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COUNTING APPARATUS.  
APPLICATION FILED DEC. 21, 1910.

996,541.

Patented June 27, 1911.

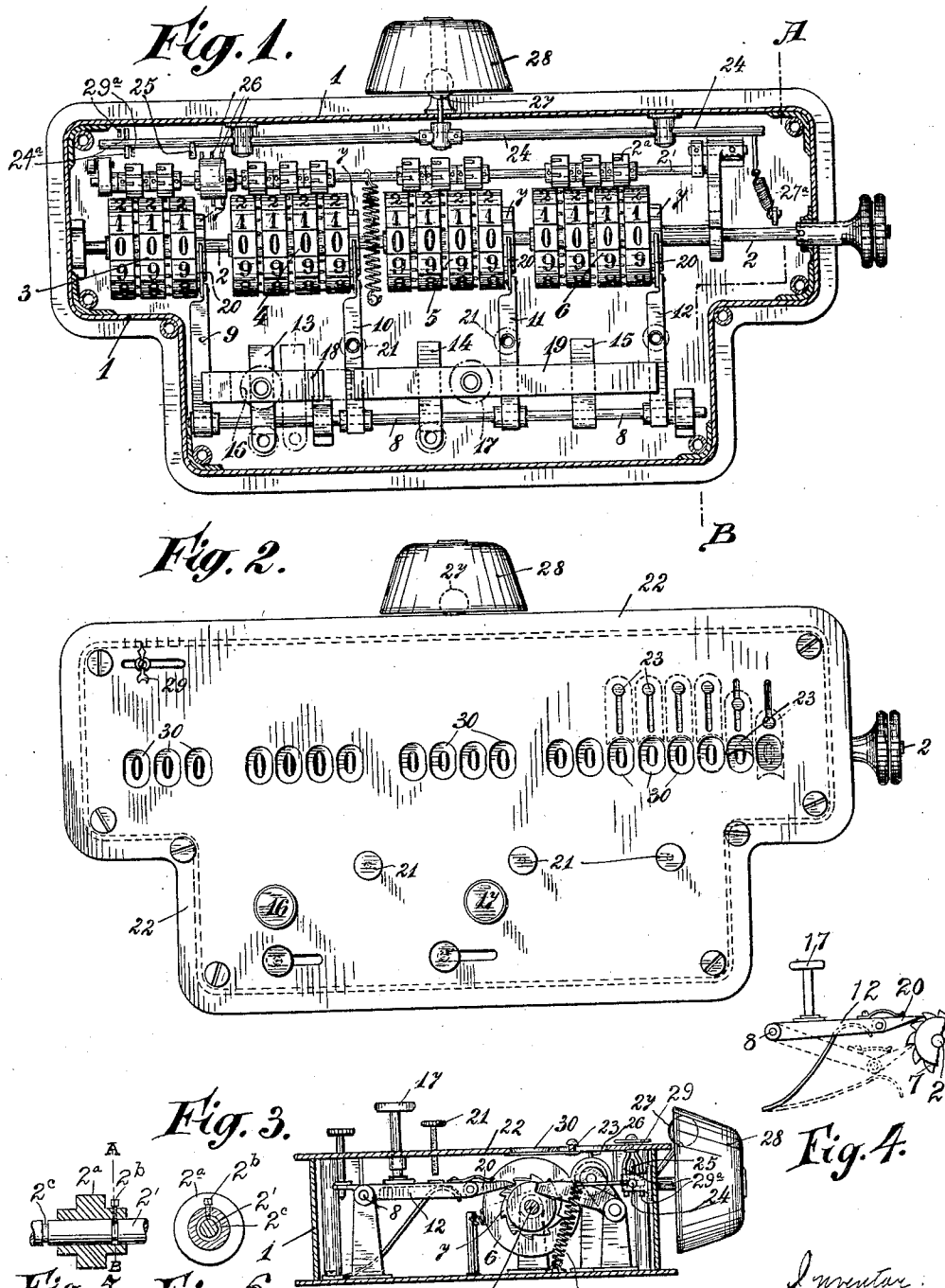


Fig. 5. Fig. 6.  
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# UNITED STATES PATENT OFFICE.

RACHMEL TOJBIN, OF BERLIN, GERMANY.

## COUNTING APPARATUS.

996,541.

Specification of Letters Patent. **Patented June 27, 1911.**

Application filed December 21, 1910. Serial No. 598,549.

*To all whom it may concern:*

Be it known that I, RACHMEL TOJBIN, a subject of the Czar of Russia, and residing at Berlin, Germany, have invented certain new and useful Improvements in Counting Apparatus, of which the following is a specification.

My invention relates to apparatus for counting and calculating cells, blood-corpuscles and the like.

