

No. 735,988.

PATENTED AUG. 11, 1903.

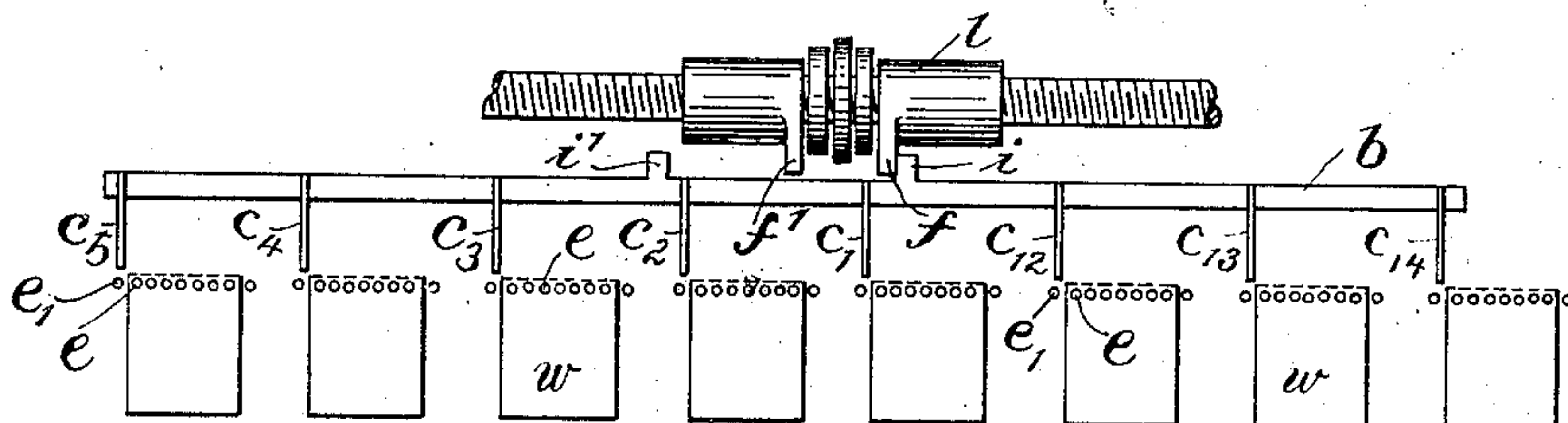
T. LIEBERKNECHT.  
KNITTING FRAME.

APPLICATION FILED SEPT. 17, 1900.

