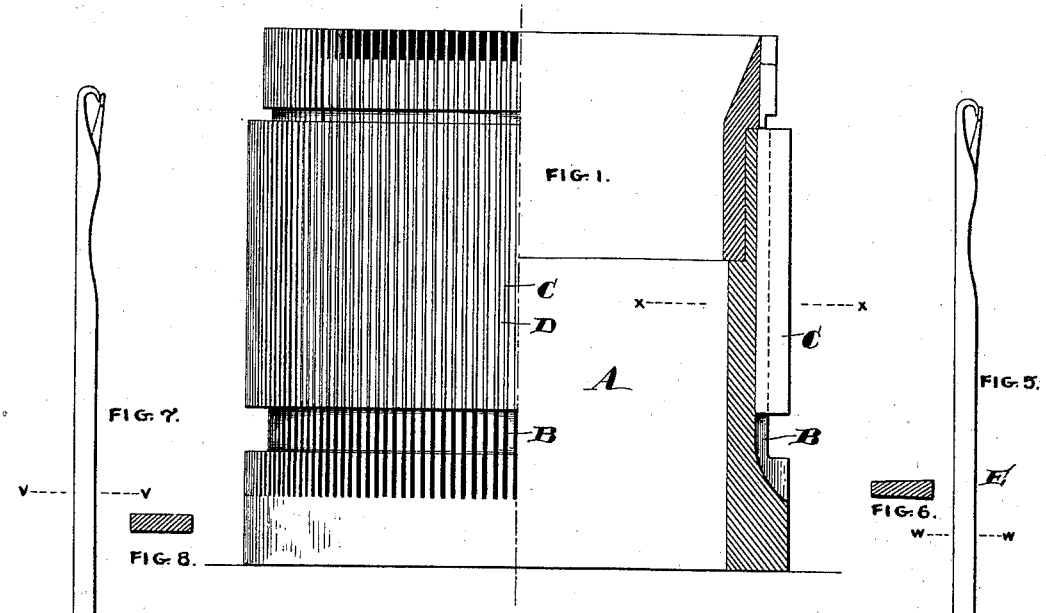
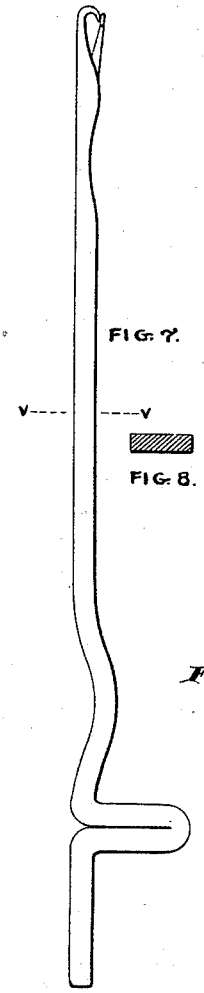
(No Model.)

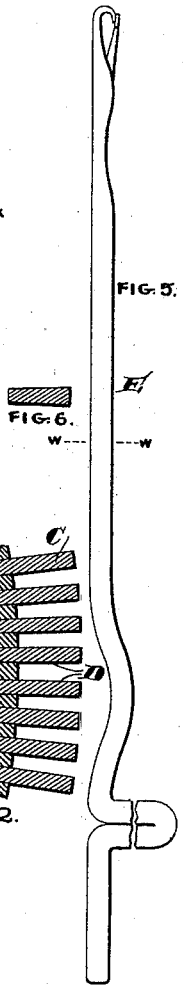
# H. W. HARLEY & W. DIEBEL.

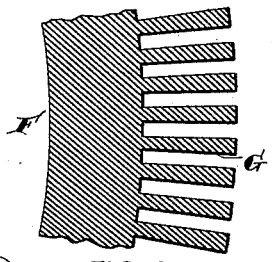
## NEEDLE CYLINDER AND NEEDLE FOR CIRCULAR KNITTING MACHINES.

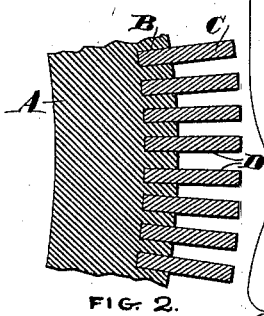
No. 423,244. Patented Mar. 11, 1890.

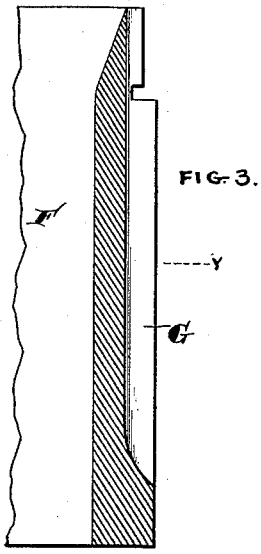
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# UNITED STATES PATENT OFFICE.

