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J. ANDERS
ARRANGEMENT FOR INDICATING COUNTING OR PRINTING, ESPECIALLY FOR AUTOMATIC BALANCES INCLINATION BALANCES
Filed Oct. 14, 1939

Serial No.
299,434

4 Sheets-Sheet 1

Fig.1

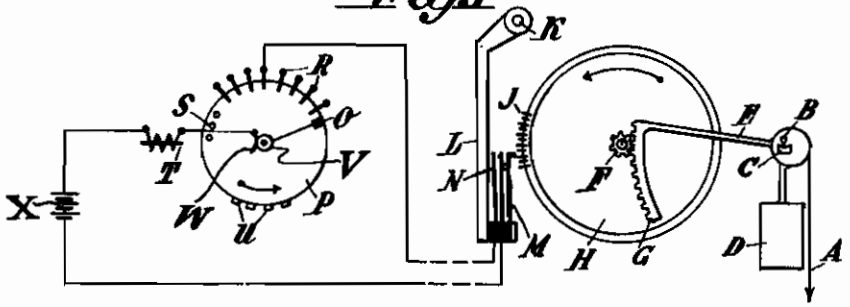

Fig.2

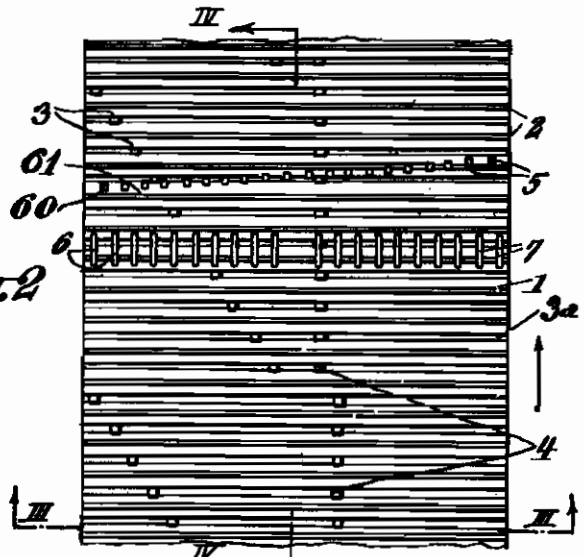

Fig.3

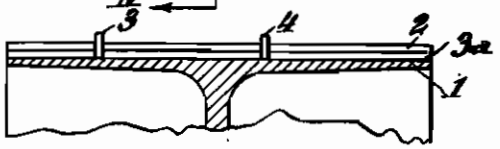

Fig.4

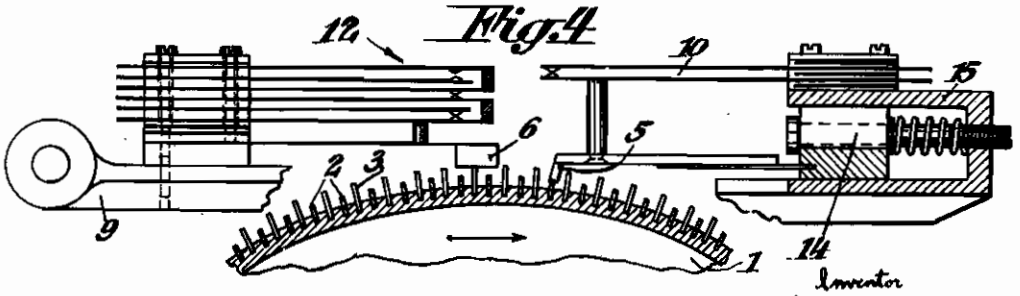

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Fig. 5.

