H. SCHWARTZ & A. A. GRUNDY.

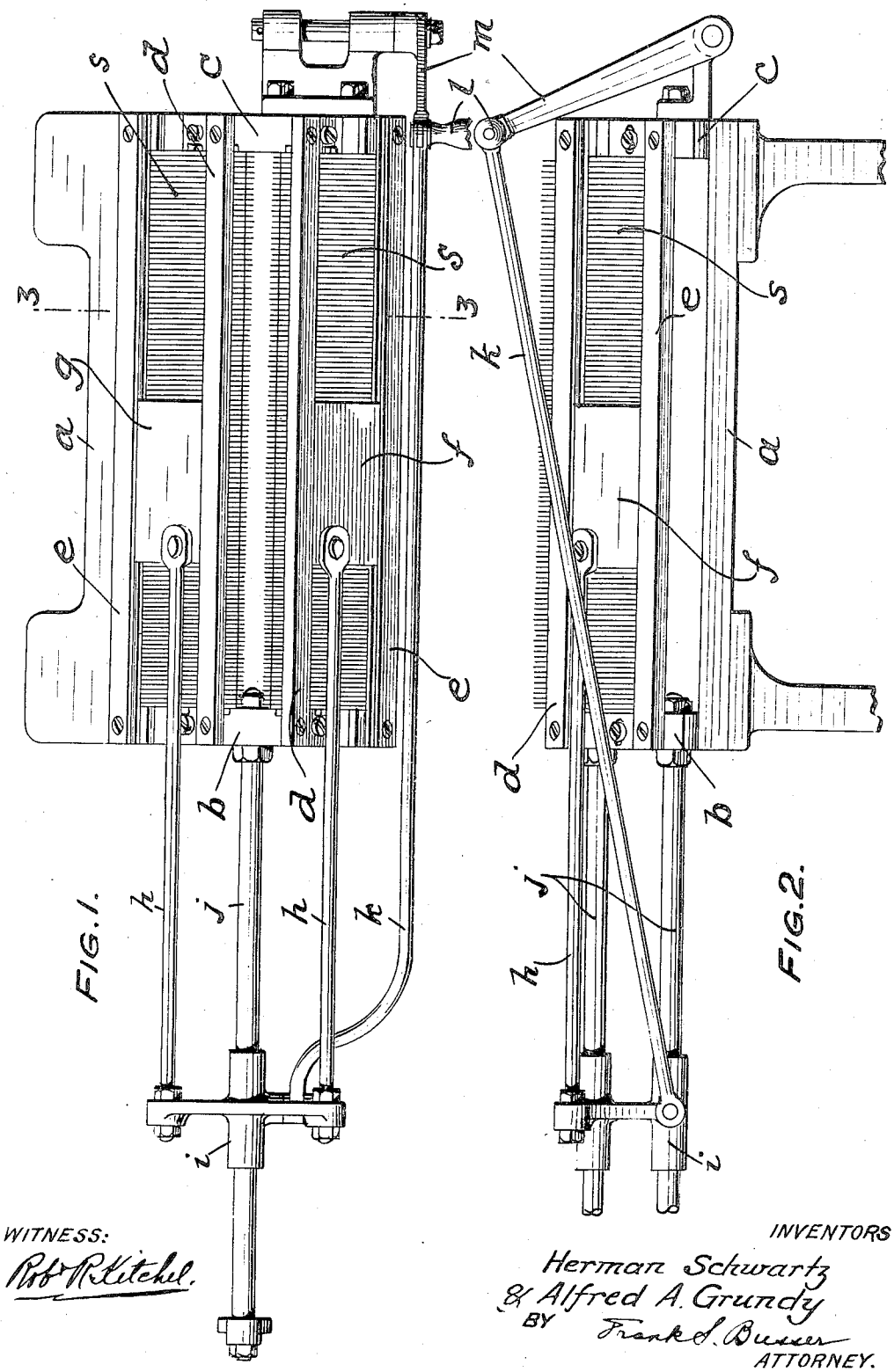
FLAT KNITTING MACHINE.

APPLICATION FILED AUG. 11, 1915.

1,210,106.

Patented Dec. 26, 1916.