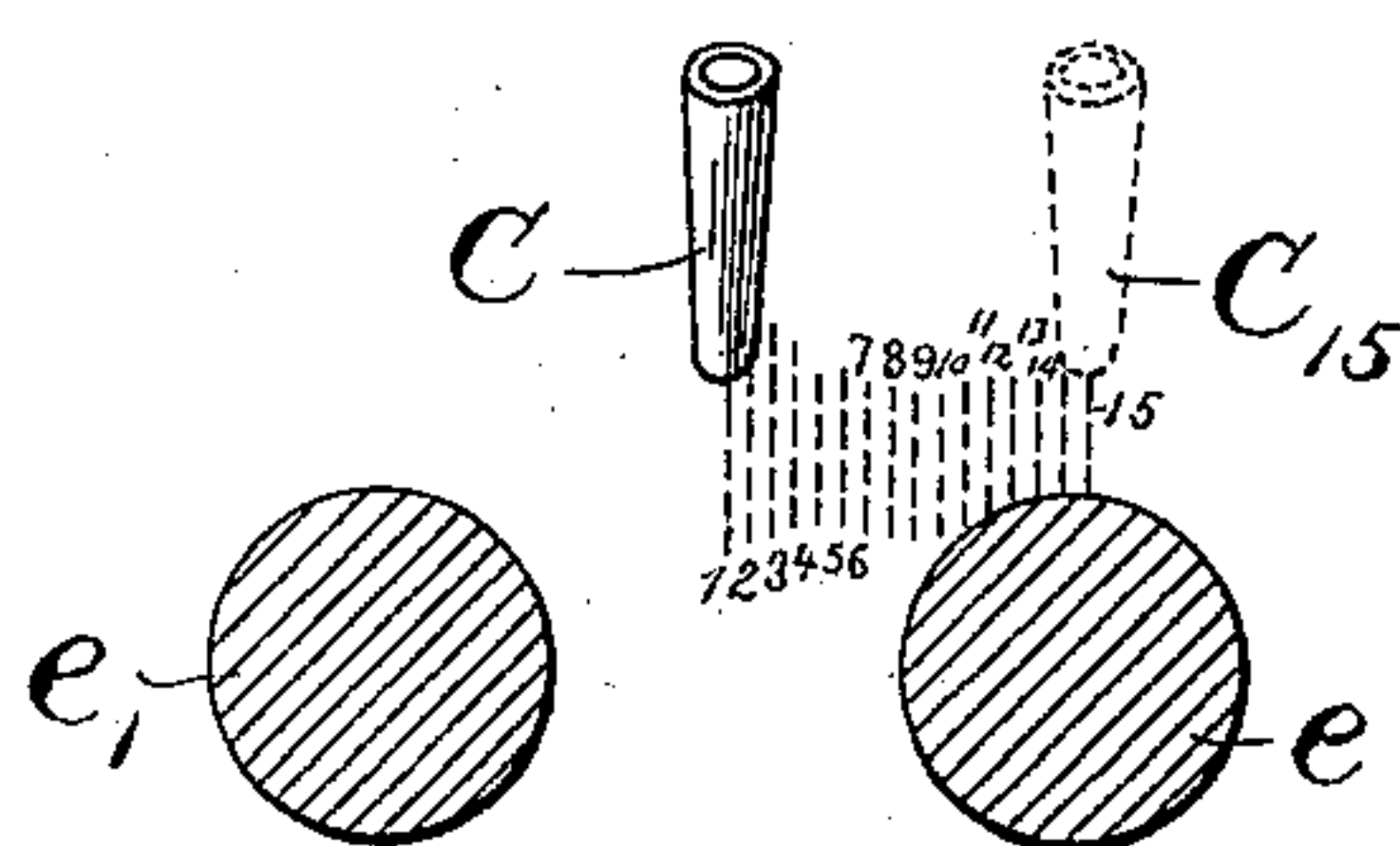
NO MODEL.