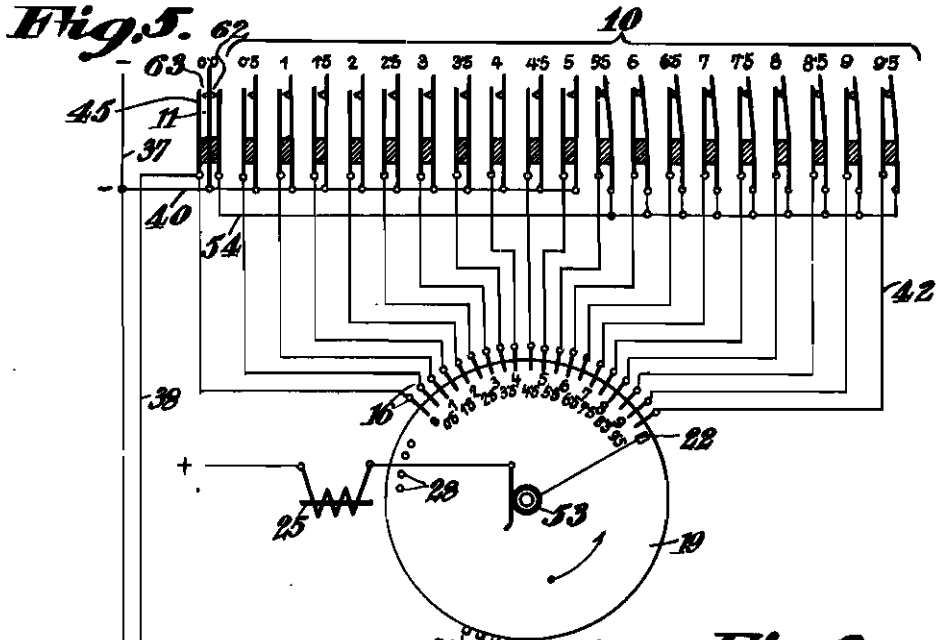
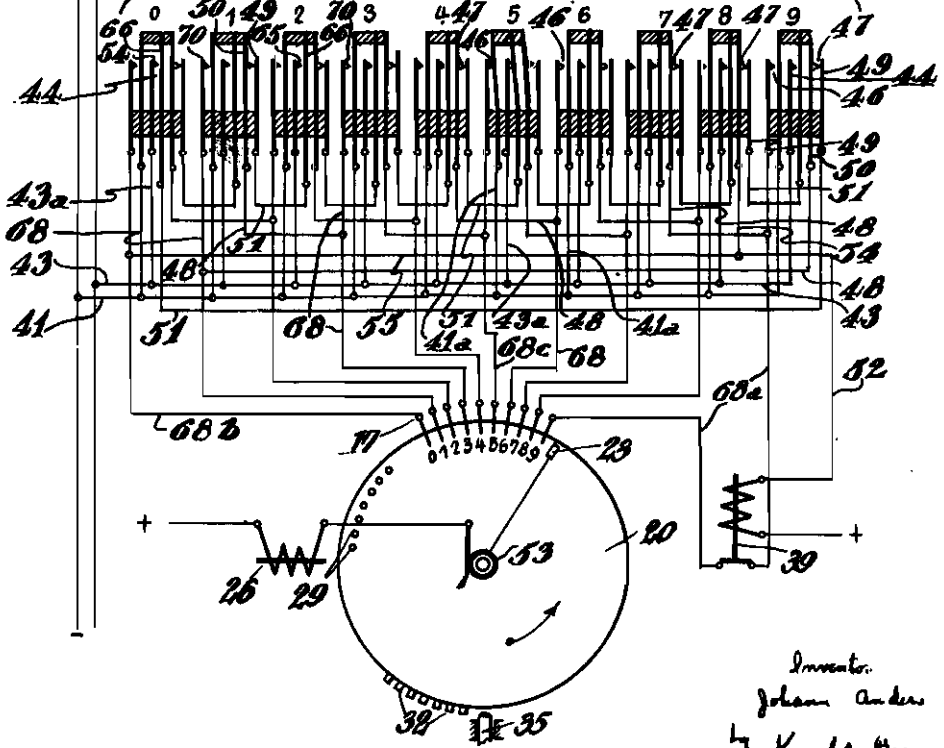


Fig. 6.



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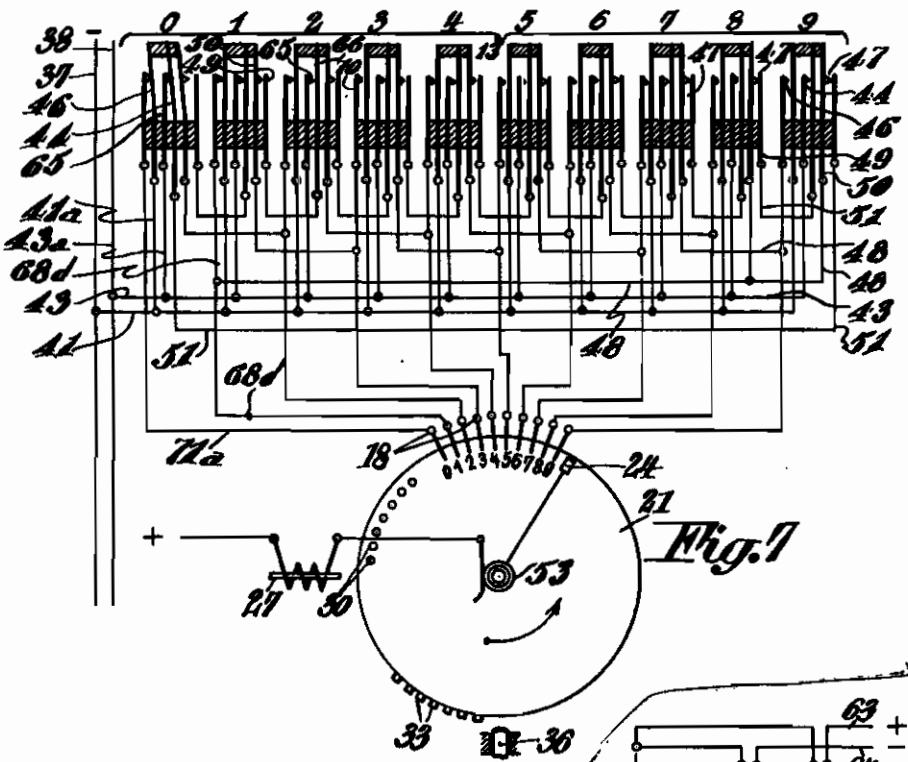

