T. F. MULLIGAN.

REGISTERING OR COUNTING DEVICE.

APPLICATION FILED DEC. 4, 1912.

1,127,491.

Patented Feb. 9, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

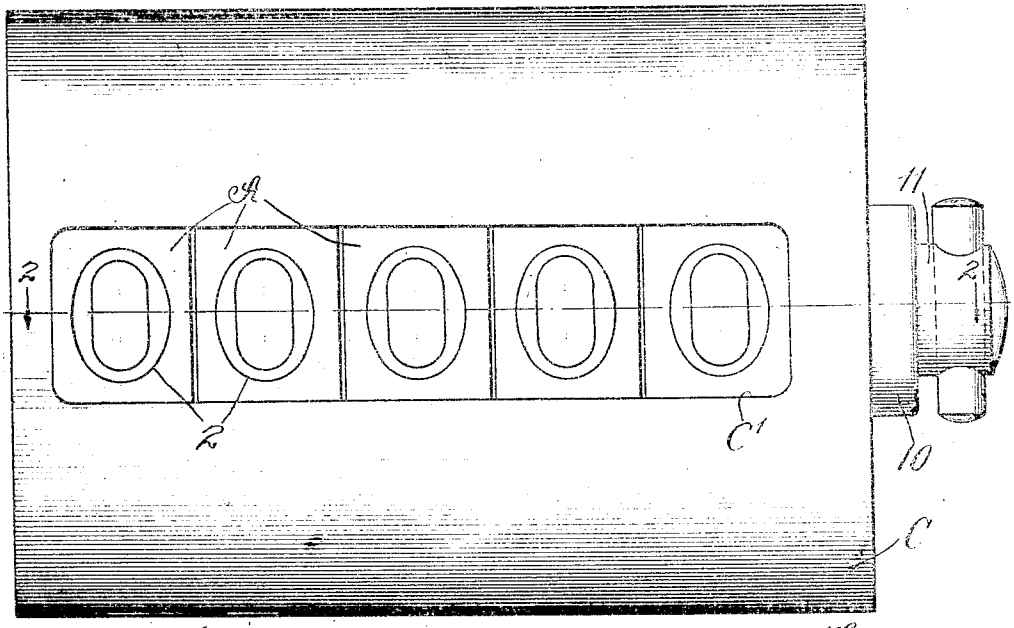
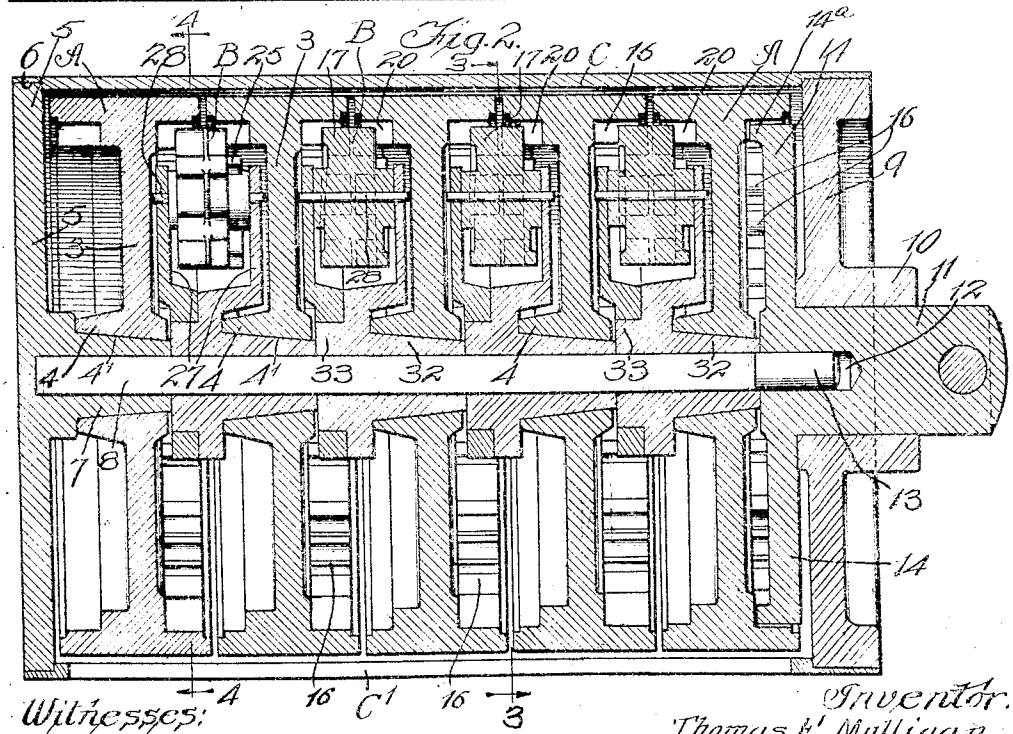


