J. L. HERRING.

COMPUTING MACHINE.

APPLICATION FILED APR. 27, 1916.

1,263,244. Patented Apr. 16, 1918.

FIG. 1.

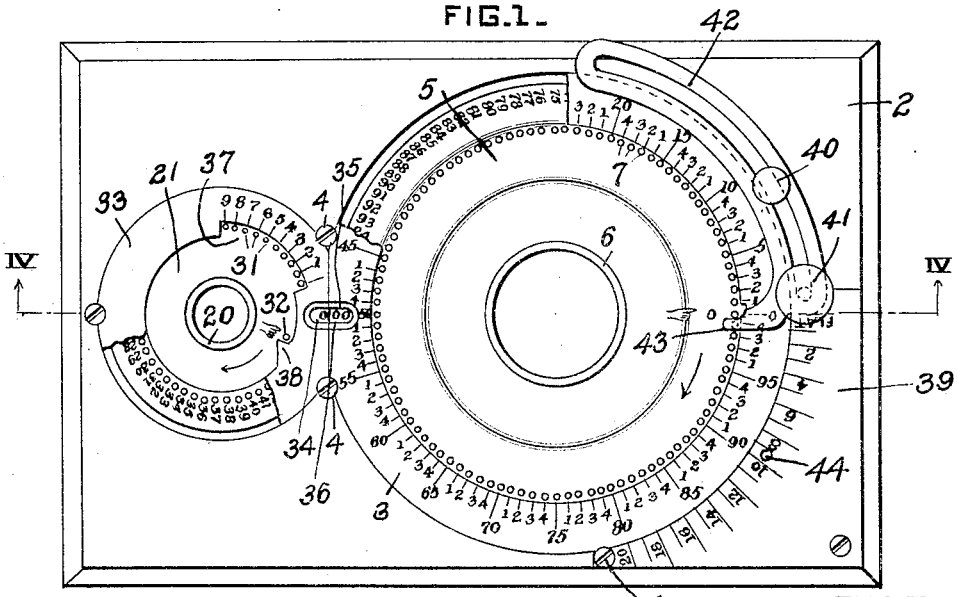


FIG. 3.

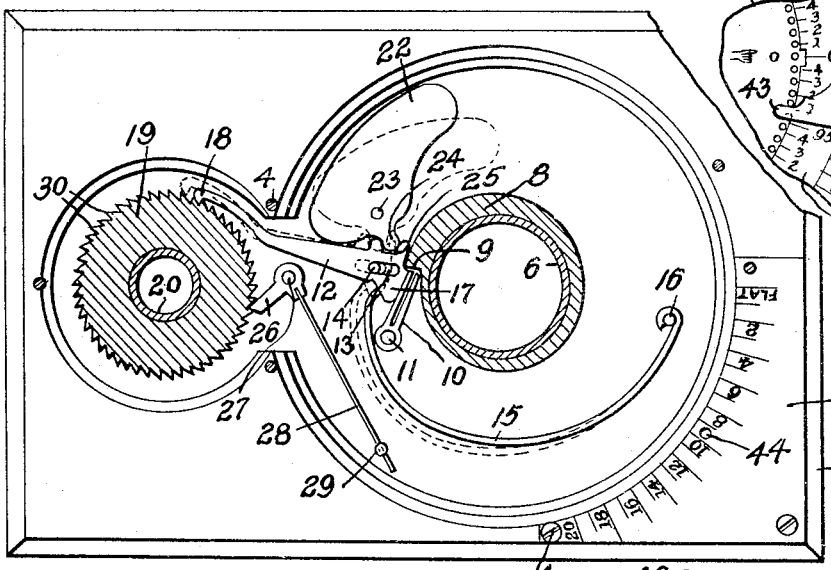


FIG. 2.




FIG. 4.

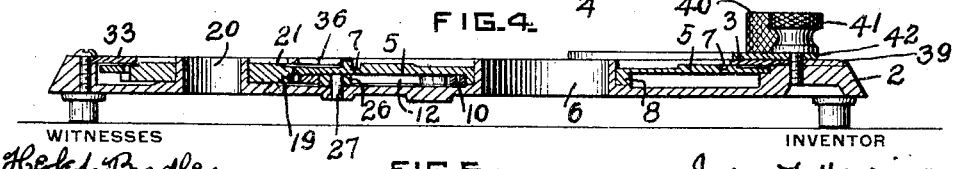


FIG. 5.

WITNESSES

J. Herbert Bradley.

Jos. Bailey Brown

INVENTOR

John L. Herring

by C. M. Goode

his attorney

# UNITED STATES PATENT OFFICE.

JOHN L. HERRING, OF IRWIN, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO HENRY H. HERRING, OF IRWIN, PENNSYLVANIA.