Fig. 7

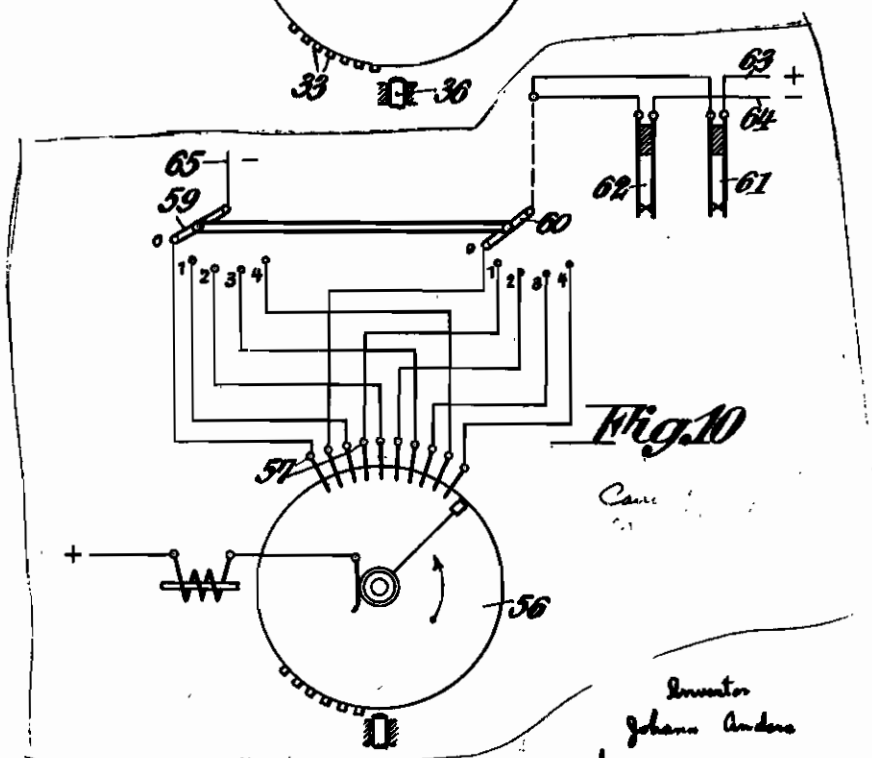

Fig. 10

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Fig. 8

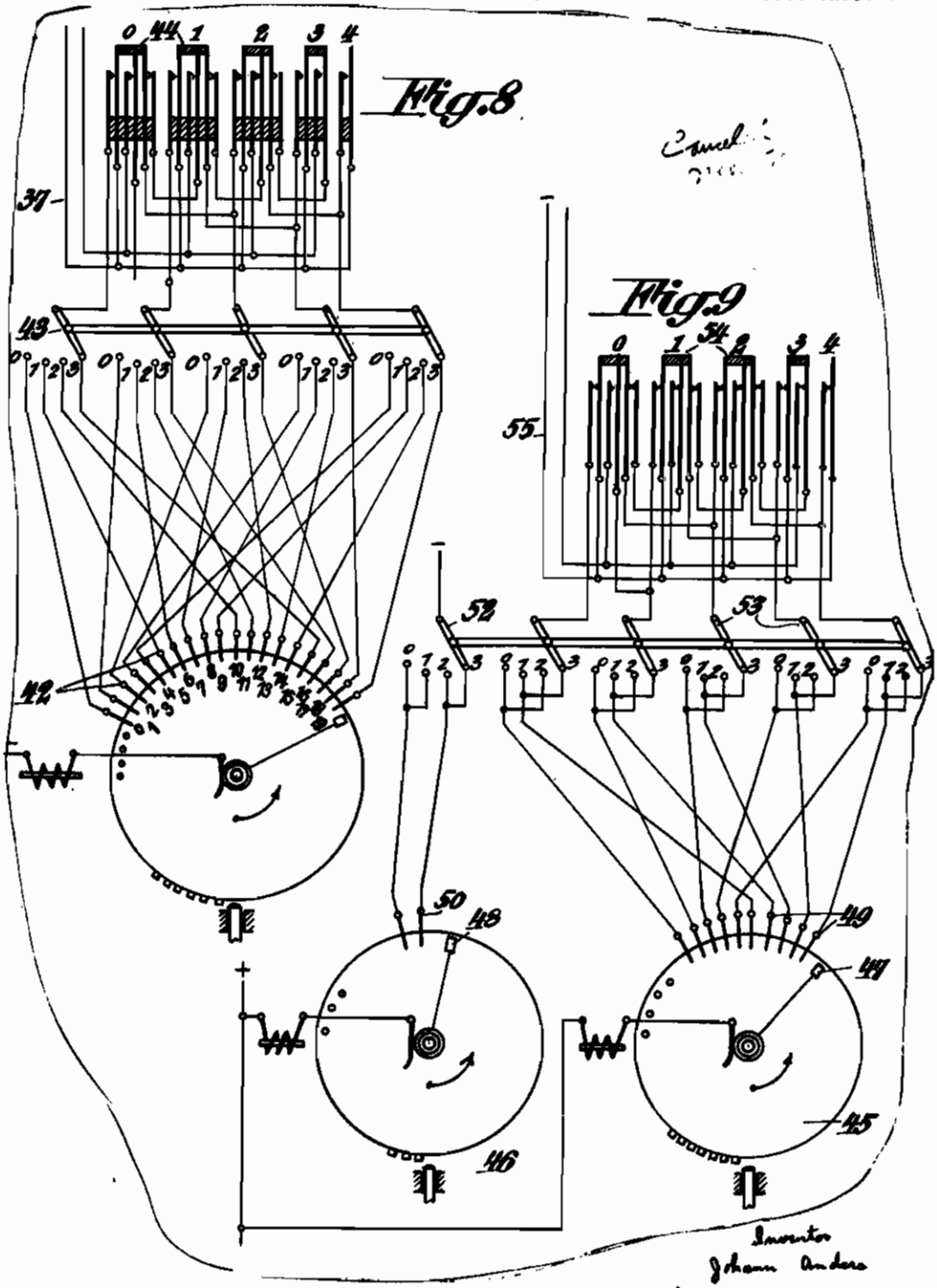

Fig. 9

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ALIEN PROPERTY CUSTODIAN

ARRANGEMENT FOR INDICATING COUNTING OR PRINTING, ESPECIALLY FOR AUTOMATIC BALANCES (INCLINATION BALANCES)

Johann Anders, Vienna, Germany; vested in the Alien Property Custodian

Application filed October 14, 1939

The invention relates to an arrangement for indicating, counting or printing, especially for automatic balances (inclination balances), in which an element adjusting itself according to the loading comprises groups of pins or the like, one for each of the weight values of different values order (units, tens, hundreds and the like), and a second element, movable relative to the first element, carries groups of switches coordinated to the groups of the first element, which switches control the adjustment of the indicating, counting or printing device when actuated by the pins of the first mentioned groups.

Known arrangements of this type possess the inconvenience that, when indicating limit values, for instance at the transition from one tens row to another, in consequence of slight inaccuracies in the mechanical construction of the arrangement which can practically not be easily avoided, faults may result. It may happen that, for instance, at the transition from the weight number 59 to the weight number 60, the switch corresponding to the highest unit value 9 is still closed, while by the switch for the tens value the weight value 6 is already adjusted, or inversely, the units value 0 is adjusted, when the tens value 5 is still adjusted, so that instead of the weight 60 either the weight 69 or the weight 50 is indicated.

According to the invention this inconvenience is avoided by the special kind of construction of the switch for the zero value of the lowest values order, and of the switches for the weight units of the higher values order (tens, hundreds and so forth) and by the special manner of connection of these switches the one with the other.

An embodiment of the invention is illustrated in the accompanying drawings by way of example.

Fig. 1 shows the total arrangement consisting of the setting drum together with the inclination arrangement, of the feeling device carrying the switches and of the number discs connected with the switches and controlled by the same.

Fig. 2 shows a portion of the unrolled surface of the drum which carries the pins for the feelers of the switches, and illustrates diagrammatically the feelers cooperating with the pins.

Fig. 3 is a cross-section through the cover of the drum on line III—III of Fig. 2.

Fig. 4 is a cross-section through a portion of the drum cover perpendicularly to the axis of this cover with the corresponding switches actuated by the feelers shown in side elevation and partly in section.