2 SHEETS—SHEET 1.

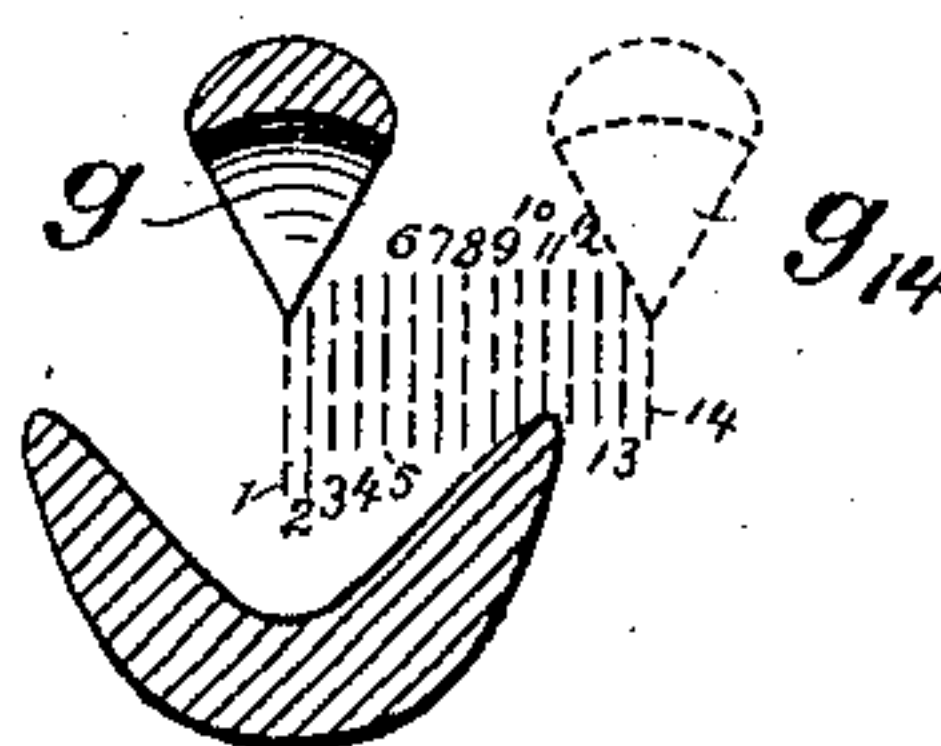
*Fig. 1.*



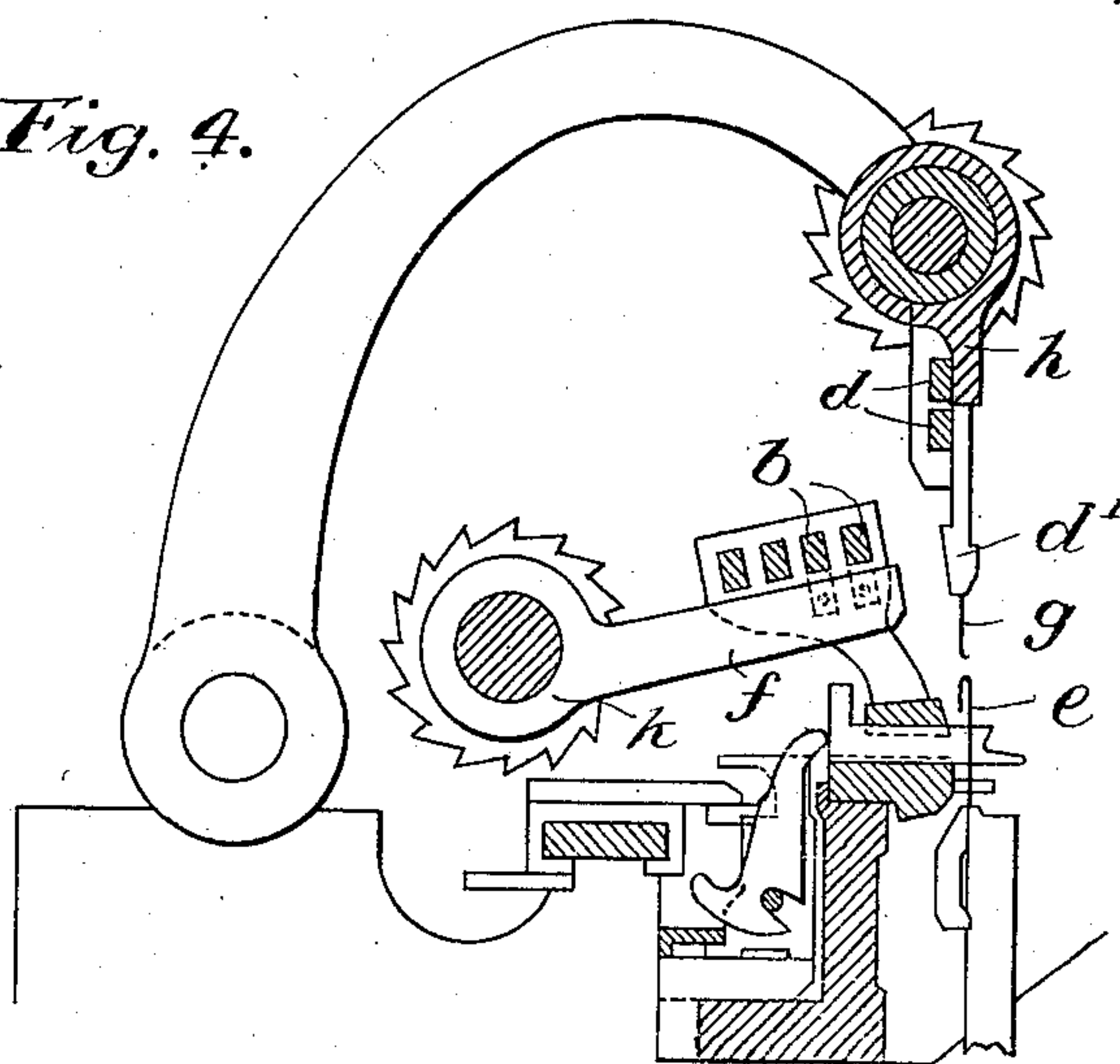
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