## COMPUTING-MACHINE.

1,263,244. Specification of Letters Patent. Patented Apr. 16, 1918.

Application filed April 27, 1916. Serial No. 93,918.

*To all whom it may concern:*

Be it known that I, JOHN L. HERRING, a citizen of the United States, residing at Irwin, in the county of Westmoreland and State of Pennsylvania, have invented certain new and useful Improvements in Computing-Machines, of which the following is a specification.

My invention relates to computing machines, and its primary object is to provide a device for automatically adding the loads of the individual cars of a train and simultaneously putting into the total a fixed allowance of tonnage per car which may be considered the constant factor of resistance to motion of the train, irrespective of its load, and under given conditions.

More particularly my invention is designed to provide an instrument in the nature of an adding machine, by which the ton loads of freight cars may be added up, the total being itself shown, and a fixed tonnage being automatically added to the load of each car to compensate for the tractive resistance of the car itself.

I provide means whereby this factor of resistance may be varied, by adjustment of the instrument, and means for fixing the device in adjusted position, so that the same factor will be added in every case, and there need be no re-adjustment.

In other words, the device is so made that it may be set for any constant factor of train resistance, thus adapting it for use in any particular railroad.

Referring to the drawings,—

Figure 1 is a plan view of my device, with parts thereof broken away.

Fig. 2 is a partial similar view showing the limiting member in adjusted position.

Fig. 3 is a plan view of the instrument, in partial longitudinal section, with the recording dials removed, showing the inclosed mechanism.

Fig. 4 is a vertical section through the instrument, on the line IV. IV. of Fig. 1.

Fig. 5 shows an operating needle for the instrument.

In railroad yards it is necessary for the yard master to compute the total load of any train which is sent out, in order to prevent overloading the engine. He knows the tonnage rating of his engine, and the load of each car is known.

It has been found by test that there is a certain uniform resistance to motion, caused by inertia, and friction of all cars on certain grades. This is very nearly the same, whether the car is empty or loaded. That is, an engine attached to five cars has to exert a certain amount of power to move the load and a certain additional amount per car to overcome, and if ten cars constitute the train resistance, with the same load approximately twice the power will be necessary to overcome the car resistance.

The actual resistance per car will, of course, depend upon the grades which are encountered, the curves, and the physical nature of the road. But having considered all of these elements, it is found that there is a nearly constant factor applicable to all cars, irrespective of whether they are empty or loaded.

It is customary for railroad engineers to figure the maximum grade of any particular division and figure the amount of power necessary to pull a ton load over such grade.

Therefore, knowing the power of any given engine, by adding the number of tons of load of the individual cars, until the maximum power of the engine is reached, a train is made up which can be handled by the locomotive. In addition to the actual loads of the cars, the constant factor of tractive resistance applicable to every car must be added in computing this total train load, the number being figured in consideration of the grades encountered, etc.

Upon the base 2 of my device I mount an annular dial 3, having counter-clockwise figures from 1 to 100, as shown. This dial is fixed in position and held tightly by screws 4.

Concentric with the dial 3 is a rotary dial 5, which is mounted on an annular post 6, which is integral with the base 2. The dial 5 has small perforations 7, one for each number on the dial face, and each perforation is radially alined with its corresponding numeral. One perforation is marked 00 and the others run 01, 02, etc., to 99, counter-clockwise, one hundred in all.

The perforation radially alined with numeral 50 is indicated by the mark 0 on the dial face and has a pointing hand also shown. An arrow on this plate indicates the proper direction of rotation. Outside of the ring of perforations 7 is the series of numerals above referred to.

Fixed on the underside of the plate 5 is a cam 8, surrounding the post 6. This cam extends entirely around the post, and ends in a sharp step 9. A lever member 10 is loosely attached to base 2 by rigid pin 11, and its movable end bears against the hook member 12, which is mounted by slot 13 on a pin 14, rigidly attached to base 2.

A spring 15 is attached to rigid pin 16 in the base, and has its free end bearing against an arm portion 17 of the hook member 12. The free end of the member 12 bears a hook 18, which engages a ratchet wheel 19, which is rotatably mounted on a central annular post 20 which is integral with the base 2. This ratchet is fixed on the underside of dial member 21.

A retarding member 22 is mounted on a pin 23 fixed in the base 2, and has a projecting arm 24, which engages a fork 25, in the base of the hook member 12, and on the opposite side of the spring engaging arm 17.

A pawl 26 is mounted on fixed pin 27, and is held normally in engagement with the teeth of the ratchet wheel 19 by means of a spring 28, one end of which passes through the fixed pin 29, attached to base 2.