Figs. 5, 6 and 7 show the connection of the switches for the units, tens, hundreds and the like with the corresponding number discs.

Fig. 8 shows the arrangement employed for the application to steel yards.

Figs. 9 and 10 show modified forms of construction of the arrangement shown in Fig. 8.

According to Fig. 1 the operation of the arrangement is as follows:

By the weight acting upon the pull rod A and placed upon the balance not illustrated, the inclination lever E carrying the inclination weight D, the edge B being oscillatably mounted on the seat C, and by the toothed sector G, mounted on the end of this lever E and meshing with the toothed wheel F, the setting drum H, which carries the pins J corresponding to the weight values of the units, tens and hundreds and so forth, is turned into the position corresponding to the loading of the balance. The arm L, pivotally mounted on the axle K is then oscillated towards the drum, this arm carrying switches N, equipped with feelers M, said switches being arranged the one at the side of the other in the direction of the axis of the drum, some of the switches N being closed by the pressure of the feelers M. If now the discs P, corresponding to the switch groups for units, tens and hundreds, and carrying each a contact O, are turned so that this contact O comes successively into contact with contacts R stationarily arranged around the disc and each one connected with the switch N, these discs are locked by a pin T which is electromagnetically actuated and adapted to engage into the teeth S and at the moment at which the contact piece O touches that contact R which is connected with the switch N which is just in circuit. At the same moment the number U arranged on the circumference of the disc becomes visible in a window or accessible for stamping, this number being coordinated to the closed contact R or to the switch N in circuit.

The Figs. 2 and 3 show the application and construction of the pins on the surface of drum I and the position of the feelers actuating the switches relative to the pins. Ribs 2, extending in parallel to the axis, correspond to the weight values of the units, groups or pins 3 coordinated to the figures 0 to 9, axially mounted and mutually displaced in the direction of the circumference of the drum by equal distances, correspond to the weight values of the tens, groups of stops 4 coordinated to the figures 0–9 and arranged the one behind the other in the circumferential direction correspond to the hun-

dreds, the stops of these latter groups being mutually displaced like stairs by equal distances in the circumferential direction. The pins 3 and stops 4 can be arranged either between or on the ribs 2.

The feelers 5 of the unit switches are arranged in a line extending obliquely to the ribs 2, so that the first feeler and the last feeler have the same relative position to two ribs following the one behind the other. The feelers 6 of the ten switches are arranged the one at the side of the other in an axial direction at distances corresponding to those of the pins 3, and the feelers 7 of the hundred switches are axially arranged the one at the side of the other at distances corresponding to those of the stops 4, and their feeling surface corresponds in length to the distance between two ribs 2.

The switches for the units (Fig. 4, right hand half) are simple switches 10 with feelers 5, the switches for the tens and hundreds (Fig. 4, left hand half) are, however, constructed as change-over switches 12, 13 with feelers 6 and 7 and with three pairs of contacts, two pairs of which are open when the switch is in the inoperative position, to be closed when the switch is actuated, and they shall therefore be called hereinafter the "pairs of operative contacts," one pair being closed in the state of rest and will hereinafter be called the "inoperative contact pair."

The switch 11 (Fig. 5) for the weight value 0 of the units is a change-over switch with two pairs of contacts, of which one pair, open in the state of rest of the switch, acts as pair of operative contacts, and the other one which is closed in the condition of rest acts as inoperative pair of contacts.

All switches are arranged on an arm 8 oscillatable relative to the drum 1, but they may be distributed over several arms to be oscillated simultaneously relative to the drum. The feelers 6 together with their switches can be shifted and stopped in guides 15 each by means of a screw spindle 14 with the object of accurate adjusting relative to the ribs 2 of the drum.

The Figures 5, 6 and 7 show in which manner the switches 10, 11, 12 and 13 for the units, tens, hundreds are connected with the corresponding rows of contacts, 16, 17, and 18 of the figure discs 19, 20, and 21 and how the switches are connected the one with the other. The form of construction illustrated relates to a balance with a total weighing range of 1,000 kg. with a fine subdivision of ½ kg. Instead of ten units of the units corresponding each to 1 kg., 20 units corresponding each one to ½ kg. are supposed.

The contacts 22, 23, and 24 fixed on the figure discs 19, 20, and 21 are each one connected by a slip ring with electromagnetic locking devices 25, 26, and 27, said devices cooperating with teeth 28, 29, and 30 of those discs the subdivision of which corresponds to the subdivision of the contacts 16, 17, and 18. The figure types 31, 32 and 33 on the circumference of the disc have also the same subdivision. The disc 19 carries in the example illustrated twenty figures 31, 0–9.5, the discs 20, 21 carry each ten figures 0–9. The printing pins 34, 35, and 36 are arranged opposite the figures.