One preferred form of my apparatus is represented by way of example in the accompanying drawing, wherein:—

Figure 1 is a plan view after the cover has been removed, Fig. 2 a like view of the complete apparatus, Fig. 3 is a vertical section on the bent line A—B in Fig. 1. Fig. 4 is a detail view of the actuating lever, pawl and ratchet, the lever and pawl being shown in their lowermost position in broken lines. Fig. 5 is a fragmental detail view showing one of the members 2<sup>a</sup> in section and illustrating its connection with the shaft 2'; and Fig. 6 is a transverse sectional view of the shaft 2' and member 2<sup>a</sup>; the section being taken on the line A—B of Fig. 5.

Referring to the drawing, of the four counting mechanisms 3 to 6 provided on a shaft 2 in the casing 1 and comprising a ratchet wheel 7, the mechanism 3 comprises three numbered disks, while each of the others comprises four.

The shaft 2' carries a number of transmission disks 2<sup>a</sup>, which are operatively connected with the numbered disks, in the usual manner, for rotating the said numbered disks. Certain of these transmission disks are rotatable upon the shaft 2' and are secured against longitudinal movement thereon by any proper means; one means being shown in Figs. 5 and 6, wherein a pin or screw 2<sup>b</sup> is secured in the hub of the disk 2<sup>a</sup> and extends into a peripheral groove 2<sup>c</sup> in the shaft 2'.

The levers 9 to 15, which can be rocked through the medium of cross-bars 18 and 19 by means of press-buttons 16, 17, are fulcrumed on an axle 8. Each of the levers 9 to 12 carries a pawl 20 which engages in such manner with a ratchet wheel 7 that, when the press-buttons are depressed, the pawls slide over the teeth of the wheels, and when the pawls are raised, after the pressed buttons have been released, the ratchet wheels are fed. By adjusting the set screws 21, the

upward stroke of the levers can be varied, so that the pawls 20 cause the ratchet wheels 7 to rotate in proportion to the stroke of the lever. The counting mechanisms can be thrown out of gear by the set-screws 21, which are mounted in the casing 1 and normally contact with the levers 9 to 12, and they may be returned to zero in any known manner.

The casing 1 is closed by a cover 22 having nineteen apertures 30. The numbers of the counting mechanisms are visible through the first fifteen apertures, while four zeros fixedly arranged under the cover are normally visible through the last four apertures. Accordingly, the number indicated by the counting mechanism 6 normally appears multiplied by 10,000. Six slides 23 are mounted on the cover so that any of the last numbers normally visible through the cover can be hidden. For the sake of simplicity these slides are shown independent one of another but they may obviously be actuated by a common member. The specific zeros to be hidden, or exposed, for the various counts, must be calculated and governed according to the particular circumstances concerning the substances being treated, or counted; and for this purpose, printed directions for use may be supplied with each of these counting machines. My apparatus also comprises a device, by which a signal is sounded after a definite number is indicated. This device comprises a shaft 24 mounted oscillatory and is axially displaceable in the casing 1. This shaft carries a stop 25; and one of the stops 26, which are operatively connected with the right-hand numbered disk of the counting mechanism 3 abuts against one of the stops 25 after a definite number of movements of the counting mechanism, whereby the shaft 24 is oscillated against the action of the spring 27<sup>a</sup> and the hammer 27 is thereby caused to strike the bell 28. The second stop 26 is located on the opposite side of the disk from the stop which is shown in the drawings; therefore, this second stop is not seen in the drawing. In the event of signals being desired after other counts than those here provided for, any desired number of stops 26 may be provided, and their respective positions must be determined by trial. The shaft 24 being axially displaceable as stated, its stop 25 can be placed as desired opposite to one of the stops 26 or be

quite out of opposition, as described. It is obvious that any reasonable number of pins 26 may be applied to the drum which carries them, they may be arranged in peripheral series, each series having a different number of pins than the other series. For instance, in Fig. 1 there is but one pin to the leftward, two in the middle and four in the rightward series, only three however, being visible, the fourth one being on the other side of the drum. It is therefore obvious that, for the same number of revolutions of the drum, the bell would be sounded four times as often if the stop 25 were in contacting relation with the rightward series of pins than it would be sounded were it in contacting relation with the leftward pin. The position of the pin 25 is indicated outside the casing by means of a pointer 29, which also serves as a means for moving the shaft longitudinally by hand. The pointer 29 is provided with depending extensions 29<sup>a</sup> which are adapted to contact the pins 24<sup>a</sup>, as indicated.