By this mechanism, when the plate 5 is rotated clockwise, its inner cam 8 bears against the member 10 and as the cam progresses, the member 10 is forced against the base of member 12, forcing it outward against spring pressure. Just before the off-set 9 reaches the end of member 10, the hook 18 is raised far enough to engage the next consecutive tooth of the ratchet 19. As the cam passes off the end of member 10, the spring 15 withdraws the hook member 12, the hook 18 in withdrawing moving the ratchet wheel clockwise for one tooth space.

The member 22 is simply a counter balance, being made of considerable weight, in order to retard the withdrawal of the hook member 12, which might otherwise cause the ratchet wheel to jump more than one space at a time. Having moved a space, the ratchet is locked in position by pawl 26, which also acts as a brake.

There are fifty teeth 30 on the ratchet 19. On the dial which is attached to this ratchet there are fifty perforations 31, radially alined with the teeth; and outside the row of perforations, and radially alined therewith is a series of fifty numerals, from zero to 49, running counter-clockwise on the dial.

A single perforation 32 is provided just inside the circle of perforations 31 with a pointing hand or other indicating mechanism. An arrow showing the proper direction of rotation of this dial is provided on its face. From the mechanism above described it will be apparent that every time the dial 5 makes a complete clockwise revolution the dial 21 will be turned in the same direction one tooth space, or, in other words, it will be advanced at any point from one indicating numeral to the next consecutive indicating numeral.

The smaller dial registers one unit for each complete turn of the larger dial. Since each revolution of the larger dial indicates 100 units, the reading of the smaller dial will register the hundreds of units, and the reading of the larger dial will show units themselves. A concentric plate 33 covers all of the figures on the dial 21 except one, which may be observed through a notch 34, which is provided inside the plate at the point of tangency of dials 21 and 5.

The dial member 3 which covers all the numerals of dial 5 but one, has a similar notch 35, which is placed opposite the notch 34, both together forming one complete opening 36 through which the complete number on each of the dials 21 and 5 may be observed. These numbers are alined, and read as one set of figures. Since the smaller dial registers the hundreds and the larger the tens and units, the two combined and alined register the complete total. When both dials are set at zero, there is no number indicated in the opening 36. A small metal needle, shown in Fig. 4, adapted to engage the various perforations is provided.

By bringing the mark 0, indicated on the dial 5 by a pointing hand, opposite the 0 indication of dial 3, the dial 5 will register zero in the opening 36. This is always done before commencing an addition.

If the operating needle is placed in a perforation of the dial 5 corresponding to any number indicated on the dial 3, and the dial 5 is turned by means of the operating needle until the perforation engaged is opposite the zero mark on the dial 3, the numeral indicated on dial 3 at the perforation first engaged will be shown in the opening 36.

If, now, another perforation is engaged with the operating finger, and that perforation in turn advanced clockwise to the zero point on the dial 3, the reading in the opening 36 will be the sum of the two numbers chosen on dial 3, and from which the perforations were advanced, and so on the any number of such movements of the dial 5.

Furthermore, as soon as the dial 5 has made a complete revolution, that is, when the zero point indicated by the pointing hand has made an entire revolution, the cam mechanism will have operated to advance the small dial 21 one tooth space, or in other words, one indicating numeral space, and the small dial will indicate in the opening 36 the numeral 1, *i. e.*, one hundred.

Opposite this will be the zero point of the large dial, and the total indicated will be "100", or a complete revolution of the larger dial, and so on for any number of additions.

The total indicated in the opening 36 will always be the total of the separate advances of the dial 5. The step 9 of the cam prevents the counter-clockwise revolution of the dial 5 beyond the zero point. A portion of the covering 33 is cut away at 37 to expose a series of perforations 31, and a series of counter-clockwise numerals radially alined with said perforations is provided on the plate 33. This furnishes a means for advancing the dial 21 as many hundreds as desired, without necessity of rotating dial 5. The operating needle is placed in any desired perforation, *e. g.*, 3, and the dial rotated clockwise until the needle is stopped by the limiting shoulder of the cut-away portion 37. The number indicated will be increased by three hundred, etc.

A spur 38 on the plate 33 is provided in the path of the pin when inserted in a perforation 32, which is inside the plate 33. When the operating needle is engaged in the perforation 32, the dial 21 may be rapidly rotated clockwise until the needle comes against the spur 38 and is stopped thereby. The perforation 32 is so spaced with regard to the numerals that when the needle engaging perforation 32 is stopped by spur 38 the indication of the dial in opening 36 is zero.

Outside the dial 3, there is mounted a radially graduated plate 39 on the base 2. The radial indicating marks on this plate begin with zero, and this mark is radially alined with the zero point of dial 3. This initial indication may be denoted by the word "Flat", meaning flat tonnage or no resistance. Thereafter, consecutive radial indicating marks are provided, all being radially alined with the numbered spaces, and the perforations, on the dials 3 and 5, but extending clockwise.