With reference to Figs. 2, 5, 6, and 7, it will be hereinafter explained, which proceedings occur for instance when recording the weight numbers 059.5, 060.0 and the next higher figures and how a faulty indication is effectively prevented by the arrangement according to the invention.

If, after the drum 1 has been adjusted to the position corresponding to the weight 059.5, the arm 9 carrying the switches for the units, tens and hundreds comes to bear against the drum 1, the unit switch for the value 9.5 (Fig. 2) is actuated by its feeler 5 pressed against the rib 2, the ten switch 12 for the value 5 by its feeler 6 pressed against the pin 3, and the hundred switch 13 for the value 0 by its feeler 7 pressed against the stop 4. Besides the unit switch 10 for the value 9.5, the unit switches 10 corresponding to the unit value 9 to 5.5 (Fig. 5) are, owing to the acute angle at which the feeler row 5 of the unit switches 10 is arranged relative to the ribs 2, actuated by their feelers 5. The ten switch 12 for the value 5 (Fig. 6) being actuated, the two operative pairs of contacts are closed, the inoperative pair of contacts is opened, whereas in all other not actuated ten switches 12 the inoperative pair of contacts is closed. In the actuated hundred switch 13 for the value 0 the two operative pairs of contacts are also closed, the inoperative pair of contacts is opened and in all the other not actuated hundred switches 13 the inoperative pair of contacts is closed.

The figure discs 19, 20, 21 are then turned in the direction of the arrows. As soon as the contact 22 of disc 19 touches the contact 16 corresponding to the unit value 9.5, it closes the circuit through the closed unit switch 10 for the value 9.5 and the closed inoperative pair of contacts of the switch 11 for the value 0, so that the disc 19 is securely held by the locking device 25 in a position, in which the type 31 designated by the number 9.5 is opposite the printing pin 34.

In a similar manner the tens disc 20 is locked by the locking device 26, as soon as its contact 23 touches the ten contact 17 for the value 5, because at this moment the circuit is closed through the operative pair of contacts (the outer one in the figure) of the ten switch 12 for the value 5. The figure type 32 designated by 5 is then opposite the printing pin 35.

In the hundred disc 21 the locking by the electromagnet 27 occurs at the moment, when its contact 24 has reached the hundred contact 18 for the value 0, because at this moment the circuit is closed through the outer one of the two operative pairs of contacts of the switch 13 for the value 0. The type 33 designated by 0 is then opposite the printing pin 36.

As already stated, the unit switches 10 for the values 9–5.5 are closed in the instance described, besides the unit switches 10 for the value 9.5. This is, however, immaterial for the indication, because the contact 22 of the disc 19 does not move up to the contacts 16 corresponding to these switches, for the reason that the disc 19 has already been locked at the contact 9.5.

If, however, the operative pair of contacts of the unit switch 11 is closed by a rib 2 for the value 0 at the actuation of its feeler, the contact 22 of the disc 19 would not move up to the contact 16 for the value 0, when the switches 10 for the values 9.5 and under these values are still closed by the adjacent rib 2, but it would be securely held already before, so that a faulty indication would take place. To prevent this, the unit switches for the values from about 5.5 to 9.5 are not connected directly to the lead 37 but through the intermediary of the inoperative

pair of contacts of switch 11 for the value 0, said pair of contacts being opened when the operative pair of contacts is closed, and therefore the connection of the switches 10 for the values 5.5 to 9.5 with the current lead 37 is interrupted, so that the disc 19 can freely turn until its contact 22 comes into touch with the contact 16 for the value 0.

In order to exclude further the above mentioned possibility of faulty indications at the transition from one tens row to another, one of the contacts of the operative pair of contacts of the unit switch 11 for the value 0 is connected by a lead 38 with a contact of the middle operative pair of contacts of the ten switches 12 (Fig. 6) and of the hundred switches 13 (Fig. 7), each of these last mentioned contacts being further connected with a contact of the inoperative pair of contacts of the switch for the next lower unit, and again the other contact of this inoperative pair of contacts with a contact of the outer operative pair of contacts of the switch for the next higher unit.

At a weight of 060.0 kg. placed on the balance, the unit switch 11 for the value 0 being closed by a rib 2, the indication will nevertheless be correct even if the ten switch 12 for the value 5 is still closed by its feeler resting on the pin 3, as the unit figure disc 19 is locked by its locking device, as soon as its contact 22 touches the contact 16 for the value 0, because thereby the circuit through the actuated operative contact of the unit switch 11 for the value 0 is closed, and the tens figure disc 20 is locked, as soon as its contact 23 touches the contact 17 for the tens value 6, because then the circuit through the closed inoperative contact of the not actuated ten switch 12 for the value 4 and through the closed middle operative contact of the actuated ten switch 12 for the value 5 is closed. The correct figure 6 is therefore standing opposite the printing ram 35, even if the ten switch for the value 5 has been actuated.