3 SHEETS—SHEET 1.



WITNESS:

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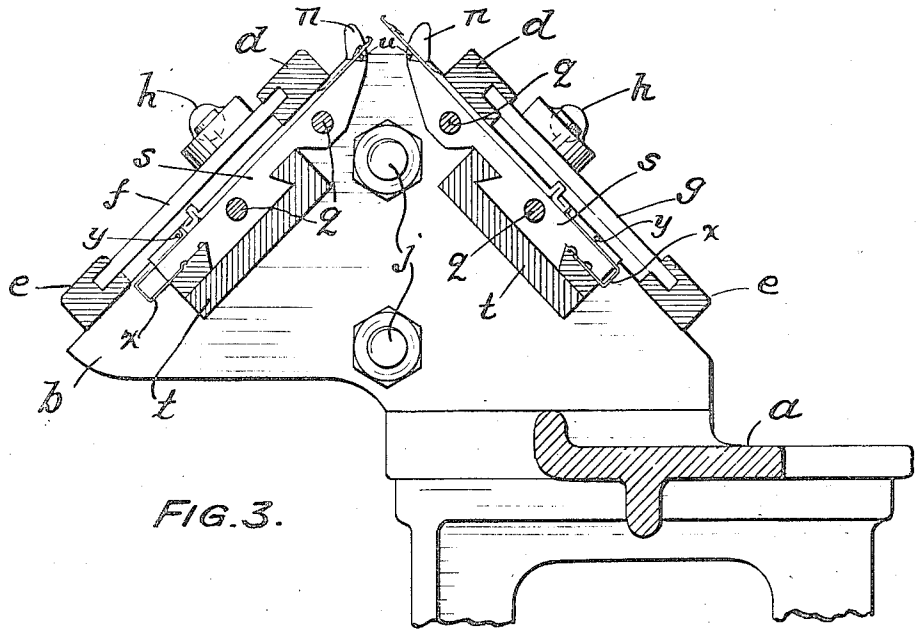


FIG. 3.

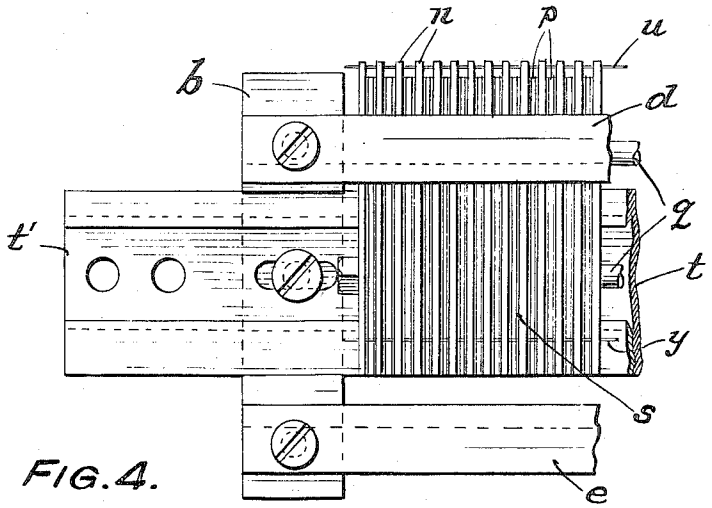


FIG. 4.

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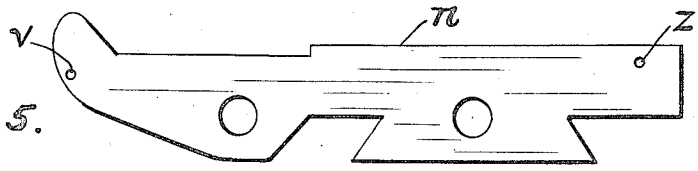


FIG. 5.

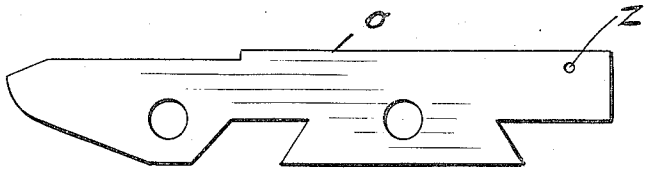


FIG. 6.