A set screw 40 threaded in the base 2, and another set screw 41 engages the plate 39, and is also threaded into base 2.

The two set screws are situated in the path of the circumference of which the slot of member 42 is a segment, and which is concentric with the dials 3 and 5.

One end of this member 42 is cut radially across and this end is adapted to register with and be radially coincident with the indicating marks on the plate 39; that is, as the member 42 may be advanced clockwise in the path determined by engagement of the two binding posts in its curved slot, the square end of the member will radially coincide with the indicating marks on the plate 39. On the inside of the curved member 42 is a radially inwardly extending finger 43, which extends across the line of perforations 7.

When the end of limiting member 42 is adjusted on the zero indication of plate 39, which is marked "Flat", the finger 43 will cross the path of perforation 7 in radial alinement with the zero indication of plate 39. Consequently, when the indicated zero on the rotary dial (which is at the numeral 50) is advanced clockwise until the operating needle is stopped by the finger 43, crossing the path of perforations 7, the numeral registered in the opening 36 for the dial 5 will be zero.

To use the machine for straight addition, it is only necessary to set the member 42 on the "flat" position, fix it there by tightening the thumb screws, and then having first set dials 5 and 21 at zero, engage the perforation 7 opposite the desired number on dial 3 (*e. g.*, 30), and rotate the dial 5 by the operating needle until it is stopped by the finger 43. The opening 36 will show the numeral 30 registered therein. The next number to be added (say 35) is then taken by engaging the perforation opposite that number with the needle, and that perforation is advanced clockwise until the needle is stopped by finger 43.

The number registered in the opening 36 will then be the sum of the two former numbers (namely 65).

Suppose the next number taken to be also 35, and the proper perforation advanced to the zero point, or to engagement with the finger 43, the sum would then become one hundred.

In computing train loads, for which my device is particularly designed, it is customary to add up the total weights of the various cars and to add thereto a certain factor which is taken as constant for each car to cover the inertia and resistance of the car, irrespective of its load. This is figured out by scientific calculation, depending on the grades to be encountered, kind of equipment, etc. It varies for different railroad divisions, but for any particular yard or division it is a constant factor for every car.

Having computed this factor and expresed it in terms of tons, which may be 2 or 4 or 6, etc., according to the particular physical characteristics of the road division, the total tractive train load is to be computed by adding the loads of the several cars, and adding for each car the constant factor which has been determined to represent the resistance to the moving of the car itself.

By setting the member 42 with its end coincident with the proper car factor (as, for example, 4), provision is made for adding to each car load figured in the total, the proper constant factor. For example, suppose the member 42 be set with its end on the indication 4 of the plate 39, each time the weight of a particular car is taken, the proper perforation will be advanced to the zero point, as above described, and then continued on to engagement of the finger 43, as determined by the indication 4. In other

words, to every carload to be totaled, there will be added the selected factor 4.

An additional threaded hole 44 is provided, so that if a large factor, such as 18, is to be added, the set screw 40 may be transferred from its normal position to the hole 44. This is simply for the purpose of rendering the adjustment of member 42 more rigid.

My device renders it unnecessary to add long columns of figures, avoids mistakes, allows a yard man to figure up his train load just as fast as he could write down the figures of the straight loads, and is accurate and efficient.

The advantages will be apparent to any one familiar with the problem solved.

Having thus described my invention and illustrated its use, what I claim is the following:

1. The combination of a computing machine having a stationary base, a disk revolubly mounted in said base and having a plurality of operating depressions adjacent the periphery thereof, said depressions being adapted to receive an operating tool, a scale on said base having indicia alining with said depressions, and a supplemental scale around a portion of said first mentioned scale, of a slidable adjustable stop mounted on said stationary base and comprising an arc shaped slotted body portion, said adjustable stop coöperating with said supplemental scale and adapted to move around the center of said revoluble disk, a plurality of adjustable holding and guiding screws extending through said slot, and a terminal projection formed integral with said body portion overlying both of said scales and extending into interfering position above the depressions in said revoluble disk.

2. A computing machine comprising a base, a disk revolubly mounted in said base and having a plurality of apertures adjacent the periphery thereof, said apertures being adapted to receive an operating tool, a scale on said base having indicia alining with said apertures, a supplemental scale mounted on said base and extending around a portion of said first mentioned scale, and a slidably adjustable arc shaped stop movable on said stationary base around the center of said disk and coöperating with said supplemental scale, said stop comprising a slotted body portion and a projection overlying both of said scales and extending into interfering position above the depressions in said disk, and a plurality of adjustable holding and guiding screws mounted in threaded apertures in said base and extending through said slot, said base having other apertures therein for the reception of said screws to allow for a greater path of travel of said stop.

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

JOHN L. HERRING.

Witnesses:
W. A. HECKMAN,
C. M. CLARKE.