Nov. 6, 1928. 1,690,915

K. E. WENZEL

APPARATUS FOR TRANSMITTING SIGNS

Filed June 1, 1926 3 Sheets-Sheet 1

Fig. 1.

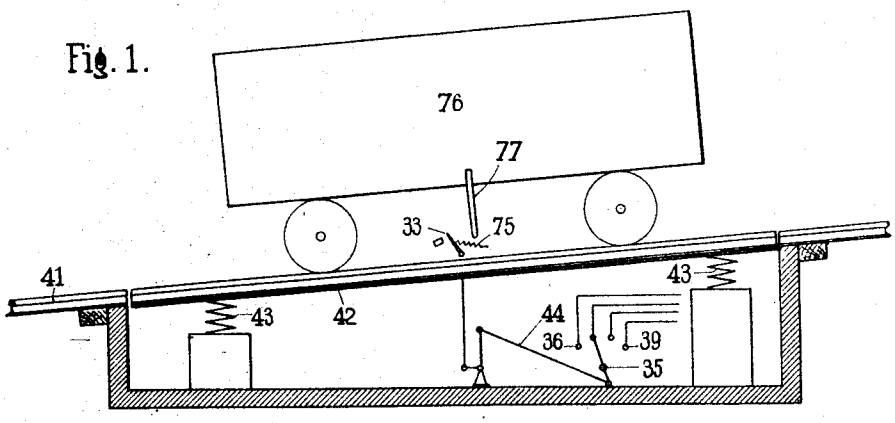
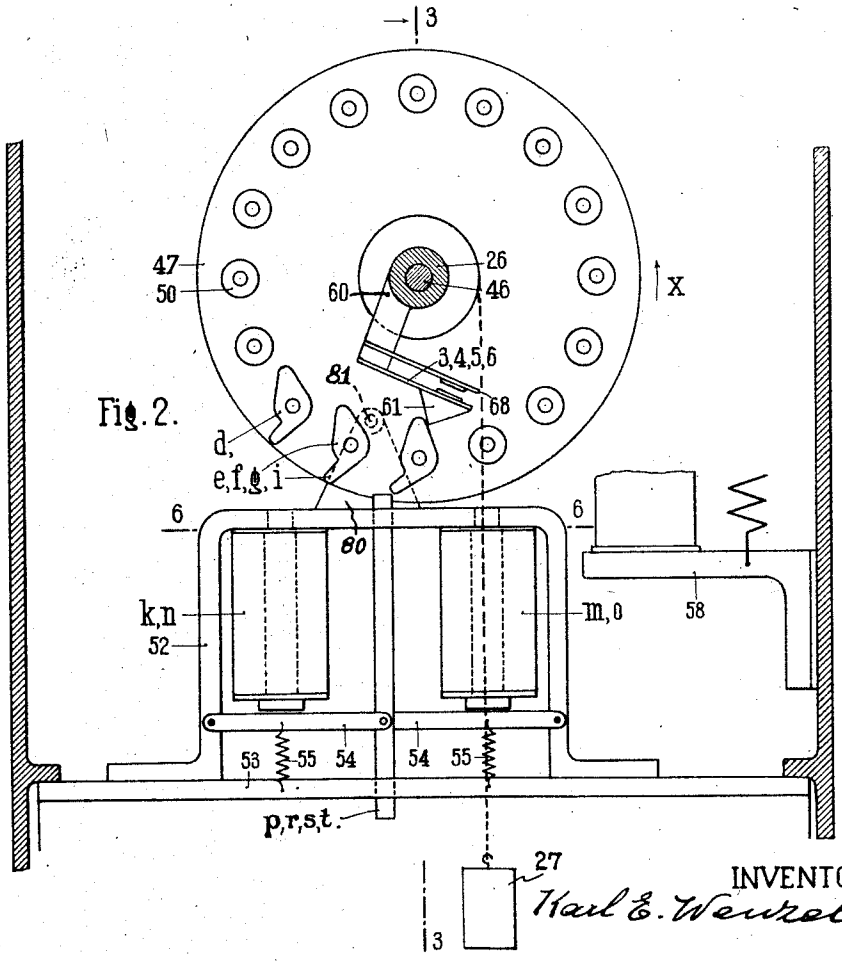


Fig. 2.