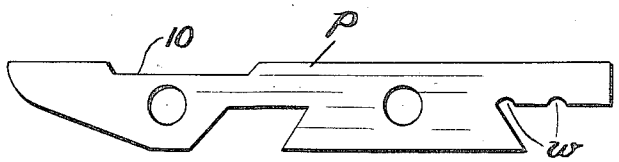


FIG. 7.

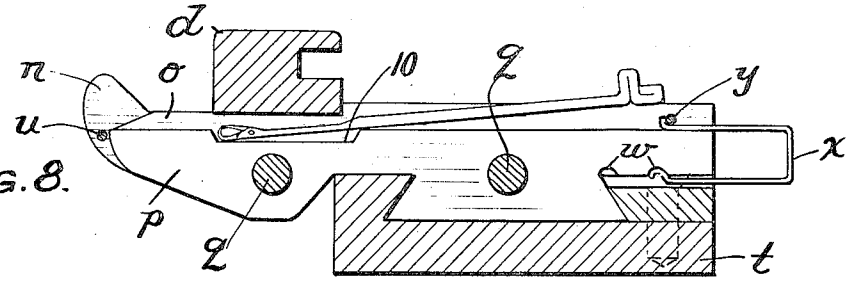


FIG. 8.

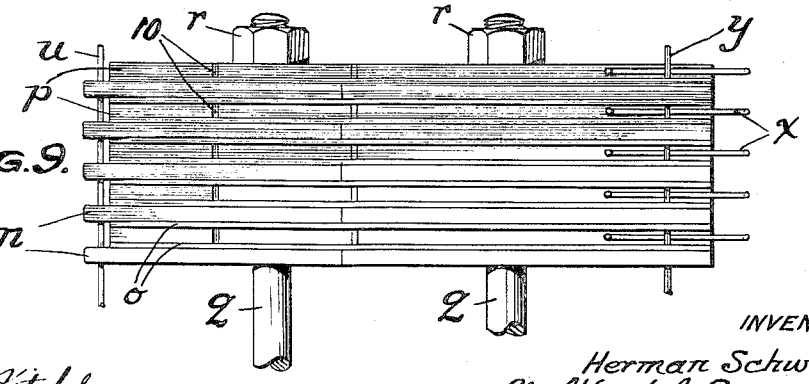


FIG. 9.

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UNITED STATES PATENT OFFICE.

HERMAN SCHWARTZ, OF PHILADELPHIA, PENNSYLVANIA, AND ALFRED A. GRUNDY, OF BROOKLYN, NEW YORK, ASSIGNORS TO THEMSELVES, AND SAMUEL GRUSHLAW, OF PHILADELPHIA, PENNSYLVANIA.

FLAT-KNITTING MACHINE.

1,210,106. Specification of Letters Patent. Patented Dec. 26, 1916.

Application filed August 11, 1915. Serial No. 44,871.

To all whom it may concern:

Be it known that we, HERMAN SCHWARTZ and ALFRED A. GRUNDY, citizens of the United States, and residing, respectively, in Philadelphia, county of Philadelphia, State of Pennsylvania, and Brooklyn, county of Kings, State of New York, have invented a new and useful Improvement in Flat-Knitting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

Our invention relates to flat or straight knitting machines.

The objects of our invention are to render the machine lighter running, to enable a partly worn needle bed to be renewed without discarding the entire bed, to permit machines to be changed from one gage to another, and to improve the construction and operation of the machine in important details.

A preferred embodiment of our invention is shown in the accompanying drawings, in which—

Figure 1 is a plan view of a flat or straight knitting machine embodying features of our invention. Fig. 2 is a front elevation of same. Fig. 3 is an enlarged cross section on line 3—3 of Fig. 1. Fig. 4 is a partial face view of one of the needle banks. Figs. 5, 6 and 7 show full size forms of blanks composing our improved needle bed. Fig. 8 is a detail section through the needle bed. Fig. 9 is a partial plan view of same.

a is the frame of the machine carrying the two end pieces *b* and *c* whose upper faces are beveled off to an angle of approximately 100 degrees with each other for receiving the needle beds, to be hereinafter described.

d is the upper rail and *e* the lower rail on each side of the machine, rigidly secured to end pieces *b* and *c*. Rails *d* and *e* are grooved on their continguous sides to form guide ways for the sliding cam plates *f* and *g* on the front and back of the machine respectively. In this manner the cam plates are fixedly held in movable relation above the needle beds, precluding the necessity of a heavy construction for the purpose of being held in position by their weight. Thus the cam plates need consist of nothing more than thin and relatively light plates *f* and *g*, to the under surface of which are secured the cams (not shown).