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

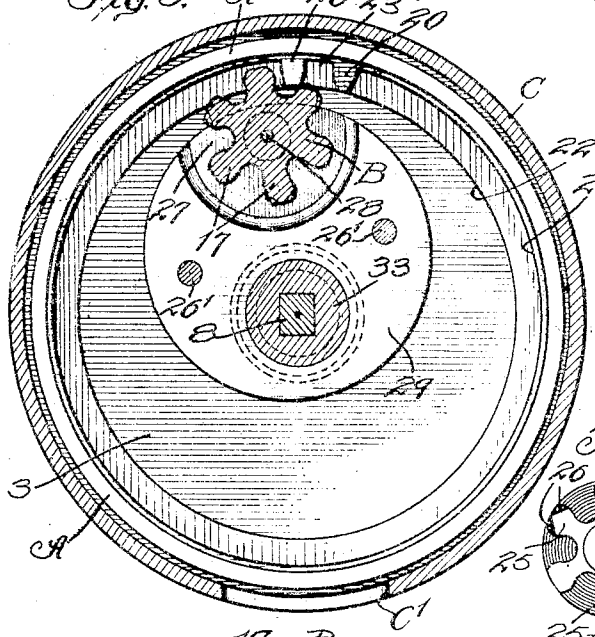


Fig. 5.

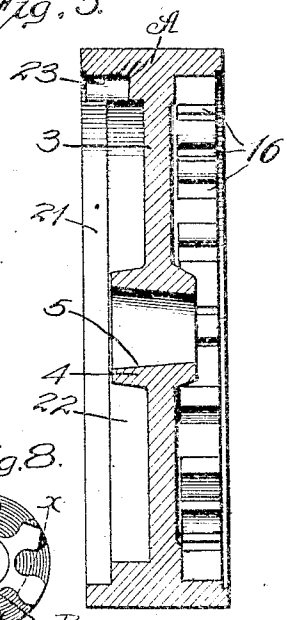


Fig. 8.

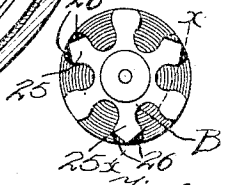


Fig. 4.

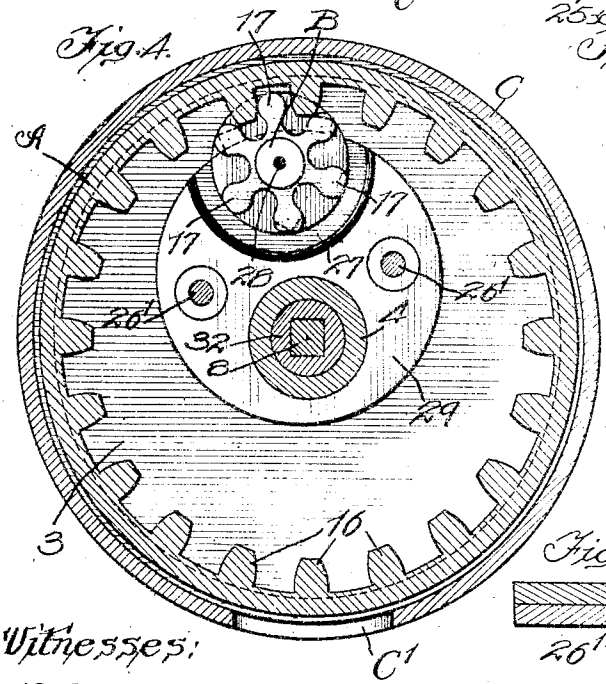


Fig. 6.

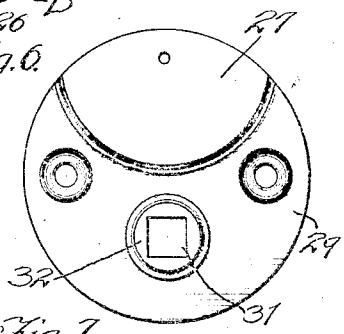


Fig. 7.

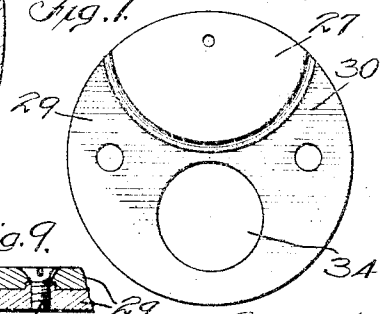
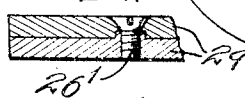


Fig. 9.