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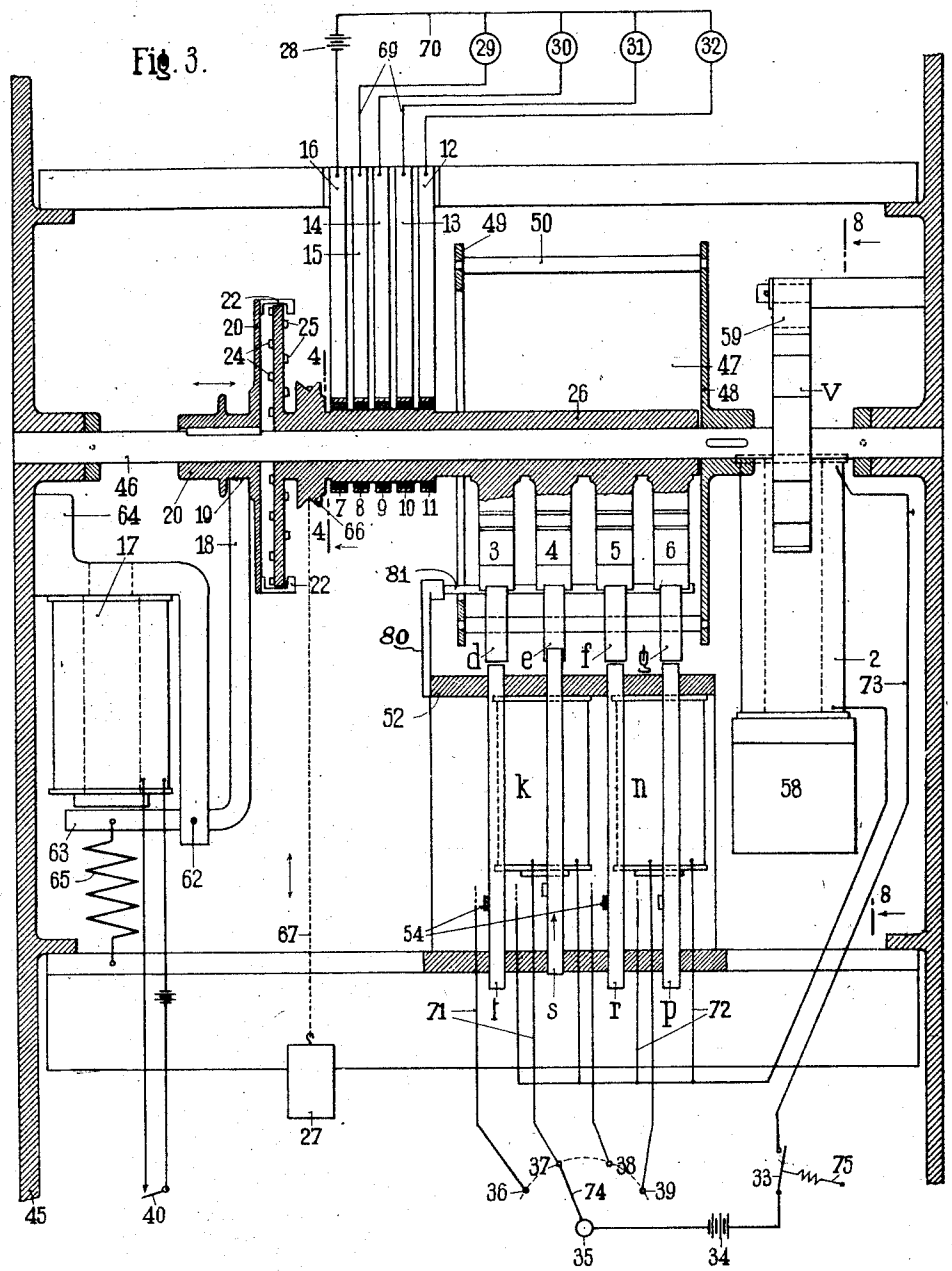
Nov. 6, 1928. 1,690,915

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Filed June 1, 1926 3 Sheets-Sheet 2

Fig. 3.



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Filed June 1, 1926 3 Sheets-Sheet 3

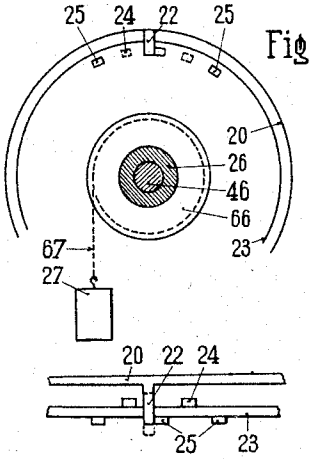


Fig. 4.