Rods *h* connect the cam plates with a frame *i* slidable on rods *j* rigidly secured to one end of the machine.

The sliding frame is connected by rod *k* with the operating handle *l* on the crank *m*. Thus, by reciprocating said handle back and forth, frame *i*, and therewith cam plates *f* and *g*, are similarly moved back and forth above the needle beds. The parts described being all of light construction, this operation requires very little power; in fact, the machine is thus brought well within the capacity of female operatives, a very economical feature.

We will now proceed to describe our new needle bed, which is of the built-up variety.

As is well known to those versed in the art, needle beds become worn in places which are used, usually near their middle, and the entire needle bed has, therefore, to be discarded; whereas all but the worn portion is still perfectly usable. Again, a mill, although necessarily equipped with machines of different gages, is often running largely on work of one gage, for which there is not available a sufficient number of machines, while machines of other gages are necessarily idle. It is obvious that if means can be devised to avoid the necessity of wholly discarding partly worn needle beds, and the compulsory disuse of other needle beds of temporarily unsuitable gages, great economy will be effected. To this end we make the needle bed of thin sections stamped out of thin sheet metal, *n*, *o*, *p*; see Figs. 5, 6, 7. Numbers of these sections are strung upon bolts *q* and clamped firmly together thereon by nuts *r*, to form a solid bed *s*, which is firmly carried by a bar *t* secured to end pieces *b* and *c*, on both the front and back faces of the machine. One of said bars may be slidably mounted for adjustment with respect to the other bar, and provided with an extension *t'*, Fig. 4, for connection with an operating cam or other device for accomplishing such adjustment.

It is to be understood that in this manner needle beds are built up of the correct number of sections *n*, *o*, *p* to suit the work required. For instance, seven gage knitting machines requiring seven needles to the inch,

will be built up of five sections *n*, two sections *o*, five sections *p* and two sections *o*, assuming that the sections are one hundredth of an inch thick. This will give a wide sinker head or nose composed of five sections *n*, totaling .05 inch in width, and a wide needle base composed of five sections *p*, also totaling .05 inch in width, between which is a narrow clearance section composed of two sections *o* of a combined width of .02 inch. This, of course, is repeated throughout the length of the needle bed. When any portion becomes worn it may be replaced by fresh sections to form a perfectly good needle bed again. Also, needle beds may be built up of any number of needles to the inch that may be required for certain work, and may be readily mounted upon any machine.

One of the points of hardest wear occurs at the upper ends of the needle base sections *p*. We have therefore shortened this end slightly and in its place run a steel wire *u* for taking the pressure of the needles. A hole *v* for carrying this wire is punched in each sinker section *n*.

The needle base sections are provided at their lower ends with notches *w* to provide for stop springs *x*. The use of these stop springs, broadly, is old and well known in the art. In their inner position they prevent the needles from dropping out of action and they are withdrawn into their outer positions to allow of the removal of the needles. The stop spring is shown in Fig. 8 in the outer position, and to prevent it from coming out altogether, we provide a stop in the form of a wire *y* strung through holes *z* in sections *n* and *o*. Wires *u* and *y*, when worn, are readily replaceable.

In order to remove the needles from their working position on the needle base sections *p* beneath rail *d*, we provide a depression 10 in each needle base section. This depression does not affect the movement of the needle when in working position, but when spring stop *x* is pushed down to its stop *y*, and the needle brought down against it, depression 10 is so located that it allows the head of the needle to drop into it. Thus in this position the needle may be grasped by its butt, raised up slightly as shown in Fig. 8, and thence readily withdrawn from the bed. In this way, also, needles may be inserted, without removing rail *d*, or disturbing any part of the bed.

