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STEPPED ROLLER FOR THOMAS CALCULATING MACHINES.

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988,069.

Patented Mar. 28, 1911.

Fig.2.

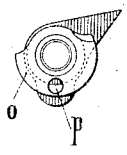


Fig.1.

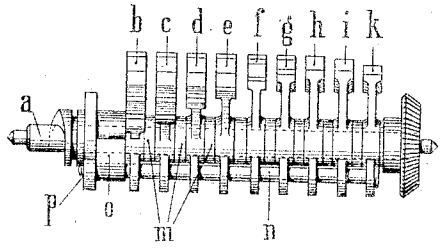


Fig.4.

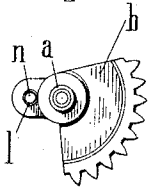
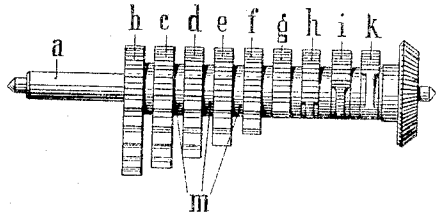


Fig.3.



Witnesses
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UNITED STATES PATENT OFFICE.

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STEPPED ROLLER FOR THOMAS CALCULATING-MACHINES.

988,069. Specification of Letters Patent. Patented Mar. 28, 1911.

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To all whom it may concern:

Be it known that I, BERNHARD BEHR, of 19 Hamburgerstrasse, Dresden, in the Kingdom of Saxony, in the German Empire, company director, have invented certain new and useful Improvements in Stepped Rollers for Thomas Calculating-Machines.

Existing stepped rollers for Thomas calculating machines consist either of a round hollow drum with step fixed thereon by soldering, pinning or the like, or of hollow rollers cast in one piece, in which the rough cast teeth are milled after the very careful centering, and the insertion of the ends. Or also such rollers are composed of half-open casings pressed complete with the teeth from sheet metal, connected by means of segments to the shaft. In these constructions a long succession of operations by hand are necessary in order to impart the good appearance to the stepped rollers which is requisite in calculating machines, and above all in order to obtain the indispensable degree of accuracy in working, so that not only has the manufacture of stepped rollers been very complicated and costly, but also the very lowest allowable degree of accuracy has only been attained by especially costly and tedious adjustments by hand. Further the stepped rollers have been mounted on a square shaft for the purpose of driving them and also of arranging by the side of the stepped roller a longitudinally slidable tappet disk which is to be carried around with the latter. This square shaft can only have a very small diameter on account of the small diameter of the tappet disk necessitated by the design. This has had the effect of rendering the shaft very liable to become bent so that it could not provide a permanently sufficient support for the stepped roller, or more especially for the tappet disk which latter must be capable of sliding longitudinally with great ease. Since the tappet disk must be able to slide very easily along the shaft, this necessitates a certain amount of "play" between the shaft and the square hole in the disk. After the machine has been in use for some time, the said "play" soon became larger owing to the forces acting upon the parts, so that the "play" between the shaft and the square hole became several times larger at the periphery. Now the proper operation and smooth working of the machine depends greatly upon the accurate movement of the cam for advancing the tens wheels, and this cam is connected to the tappet disk. Further, owing to the insecure fixing of the stepped roller on the square shaft, the roller often became loose, and the working of the machine was frequently hindered from this cause. Also, the great momentum of the heavy stepped rollers was a source of trouble in the working of the machine.

Now, the present invention has for its object to avoid the above mentioned drawbacks, and the improvements consist substantially in constructing a stepped roller of a number of separate toothed segments which are connected together by means located outside the shaft, and in arranging the slidable tappet disk (cam for advancing the tens wheels with locking sector) to be carried along by the common carrier extending throughout the structure.

Hand work and costly adjustments are not necessary in the construction of the improved stepped roller. The actual stepped roller is built up of a number of machined toothed segments and the shaft can be round. Perforated disks or washers are arranged between the several segments, and the entire structure can be clamped tight by means of a nut, or by driving the parts tight upon the shaft so as to exclude any liability of the shaft to become bent.

In one form of construction each toothed segment is formed with an eye located far outside the center, which provides a secure means for fixing in position for milling the teeth, so as to insure an exact correspondence in the positions of the several segments and also of the teeth relatively to one another. A pin which is fixed to the driving bevel wheel is inserted loosely through all the eyes. The eye and the pin may however be replaced by any other mechanical means located outside the shaft for connecting the segments with one another and with the driving bevel wheel and the tappet disk.

A shifting of the segments relatively to one another, or a chattering of the same on the shaft is rendered quite impossible. The position of the parts relatively to the round shaft, and even a slipping movement on it in the direction of rotation are now matters of indifference. The prolongation of the pin or other equivalent, serves at the same time as a means for driving the tappet disk. The tappet disk can now be arranged to slide much more readily along the shaft,

without being liable to shift in the direction of rotation, because the driving means lies also in this case, far outside the center. The weight of the roller is much reduced by this means, more particularly because the washers can be made of the very lightest metal since they are subjected only to compression. The cost of manufacture of the improved stepped roller which is stronger, more accurate and efficient, is at least one-fourth of the cost necessary hitherto.

One embodiment of this invention is illustrated by way of example in the accompanying drawings in which:—

Figure 1 is a side view of the improved stepped roller; Fig. 2 is a front end view of the tappet disk. Fig. 3 is a plan, and Fig. 4 is a front end view of the stepped roller after the tappet disk has been removed.

The stepped roller is composed of the machined toothed segments *b*, *c*, *d*, *e*, *f*, *g*, *h*, *i*, *k*, threaded upon the round shaft *a*. Each of these toothed segments is provided with an eye *l* and is bored with a round hole for mounting on the shaft *a*. Washers *m*, preferably of a light metal, are arranged on the shaft *a* between the several toothed segments *b* to *k* for the purpose of securing and, if necessary, varying the distances between the segments.

n is a pin inserted through the eyes *l* of the segments *b* to *k*. This pin projects beyond the last toothed segment, and serves as a means for driving the tappet disk *o* which is slidable longitudinally in the usual manner. The tappet disk *o* is formed for this purpose with a corresponding aperture *p* which enables it to slide along the pin *n* while it can also be carried around by said pin.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A stepped roller for Thomas calculating machines comprising in combination, a rotary shaft, a plurality of integral toothed segments on said shaft, means maintaining said segments in spaced relation with respect to each other, means disposed at one side of said shaft for holding said segments in predetermined relation with respect to each other and an operating member connected with said last named means, substantially as and for the purposes set forth.

2. In a stepped roller for Thomas calculating machines, the combination of a rotary shaft, a plurality of separate toothed segments on said shaft, a tappet disk slidable longitudinally on said shaft, and a common driving member passing through said toothed segments and said tappet disk.

3. In a stepped roller for Thomas calculating machines, the combination of a rotary shaft, a plurality of separate toothed segments on said shaft each of said toothed segments being formed with an eye outside said shaft, a tappet disk slidable longitudinally on said shaft, formed with an eye outside said shaft, and a pin-like driving member passing through all the eyes in said segments and through the eye in said tappet disk.

In testimony whereof I have hereunto set my hand in presence o two subscribing witnesses.

BERNHARD BEHR.

Witnesses:
PAUL ARRAS,
CLÄRE SIMON.