Witnesses:

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UNITED STATES PATENT OFFICE.

THOMAS F. MULLIGAN, OF FORT WAYNE, INDIANA, ASSIGNOR TO S. F. BOWSER & COMPANY, INCORPORATED, OF FORT WAYNE, INDIANA.

REGISTERING OR COUNTING DEVICE.

1,127,491. Specification of Letters Patent. Patented Feb. 9, 1915.

Application filed December 4, 1912. Serial No. 734,818.

To all whom it may concern:

Be it known that I, THOMAS F. MULLIGAN, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Registering or Counting Devices, of which the following is a specification.

My invention relates to counting devices or registering mechanisms, and has more particular reference to counting devices or mechanisms of the type having a series or train of counting wheels.

One of the objects of my invention is to provide a counter device or registering mechanism which will be made up of a plurality of completely interchangeable parts so formed that they may be carried in stock quantities and simply assembled into counting devices of any desired counting range or capacity entirely without the aid of special parts and special machine work.

A further object of my invention is to provide an improved interchangeable counting unit which may be stacked or assembled with other identical units without the aid of screws or other fastening devices whereby to form a counting train or registering device of any desired counting range or capacity.

A further object of my invention is to provide an improved device of this character which will be simple, durable and reliable in construction, effective and efficient in operation and extremely inexpensive to manufacture.

Other objects of my invention will appear hereafter.

My invention consists in the features of novelty exemplified in the construction, combination and arrangement of parts herein described, and shown in the accompanying drawing which illustrates one embodiment of my invention, and set forth more particularly in the appended claims.

In the drawings Figure 1 is a general view in elevation of a registering or counting device embodying my invention, the opening or window in the casing being shown to expose the numbers on the counting wheels. Fig. 2 is a central longitudinal section on the line 2—2 of Fig. 1. Figs. 3 and 4 are transverse staggered sections substantially on the lines 3—3 and 4—4, respectively, of Fig. 2. Fig. 5 is a central section of one of the counting wheels or number-bearing wheels. Figs. 6 and 7 illustrate the parts which support the small transfer pinions or members. Fig. 8 is a face view of one of these transfer pinions showing the angular faces of certain special teeth thereon, and Fig. 9 is a detail section showing the method of fastening the parts together which are shown in Figs. 6 and 7.

The structure shown in the drawings is that which I have found best adapted, from a manufacturing and assembling standpoint, to certain requirements and it is in connection with this structure I will explain my invention, but it will be obvious to one skilled in the art after having obtained an understanding of my invention from the disclosure herein made that my invention is not limited to the particular structure shown in the drawings. In the drawings I have shown a registering or counting device having a counting range up to five numbers and hence having five counting wheels or units A. These counting or number wheels are of the same diameter and each one of them has a flat periphery or rim of a breadth suitable for carrying counting numerals or characters 2. The rim of these wheels is supported by thin integral webs 3 at the center of which are integral hub members 4 and these hub members have tapered circular bores or bearing surfaces 4^1. Between each two number wheels of the series is a small pinion B which transfers the result of one rotation of one of the number wheels to the number wheel next adjacent in the series by actuating said next adjacent wheel a fraction of a revolution, so that the individual counting units will progressively or cumulatively build up a total as is usual in registering mechanisms of this character. The counting wheels and other parts of the mechanism are preferably inclosed in a suitable cylindrical casing C having an opening or window C^1 which exposes a corresponding portion of each of the counting wheels and enables the total sum registered by these counting wheels to be conveniently read. The casing or inclosure C may and preferably does comprise a hollow cylindrical shell of thin metal. At one end of this casing I provide a circular disk-shaped head or end member 5 which may be seated or fitted into an annular shoulder or groove 6 in the end of the casing to position it relatively. This

head member 5 has a central instanding member or extension 7 which is tapered corresponding to the hub bore 4^1 of the last counting wheel in the series and upon which said counting wheel is adapted to rotate. This extension portion also detachably supports one end of a centrally disposed square shaft 8 which extends longitudinally throughout the entire mechanism, the extension member 7 preferably having a square bore or socket for this purpose. The other end of the casing has a similar head member 9 preferably fitted into the end of the casing in the same manner as the head member 5. This head member 9 has an integral central journal bearing 10 in which a large short shaft 11 rotates as clearly shown in Fig. 2. The inner end of this short shaft 11 has a central bore 12 which is circular in section and which supports the corresponding end 13 of the square shaft 8, the end portion 13 of said square shaft being formed circular in section so as not to interfere with the rotation of the short shaft 11. The short shaft 11, as is seen, projects through the end of the casing and affords suitable means for connecting it with the apparatus or mechanism which actuates the registering device and which is to have its operations registered. On the inner end of the short shaft 11 I form an integral disk 14 which serves as a suitable means for communicating the motion of the short shaft 11 to the first or adjacent end counting wheel A of the series.