Witnesses.

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NO MODEL.

2 SHEETS—SHEET 2.

Fig. 5.

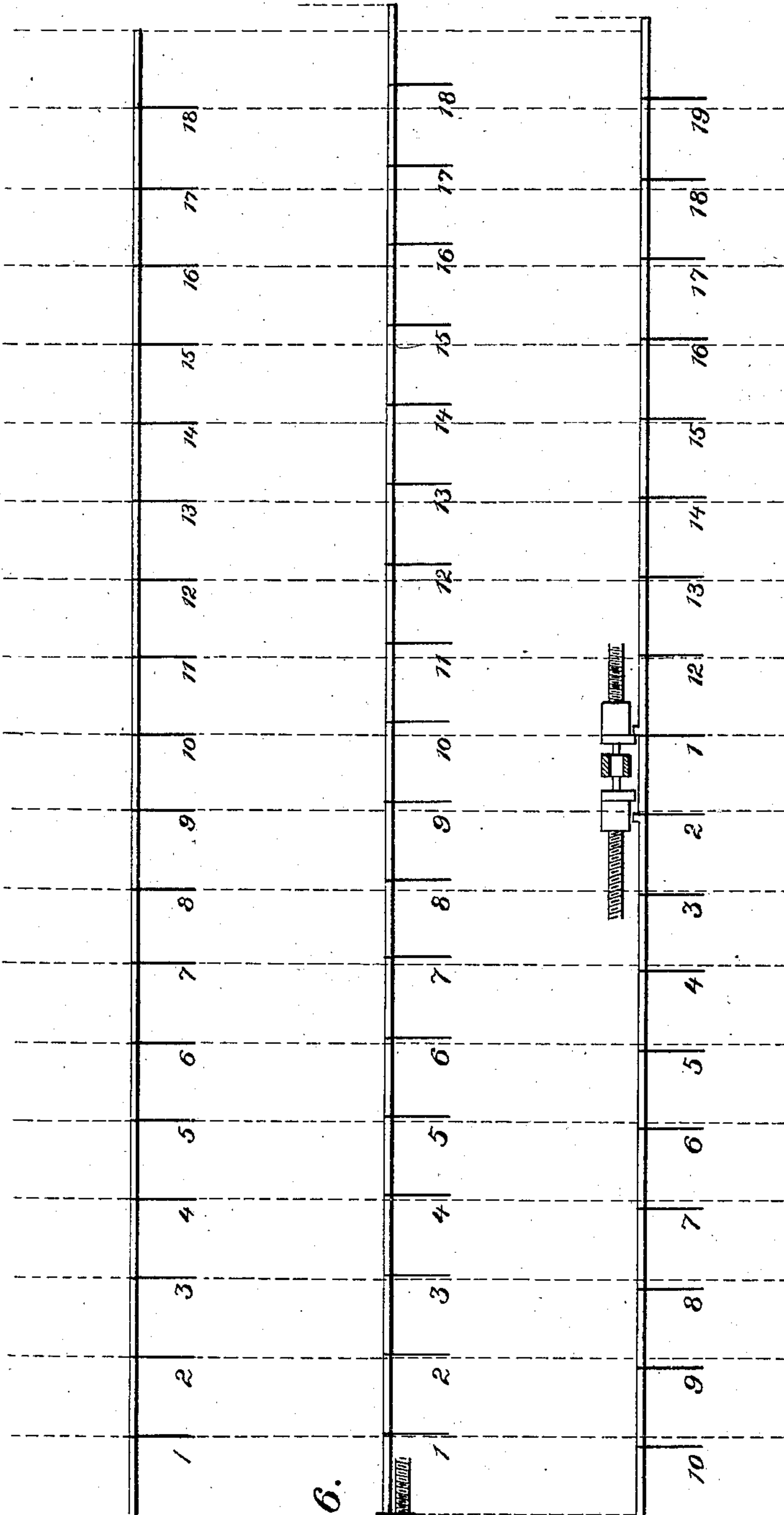
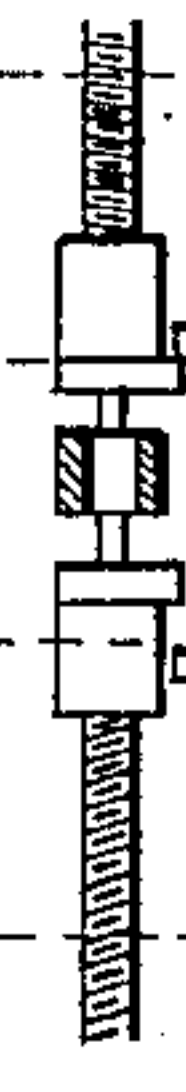