The operation of the device is as follows:—A quantity of the substance to be examined is placed under the microscope in a counting chamber, which consists of an object-holder having a cavity of 1/10 c.mm. volumetric contents divided into 400 squares. This counting chamber, being of well known construction and forming no part of the present invention, is not here described or shown. As soon as the investigator sees one of the 400 squares he depresses the left-hand press-button 16, feeds the counting mechanism 3 one tooth forward and thus counts the squares. As each cell is observed he depresses the right-hand press-button 17. This press-button is on the cross-bar 19 which is located above the three levers 10, 11, 12. If these three levers were in the same position, when the button 17 is depressed, each of the three counting mechanisms 4, 5, 6 would be fed a like amount. But this is not to take place. To this end, the set-screws 21 are provided, by which one or more of the levers 10 to 12 can be depressed so far that they are out of reach of the cross-bar 19. In the present instance the lever 12 may be supposed to be rendered inoperative, so that only the two counting mechanisms 4 and 5 are actuated. Further, the last counting mechanism 6 is preferably normally set to be fed twice as fast as the others so that it does not count 1, 2, 3 and so on, but 2, 4, 6 and so on. When the button 17 is depressed the mechanisms 4 and 5 are fed one tooth.

I will assume that the substance to be examined is a liquid, diluted tenfold, containing cells. It is to be determined how many cells are in one cubic millimeter of undiluted liquid. One drop of the diluted liquid is put into the above mentioned cavity

of 1/10 c. mm. 400 squares are to be counted and the signal is accordingly adjusted to 400. 30 cells may be counted in these squares. Accordingly, at the end of the count the left-hand mechanism 3 will show 400 and the mechanisms 4 and 5 will each show 30. The counting mechanism 6 had previously been placed to 0 and the last six numerals hidden by the slides 23. Consequently, the counting mechanism 5 does not in fact read 30 but 3000. As can readily be proved by calculation this number is the number of the cells actually contained in one cubic millimeter of the undiluted liquid.

As a second example it will be assumed that a twentyfold dilution is used and that 40 squares are to be counted. In this case, the counting mechanism 5 is disconnected and the counting mechanism 6, which does not count 1, 2, 3 but 2, 4, 6, connected. When 25 cells have been counted in the 40 squares, at the end of the count the counting mechanism 3 will be at 40, the counting mechanism 4 at 25, the counting mechanism 5 at 0 and the counting mechanism 6 at 50. One of the four stationary zeros had previously been hidden, so that the counting mechanism 6 does not show 50, but 50,000.

The above described arrangement of my apparatus enables only the absolute number of cells to be determined. If the percentage of two kinds of cells is to be determined, the cross-bar 18 is displaced longitudinally to the right into the position shown in dotted lines, so that it rests on the lever 10. The last counting mechanism is again disconnected and all six zeros hidden. When observing the one kind of cells the right-hand press-button 17 is depressed, and when observing the other kind of cells the left-hand press-button 16 is depressed. If the button 17 is depressed six times and the button 16 four times, the counting mechanism 5 will show 600 and the counting mechanism 4 will show 10. The ratio of 60% is obtained by division from these two numbers.

I claim:—

1. In counting apparatus of the type described, the combination of a casing, a plurality of counting mechanisms each comprising a ratchet wheel mounted in the casing, a plurality of levers each arranged to actuate a ratchet wheel, one cross-bar, carrying a press-button, for actuating some of said levers, another cross-bar, carrying a press-button, for actuating the remainder of said levers, a plurality of zeros fixedly arranged in the casing in line with one of said counting mechanisms, and slides movable on the casing for hiding said zeros.

2. In counting apparatus of the type described, the combination of a casing, a plurality of counting mechanisms each comprising a ratchet wheel mounted in the cas-

ing, a plurality of levers each arranged to  
actuate a ratchet wheel, means for throw-  
ing the counting mechanism out of gear,  
one cross-bar, carrying a press-button, for  
5 actuating some of said levers, another cross-  
bar, carrying a press-button, for actuating  
the remainder of said levers, a plurality of  
zeros fixedly arranged in the casing in line  
with one of said counting mechanisms, and  
10 slides movable on the casing for hiding said  
zeros.

3. In counting apparatus of the type de-  
scribed, the combination of a casing, a plu-  
rality of counting mechanisms each com-  
prising a ratchet wheel mounted in the cas-  
ing, a plurality of levers each arranged to  
15 actuate a ratchet wheel, one cross-bar, carry-

ing a press-button, for actuating some of said  
levers, another cross-bar, carrying a press-  
button, for actuating the remainder of said 20  
levers, one of said cross-bars being longitudi-  
nally displaceable and able to coact with a  
variable number of levers, a plurality of  
zeros fixedly arranged in the casing in line  
with one of said counting mechanisms, and 25  
slides movable on the casing for hiding said  
zeros.

In testimony whereof, I affix my signature  
in the presence of two witnesses.

RACHMEL TOJBIN.

Witnesses:

WOLDEMAR HAUPT,  
HENRY HASPER.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

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