By reference more particularly to Figs. 3, 4 and 5 it will be seen that the inner peripheries of the rims of the counting wheels have annular series of gear teeth 16 located on corresponding sides of the webs 3 and projecting radially inward. The short shaft 11, as before mentioned, is adapted to be connected directly or indirectly with the mechanism which drives the registering device and which is to have its operations counted. Said shaft may be connected in any desired manner to said mechanism. The motion of the shaft is connected to one end of the series of counting wheels through the medium of the disk 14 and the teeth 16 on the inner periphery of the adjacent or unit counting wheel A. As shown more particularly in Fig. 2, this disk 14 has peripheral teeth or projections 14^a which mesh with or fit the teeth 16 on the inner periphery of the adjacent or unit counting wheel A so that said counting wheel and disk 14 are virtually locked together and the rotations of the disk 14 will be imparted to the said counting wheel. The rotations of said counting wheel will be transmitted to the other counting wheels of the series in a manner which I will now describe. These teeth constantly mesh with corresponding sets of teeth 17 at one side of the transfer pinions B for actuating the counting wheels. On the other side of the webs 3 the counting wheels are each provided with two teeth 20 of identically the same form and dimensions as the series of teeth 16 above mentioned, these two teeth projecting radially inward. The remaining portions 21 of the internal peripheries of the counting wheel rim is left blank so that there will be no co-action between the counting wheels and their corresponding transfer pinions except when their two teeth 20 are in engagement with said transfer pinions. On the same side of the web 3 each counting wheel has an internal peripheral portion 22. This portion 22 is of a diameter the same as that of the circle in which the inner ends of the teeth 20 lie, and is free of projecting teeth. The space 23 between the two teeth 20 however extends into this internal peripheral portion 22 as shown clearly in Fig. 5. Each transfer pinion as shown in the drawings, is provided with teeth conforming to the teeth 16 and 20 of the counting wheel and adapted to mesh therewith. These pinion wheels occupy the space between the counting wheels A and are long enough to bridge adjacent counting wheels. In other words, one transfer pinion is common to two adjacent counting wheels; hence it will be seen that when one of the counting wheels is rotated a complete revolution its two teeth 20 will impart to its transfer pinion a fraction of a revolution corresponding to two of its teeth and this will in turn actuate the adjacent counting wheel next in the series the same fraction of a revolution. These counting wheels are preferably arranged each numbered from zero to 9 inclusive on the basis of a counting system in multiples of ten and the teeth are correspondingly proportioned so that a complete rotation of one counting wheel will, through the medium of its transfer pinion and the series of teeth 16, advance the counting wheel next highest in order one tenth of a revolution. These parts may of course be varied to meet the requirements of the particular counting system employed.

In order to prevent the rotation of the transfer pinions and consequently the counting wheels which they drive except when the transfer teeth 20 are in mesh they are provided with extensions 25 on alternate teeth 20. These extensions are long enough to enter the spaces 23 and allow the pinions to rotate to the extent of two teeth. During the remaining part of the rotation of the counting wheels these extensions ride against the inner peripheral portions 22 of the counting wheels in such manner as to lock the transfer pinions against rotation but at the same time permit the rotation of the counting wheels. The faces 26 of these extensions 25, as will be seen, are arranged at such an angle that they conform substan-

tially to the general arc of the inner peripheral portions 22 of the counting wheels as indicated by the curved dotted line x—x in Fig. 8. The transfer pinions, as before stated, occupy the space between the counting wheels and in order to prevent them being carried bodily around during the rotation of the counting wheels I provide supports therefor which hold them in a definite relative position with respect to said counting wheels and the central shaft 8. In order to carry out the idea of interchangeability of parts I preferably make the pinion supports in the form of two circular shaped members 29 (Figs. 6 and 7) clamped face to face by the screws 26^1 (Fig. 9). The two circular members which support each pinion are provided with opposed indented or offset portions 27 which provide suitable recesses or sockets for the pinions.