HOWARD W. HARLEY AND WILLIAM DIEBEL, OF PHILADELPHIA, PENNSYLVANIA.

## NEEDLE-CYLINDER AND NEEDLE FOR CIRCULAR-KNITTING MACHINES.

SPECIFICATION forming part of Letters Patent No. 423,244, dated March 11, 1890.

Application filed September 4, 1889. Serial No. 322,956. (No model.)

*To all whom it may concern:*

Be is known that we, HOWARD W. HARLEY and WILLIAM DIEBEL, citizens of the United States, and residents of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Needle-Cylinders and Needles for Circular-Knitting Machines, of which the following is a true and exact description, due reference being had to the drawings which accompany and form part of this specification, and in which similar letters denote similar parts.

Our invention has particularly for its object an improved construction of knitting cylinders and needles the needle-guides of which shall be stronger and more durable than now in common use, and also of a needle especially adapted for use with a knitting-machine provided with said guides. In the circular-knitting machines as ordinarily constructed the needle-cylinder is cast or formed in one piece, and then the grooves are cut into the surface of said cylinder, and generally cut on the straight, which causes the inner portion of said guides to be thinner than the outer portion. Again, cutting grooves in a cast surface makes the guides fragile, and in use they often break, which is expensive, and also, cast metal not being as strong as wrought or sheet metal, it is necessary to have the metal between the grooves quite thick.

Our improvement consists in casting or forging the body of the needle-cylinder and then forming grooves in its surface of sufficient size and depth to receive and retain strips of sheet-steel cut to the desired length, and the groove or guide is formed between these strips of sheets of steel. We prefer to form these strips of equal thickness throughout, in which case the guides or spaces between the strips will taper slightly, and in such case we use our improved needle, which is a needle provided with a tapering cross-section which will conform to the taper of the guide. We prefer to do this rather than cut the strips on a taper, as it is easier to taper the needle than the strip. In order to prevent the strips working loose in the grooves, the cylinder, with its guides, is dipped into a solder bath.

In the drawings, Figure 1 is a view of our improved needle-cylinder partially in section. Fig. 2 is an enlarged sectional view of a part of the needle-cylinder on line $x\,x$, Fig. 1. Fig. 3 is a section of part of old construction of needle cylinder and guides. Fig. 4 is a section on line $y\,y$, Fig. 3. Fig. 5 is a view of our improved needle. Fig. 6 is a section on line $w\,w$, Fig. 5. Fig. 7 is a view of old form of needle. Fig. 8 is a section on line $v\,v$, Fig. 7.

A represents the base, body, or core of the needle-cylinder.

B represents the grooves cut in said base or core A.

C represents the strips of sheet metal, which are inserted in said grooves, and between which strips C the guide D for the needle is formed.

E represents our improved needle, Fig. 5, and, as shown in Fig. 6, this needle tapers slightly inward in cross-section, so as to conform to guide D.

In Figs. 3 and 4 is shown the old form of construction of needle guide and cylinder, where the cylinder F is first cast or formed into the full size, and then the slots or guides G are cut into it to the full extent and depth of the needle-guide, and in Figs. 7 and 8 are shown the ordinary needle, which has no taper, the guide or slot G being of equal width throughout its entire extent.

By our improved character of guide, we are enabled to have the same extent of metal throughout in the side of the guide, and on account of the greater strength of sheet, rolled, or wrought metal over cast metal we are enabled to make the metal in the sides of the guides thinner, and thus use a greater number of needles in the same sized cylinder.

If desired, the strips C may be formed with a taper, in which case straight needles may be used.

Having now fully described our invention, what we claim, and desire to protect by Letters Patent, is—

1. In combination, a needle-cylinder having grooves therein and metal strips inserted and fixedly retained in said grooves.

2. In combination, a needle-cylinder having grooves therein and strips of rolled or wrought

metal inserted and fixedly retained in said grooves.

3. In a circular-knitting machine, a needle the cross-section of which tapers, substantially as and for the purpose described.

4. In a circular-knitting machine, in combination, a needle-cylinder having grooves therein, metallic strips inserted and retained in said grooves, which form tapering guides, and a needle the cross-section of which tapers, substantially, to conform with the taper of the guide.

5. In a circular-knitting machine, in combination, a needle-cylinder having grooves therein, strips of rolled or wrought metal inserted and retained in said grooves, which strips form tapering guides, and a needle the cross-section of which tapers, substantially, to conform with the taper of the guide.

In testimony of which invention we have hereunto set our hands, at Philadelphia, Pennsylvania, this 3d day of September, 1889.

HOWARD W. HARLEY.
WILLIAM DIEBEL.

Witnesses:
ABNER J. DAVIS,
JAMES H. SHIELDS.