Nothing is changed in this respect, if at a small adjusting of the drum 1 simultaneously with the ten switch for the value 5 also the ten switch for the value 6 is actuated. The course of the current through the ten switches for the values 4 and 5 is then the same as before, further current flows, however, through the now closed outer operative pair of contacts of the ten switch for the value 6 to the contact 17 for the value 6, so that the figure disc 20 is locked at this value as before.

If at a further slight increase of weight the feeler of the unit switch 11 moves away from the rib 2 so that its operative contact is opened and the lead 38 becomes currentless, the middle operative pairs of contacts of both switches will become currentless, even if the ten switch for the value 5 is still actuated simultaneously with the ten switch for the value 6, and the current flows only through the outer operative pairs of contacts of these switches, so that current is fed to the contacts 17 for the values 5 and 6 and the figure disc 20 is again locked corresponding to the contact 17 for the value 6 which has been attained first.

If at a further adjusting of the drum 1 in the sense of a slight increase of weight the feeler of the ten switch for the value 5 moves away from the pin 3, only the ten switch for the value 6 is actuated and therewith the same proceeding as before at sole actuation of the switch for the value 5 is repeated.

In order to ensure a faultless indication also at the transition from the weight value 099.5 to the value 100.0 and to prevent that, instead of the ten value 0 the ten value 9 is indicated, a relay 39 is provided in the connection of the contact 17 for the value 9 of the figure disc 20 (Fig. 6) with the ten switch for the value 9. When a weight 100 is placed on the balance, the operative contact pair of the unit switch 11 for the value 0 is closed. If then the ten switch 12 for the value 9 and the hundred switch 13 for the value 9, are further actuated, the current flows from the lead 38 through the middle operative pair of contacts of the ten switch for the value 9 and through the inoperative pair of contacts of the ten switch 8 on the one hand to the contact 17 for the value 0 and on the other hand through the coil of the relay 36 and further (Fig. 7) through the middle pair of operative contacts of the hundred switch 13 for the value 9 and the inoperative pair of contacts of the hundred switch for the value 8 to the contact 18 for the value 1 of the figure disc 21. By the relay 39 (Fig. 6) through which current flows the connection of the outer operative pair of contacts of the ten switch for the value 9 with the contact 17 for the value 9 of the figure disc 20 is then interrupted, so that the contact 23 of this disc gets, when the disc is turned, to the contact 17 for the value 0. By the figure discs the correct value 100 is therefore indicated.

The indicating arrangement according to the invention can further be applied also to steel yards, in which the inclination arrangement for the automatic weighing of only that portion of the total load is used, which is not yet equalized by the sliding weights. The weighing range of the inclination arrangement is therefore in this instance employed repeatedly in accordance with the number of the sliding weights.

Different possibilities of construction exist. Fig. 8 shows the connection for the case of steel yard, the inclination arrangement of which is destined for the indication of up to, for instance, 500 kg. and the total weighing range of which amounts to 2000 kg. with the application of three sliding weights, each of 500 kg. and a fine adjusting of 1 kg. The figure discs for the units and tens, not shown in Fig. 8, effect the indication of these units in the already described manner. For the indication of the hundred figures 1–19 the disc 40 with the contact 41 is provided, to which twenty contacts 42 for the values 0–19 are coordinated, and which is connected with the hundred switches 44 through change-over switches 43 commonly to be actuated each one with four contacts corresponding to four weighing ranges each one comprising 500 kg. In this instance the hundred switches for the values 0, 1, 2 are equipped with two operative pairs of contacts and with one inoperative pair of contacts, the switch for the value 3 with two operative pairs of contacts and the switch for the value 4 with one operative pair of contacts.

If, for instance, when a total weight of 1756 kg. is to be measured three sliding weights each of 500 kg. have to be added, the drum adjusting itself according to a weight of 256 kg., the figure disc 40 must come to a standstill with its contact 41 at the hundred contact 42 for the value 17, which is to be indicated instead of the hundred value 2 (of the number 256). The switches 43 are therefore, as three sliding weights have to be added, to be adjusted to the contact 3. As the

operative pairs of contacts of the hundred switch 44 for the value 2 are closed by the corresponding stop of the drum, the current flows from the lead 37 through the outer operative pair of contacts of the hundred switch 2 and the contact 3 of the coordinated change over switch 43 to the contact 42 for the value 17, so that the disc 40 is locked at this value.