The pinions are mounted upon small shafts 28 which, as seen more particularly in Figs. 2, 3, 4, 6 and 7, are journaled in suitable bearing openings in the walls of these offset portions. One of these supporting members 29 has a hub portion provided with a square bore 31 fitting the central square shaft 8 so as to prevent it from bodily rotating about said shaft. The portion 32 of this hub projects from one face of said supporting member 29 and is tapered so as to form a bearing for the tapered hub 4 of the adjacent counting wheel. The other end portion 33 of the hub is shorter and somewhat larger in diameter. It projects from the opposite face of the supporting member 29 and is preferably circular in section so as to fit within a circular opening 34 in the other supporting member 29. Thus the two supporting members are separably interfitted with respect to each other. It will thus be seen that a counting wheel with its corresponding transfer pinion and the supporting parts therefor constitute a unit counting element or counter, the parts of which are identical in every respect with and are consequently interchangeable with the corresponding parts of any other counter units in the series. This construction is of extremely great advantage from a manufacturing standpoint. This is obvious for the reason that the corresponding parts of all of the units may be made in large quantities and carried as stock parts. Thus by merely assembling the parts of the number of counting units desired and then assembling the duplicate units on the shaft, a complete counting mechanism of any desired counting range may be obtained. The formation of the parts as above described also has the extremely important manufacturing advantage that they may be cast ready for assembling without requiring any preparatory machine work whatever. From an operating standpoint it is to be observed all of the counting wheels except the first in the series, are locked against rotation except at such times as when a total amount of one wheel is to be transferred to the next wheel.

My invention, as before stated, is illustrated by the particular structure shown in order that an understanding may be had of the invention, but it will be obvious that my invention may be embodied in other modified structures without departing from the scope and spirit thereof and I wish it to be so understood.

What I claim is:—

1. In a device of the class described, the combination of a plurality of interchangeable counting wheels having internal gear teeth, a plurality of interchangeable transfer pinions meshing with said gear teeth and adapted to actuate said counting wheels, transfer pinion supporting members each having a hub upon which one of said counting wheels is rotatably mounted, means on the adjacent counting wheels for actuating said pinions at the transfer points in the rotation of said adjacent counting wheels, and interengaging means on said pinions and said adjacent counting wheels locking said pinions against actuation during the remaining portions of the rotation of said adjacent counting wheels.

2. In a device of the class described, the combination of a common shaft, a plurality of interchangeable members separably assembled on said shaft in non-rotative relation thereto, a plurality of interchangeable transfer pinions each supported by one of said members, and a plurality of interchangeable counting wheels engaging said pinions and each mounted on one of said pinion supports.

3. In a device of the class described, the combination of a non-rotative supporting member having a lateral extension, a counting wheel rotatably mounted on said extension, and a carrier wheel mounted on said supporting member in position to be actuated by said counting wheel.

4. In a device of the class described, the combination of a non-rotative supporting member having an axial extension, a counting wheel rotatably mounted on said extension, a carrier wheel mounted on said supporting member in position to be actuated by said counting wheel, and a non-rotative shaft supporting said supporting member.

5. The combination of a non-rotative spindle, a plurality of non-rotative bearing members mounted on said spindle end to end, a plurality of counting wheels each rotatably mounted on one of said bearing members, and a plurality of carrier members each mounted on one of said bearing members in operative position with respect to said counting wheels.

6. The combination of a common spindle,

a plurality of interchangeable bearing members removably mounted on said spindle in end to end relation, a plurality of counting wheels each mounted on one of said bearing members and each counting wheel being held against longitudinal movement by the next adjacent bearing member, a supporting member carried by each of said bearing members and positioned between the adjacent counting wheels, and transfer devices each carried by one of said supporting members and having means coöperating with adjacent counting wheels for imparting rotation of one of said wheels to the next adjacent wheels.

7. The combination with a non-rotating spindle, of a plurality of similar hub members interchangeably mounted on the spindle one against the other and each having a tapered round hub, a plurality of interchangeable counting wheels with correspondingly tapering hubs rotatably mounted on the other hubs, and transfer wheels carried by each of said supporting members and coöperating with adjacent counting wheels for imparting the rotation of one counting wheel to the next adjacent wheels.

8. The combination with a non-rotating spindle, of supporting means consisting of a series of interchangeable supporting members non-rotatably mounted on the spindle with tapered hub portions placed end to end, a plurality of interchangeable counting wheels each having a tapered hub rotatably fitting the other hubs and held against displacement by the hub of the next adjacent supporting member, and transfer pinions carried by said supporting members and coöperating with the counting wheels for imparting rotation of one wheel to the next one.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 29th day of November A. D. 1912.

THOMAS F. MULLIGAN.

Witnesses:
J. R. MATLACK,
L. W. THOMAS.