Fig. 6.



Fig. 7.



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# UNITED STATES PATENT OFFICE.

THEODOR LIEBERKNECHT, OF HOHENSTEIN, GERMANY.

## KNITTING-FRAME.

SPECIFICATION forming part of Letters Patent No. 735,988, dated August 11, 1903.

Application filed September 17, 1900. Serial No. 30,259. (No model.)

*To all whom it may concern:*

Be it known that I, THEODOR LIEBERKNECHT, a subject of the German Emperor, and a resident of Hohenstein, Germany, have invented certain new and useful Improvements in Knitting-Frames, of which the following is a specification, reference being had to the accompanying drawings, wherein—

Figure 1 is a plan view of the improvement. Fig. 2 shows the lateral displacement of the thread-guides due to expansion. Fig. 3 shows the lateral displacement of the upper needles due to expansion. Fig. 4 shows the application of the invention to a cotton-knitter. Fig. 5 shows the thread-guides in their proper position. Fig. 6 shows the thread-guides displaced by expansion in case of end buffer. Fig. 7 shows the thread-guides displaced by expansion in case of buffers being at the middle of bar.

In very large frames adapted to work a plurality of pieces of goods *w* side by side several parts and particularly the guide-rails *b* or the upper rails *d*, Fig. 4, are very long. The frame of the machine, the series of needles *e* being arranged in separate needle-beds, is formed of a long and heavy body, while the rails *b d* made of equal length are thin and comparatively light. When the temperature is raised—for instance, by heating the work-rooms in winter—the thin rails *b d* will be heated more quickly than the heavy frame and therefore they are expanded to a greater extent than the latter, whereby in the construction heretofore used the parts do not exactly correspond to each other during the first period of the work. The extreme or border loops become irregular or fail to be formed. Thus the frame will be useless until all the parts thereof are uniformly heated. The upper needles present the same objectionable feature, since the points of the said needles *g* cease to reach the middle line of the lower needle-groove and finally move to and beyond the edge of the lower needles, whereby the machine is also rendered useless. This will be better understood by reference to Figs. 2 and 3 and the vertical dotted lines therein. Supposing the knitter to have a plurality of needle-beds and the guide-bars to operate against buffers acting against their extreme ends, it is understood that in its

proper operation the thread-guide *C' C<sup>2</sup>*, &c., must always be in the middle line between the needle at the edge of piece of goods being knit and the next needle outside of it—that is, the first idle needle.