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

1. In a flat knitting machine, the combination with the needles, of a plurality of separate needle rest sections and a plurality of spacing sections spacing apart the needle rest sections, certain of the spacing sections having jacks, each needle rest section being of a fractional part of the thickness of a single needle rest and each spacing section being of a fractional part of the width of a single space between needle rests, a support for, and separate from, the sections, and means to detachably secure said sections to their support in different predetermined relations, whereby the various sections may be variously arranged and distributed to adapt them to produce needle beds of different gages.

2. In a flat knitting machine, the combination with the needles, of a multitude of separate needle rest sections, sinker sections and divider sections arranged on edge, each of said sections being of the fractional part of the thickness of a needle, a support underlying said sections, and means to hold said sections in fixed relation to each other and to the support, whereby the arrangement of the sections may be varied to produce needle beds of different gages.

3. In a flat knitting machine, the combination with the needles, of a multitude of separate needle rest sections, sinker sections and divider sections, a longitudinally recessed frame, a longitudinally extending bar and a gib secured thereto, slidable in the frame and forming between them a dove-tail recess, all of said sections having along their lower edges integral dove-tail flanges of similar contour adapted to the dove-tail recess, and means to hold all of said sections in fixed relation to said bar.

4. In a flat knitting machine, the combination with the needles, of a multitude of separate needle rest sections and a multitude of sections spacing apart the needle rest sections, certain of the last named sections having jacks, whereby the arrangement of the sections may be varied to produce needle beds of different gages, a frame recessed in the direction of its length, a longitudinally extending bar and a detachable gib slidable longitudinally in said recess and forming between them a recess, all of said sections having along their lower edges integral flanges of similar contour adapted to the last-named recess, and means to hold said sections in fixed relation to each other and in fixed relation to the bar.

5. In a flat knitting machine, the combination with the needles, of a multitude of separate needle rest sections, sinker sections and divider sections, a frame having a longitudinally extending recess, a recessed bar slidable longitudinally in said frame, said sections having flanges extending into the recess on the bar, and means securing said sections in position.

6. In a flat knitting machine, the combination with the needle bed, of a pair of longitudinally extending rails one of which overlies the upper or inner portion of the needle bed, a reciprocatory cam-plate slidable within and between guides in said rails,

the needle bed having transversely extending recesses underlying the upper rail to permit removal and replacement of needles without removing said rail.

7. In a flat knitting machine, the combination with the needle bed, of a pair of longitudinally extending rails one of which overlies the upper or inner portion of the needle bed, a reciprocatory cam-plate slidable within and between guides in said rails, the needle bed having transversely extending recesses underlying the upper rail, and stops engaging the outer ends of the needles, the inner portions of said needles overlying said grooves, said stops being retractable to permit the needles to be drawn outwardly, tilted down at their inner ends and then withdrawn.

8. In a flat knitting machine, the combination with the needle bed, of a pair of longitudinally extending rails one of which overlies the upper or inner portion of the needle bed, a reciprocatory cam plate slidable within and between guides in said rails, the needle bed having transversely extending recesses underlying the upper rail, and stops engaging the outer ends of the needles, the inner portions of said needles overlying said grooves, said stops being retractable outwardly, and means limiting the outward movement of said stops.

9. In a flat knitting machine, the combination with a pair of guide rails, of a cam-plate longitudinally reciprocable between said rails, and a needle bed comprising a multitude of transversely extending sections arranged on edge, certain of said sections being spaced from the upper rail of the pair to form needle bases along their upper longitudinal edges, said needle base sections being grooved underneath, and transversely of, said upper rail to permit of the insertion and withdrawal of needles.

10. In a flat knitting machine, the combination with a pair of guide rails, of a cam plate longitudinally reciprocable between said rails, and a needle bed comprising a multitude of transversely extending sections arranged on edge, certain of said sections being spaced from the upper rail of the pair to form needle bases along their upper longitudinal edges, said needle base sections being grooved underneath, and transversely of, said upper rail to permit of the insertion and withdrawal of needles, retractable stops for the needles movable upon the outer or lower ends of the needle base sections, and a wire extending through sections other than the needle base sections and adapted to limit the retracting movement of said stops.

In testimony of which invention, we have hereunto set our hands, at Philadelphia, on this 9th day of August, 1915.

HERMAN SCHWARTZ.
ALFRED A. GRUNDY.