Fig. 9 shows a modified form of construction for the same total weighing range of 2000 kg., however with two figure discs 45, 46 one for the hundred values and the other for the thousand values. Ten fixed contacts 49 are therefore coordinated to the disc contact 47 of the disc 45 and two fixed contacts 50 to the contact 48 of the disc 46. The contacts 0 to 9 designated by 49 are then connected with the leading-in wire 55 through change-over switches 53 and the hundred switches 54, the two contacts 50 through a change-over switch 52. The contacts 0, 1 and 2, 3 of the change-over switch 52 and the contacts 0, 2 and 1, 3 of the change-over switches 53 are connected the one with the other. The change-over switch 52 for the thousand figures value is coupled with the change-over switch 53 for the hundred figures value and is adjusted in accordance with the number of the sliding weights employed.

If the loading amounts for instance to 1700 kg. and three sliding weights each of 500 kg. have been slid in, the operative pairs of contacts of the hundred switch 54 for the value 2 are closed by the corresponding stop of the adjusting drum corresponding to the overweight of 200 kg. As the change-over switch 52 is adjusted to contact 3 according to the three adjusted weights, the current flows from the lead 55 through the outer operative pair of contacts of the hundred switch 54 for the value 2 through the contact 3 of the change-over switch 53 to the contact 49 for the value 7, so that the disc 45 is locked at this value. The disc 46, however, comes to a standstill as soon as its contact 48 has reached the contact 50 for the value 1 and thereby the circuit through the contact 3 of the change-over switch 52 is closed.

Fig. 10 shows another form of construction for the case of a steel yard with inclination arrangement for a total weight range of 9999 kg. with fine division of 1 kg. with four sliding weights each of 2000 kg. and with a range of the inclination balance of 2000 kg. The figure disc 56 serves for the indication of the thousand figures value and comprises therefore ten stationary contacts 57 for the weight values 0 to 9 of the thousand figures value. The contacts 57 for the values 0, 2, 4, 6, 8 are connected through the change-over switch 59 with the current lead 65, the contacts 57 for the values 1, 3, 5, 7, 9 through the change-over switch 60 and the switch 62 directly with the current lead 64 or through the intermediary of the switch 61, the lead 63 and the switch 11 (Fig. 5) for the zero value of the units with the current lead. The switches 61 and 62 are controlled by special pins of the drum 1 in such a manner that at an adjusting of the drum to weight values from 998 to 1005 kg. the switch 61, at a drum adjusting to values from 1003 to 2000 kg. the switch 62, is closed, but otherwise both switches are open.

When adjusting to the contacts 0 of the two intercoupled change-over switches 59 and 60 no sliding weight is inserted. For weight values below 1000 kg. current flows from the lead 65 through the change-over switch 59 to the contact 57 for the value 0 of the thousands. As the switches 61 or 62 are open at weight values from 0 to 997 or from 0 to 1002 kg., the disc 56 can turn until it reaches the value 0. At the weight values 1000 to 1002, however, current flows through the switch 11 for the value 0 of the units through the wire 63 through the closed switch 61 and the change-over switch 60 to the contact 57 for the value 1. At the weight values from 1003 to 1005 both switches 61 and 62 are closed, and from the weight value 1006 upwards only the switch 62 is closed. The current feed is therefore effected at the weight values 1003 to 1005 from the lead 63 and from the weight value 1006 upwards from the lead 64 through the switch 62 to the contact 57 for the thousands value 1.

At the weight values 998 and 999 the switch 62 is open and the switch 61 closed. As, however, the switch 11 for the zero value of the units is not actuated at this position of the drum, no current can flow in the lead 63, so that also in this position the disc 56 can turn up to the zero point.

The proceedings occur in a similar manner as above described at weight value between 2000 and 4000 kg. or between 4000 and 6000 kg. and so forth, the change-over switch 59 being set according to insertion of a sliding weight of 2000 kg. to the contact 1, of two sliding weights to the contact 2 and so forth.

In order to obtain a rapid adjusting of the drum 1, and as far as possible an aperiodical adjusting, the cover is made from specially light material, preferably of artificial pressed mass, light metal or the like. The ribs 2, pins 3 and stops 4 made of sheet steel are inserted and fixed into grooves in the drum cover, or pressed into the artificial pressing mass. For a clear adjusting of the drum corresponding accurately to the loading applied on to the same, it is absolutely necessary to avoid any free play of the movable elements of the inclination arrangement in guides and in the intermeshing teeth.

The arrangement is also destined for indications based on the decimal system and also for indications based on any other systems of weight and standard.

According to the provisions of the Patent Statutes, I have explained the principle and construction of my invention and have illustrated and described what I now consider to represent its best embodiment.

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