In Fig. 1 *w* represents the piece of goods being knit. The work has reached the width shown and only one idle needle is shown to the left of the working edge. Imagine, now, that the work has reached but half the width shown. It will be clear that a number of idle needles will be to the left of the working edge and consequently to the left of the thread-guide. In Fig. 2 the edge needle is represented by *e*, and *e'* is the first idle to the left of the working edge. As the work of broadening or narrowing the goods progresses the actual position of the thread will vary as to the particular part of the needle-bed, but its relative position in the middle line between the two needles opposite it at the time being should always be the same. Now, if the guide-bars are expanded relatively more than the frame and the bar is supposed to be abutting against the left buffer, the first thread-guide from the left, which we call *C'*, will have been displaced to the right of its normal position with respect to the frame by the amount of excess of expansion due to the comparatively short piece of bar between *C'* and the buffer, so that the position of *C'*, which is indicated by the dotted line marked 1, will be almost the correct one, midway between needles *e* and *e'*, these designating the edge needle and the next needle outside of it, respectively. In Fig. 6 position 1 would show the same displacement of the thread-guide to the right of the dotted line which indicates the normal position of the thread-guide throughout Figs. 5, 6, and 7. The next guide to the right, *c<sup>2</sup>*, will be displaced by the excess of expansion of the bar length up to it consequently more than was *C*, assuming then the position marked 2 in Figs. 2 and 6. This error will increase with the distance of the thread-guide from the end of bar until, in the case of *C<sup>15</sup>*, the thread-guide has been moved to a position directly over the edge needle *e'*, as shown in Fig. 2. Precisely the same displacement occurs with the upper needles *g*, Fig. 3, whereat the twelfth from left end of the guide-bar, the apex of the needle, has



passed completely outside of the lower-needle groove, and at 14 the whole upper needle has passed the lower needle, rendering it clearly inoperative.

5 My present invention consists in arranging the buffers  $f f'$  in the middle of the machine to be engaged by lugs  $l l'$ , placed at each side of and close to the middle of the guide-bar, as shown in Fig. 1. Then when the rail  $b$  en-  
 10 gages the buffer  $f$  by means of its lug  $i$  the first guide  $c$  on the left-hand side of  $i$  will still occupy a good position, while the next guides  $C^{12} C^2$  on the right and left hand side of  $i$  are brought nearer the one to the edge needle  
 15  $e'$ , Fig. 2, and the other to the first idle needle  $e$ , and so on. This positioning of the needles is continued only for half the number of guides, whereby the error will be reduced by one-half, the guides remaining always be-  
 20 tween the needles  $e e'$ , Fig. 2, while the upper needles still work within the lower-needle grooves, Fig. 3. Thus the width of the frame may be doubled.

25 Fig. 4 shows the improvement applied to a cotton-knitter wherein the buffers  $f$  for the rails  $b$  are arranged at about the same height as heretofore, while the buffers for the rails  $d$  are arranged at  $h$ . Thus said buffers  $f f'$  do

not affect the needle-beds  $e$ , and as the same are omitted on both sides of the frame the lat-  
 30 ter may be made wider and have more needle-beds than heretofore.

Having fully described my invention, what I claim, and desire to secure by Letters Pat-  
 35 ent, is—

1. In a knitting-frame, the combination with the lower guide-rails, the thread-guide and the upper-needle rails, of buffers  $f f'$  ar-  
 40 ranged in the middle part of the machine and serving to regulate the stroke of the thread-guide, substantially as and for the purpose set forth.

2. In a knitting-frame, the combination with the lower guide-rails, the thread-guide, and the upper-needle rails, of buffers  $f f'$  ar-  
 45 ranged behind the needle-beds of the machine, and serving to regulate the stroke of the thread-guide, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as  
 50 my invention I have signed my name in presence of two subscribing witnesses.

THEODOR LIEBERKNECHT.

Witnesses:

F. J. DIETZMAN,  
 H. THIELE.