Fig. 5.

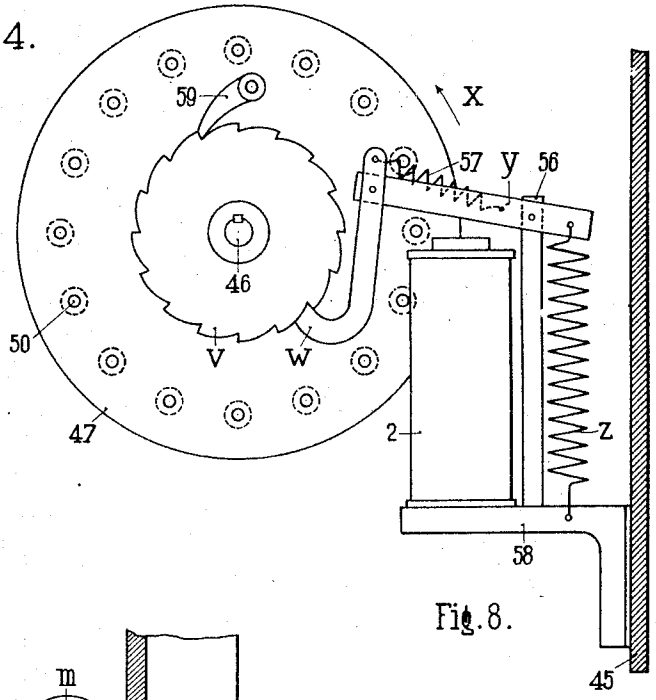


Fig. 8.

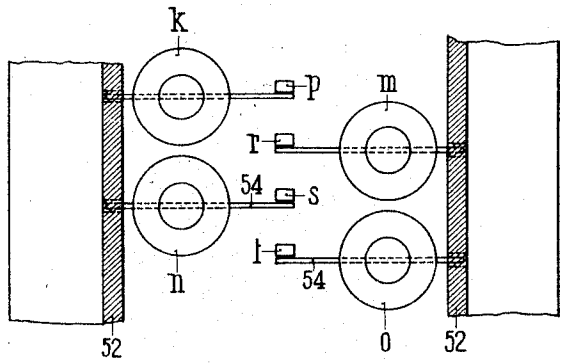


Fig. 6.

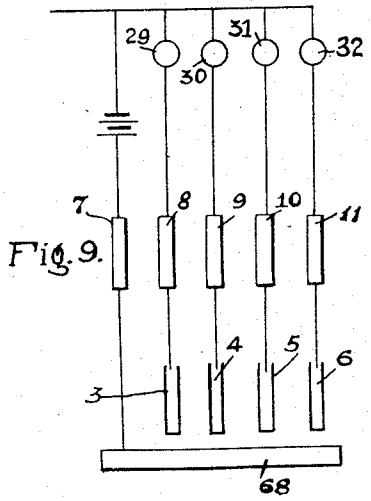


Fig. 9.

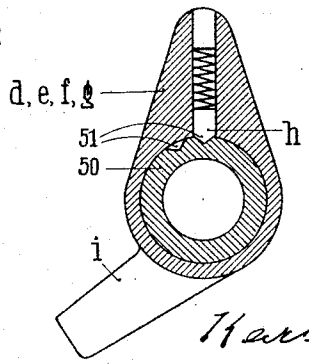


Fig. 7.

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Patented Nov. 6, 1928. 1,690,915

UNITED STATES PATENT OFFICE.

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APPARATUS FOR TRANSMITTING SIGNS.

Application filed June 1, 1926, Serial No. 113,029, and in Germany June 5, 1925

My invention relates to improvements in apparatus for transmitting signs, and the object of the improvements is to provide an apparatus in which signs are successively set on a mechanical registering apparatus and transmitted therefrom at a later period of time to another place. My improved apparatus is designed for use in connection with track brakes such as are used for controlling the movement of railway cars on the track. As is known to those skilled in the art railway cars are arranged on the track for composing trains or other purposes by causing the same to move down an inclined part of the track, and at the bottom end of the said inclined part a track brake is provided for controlling the velocity of the car according to the length of way to be made by the car. For determining the braking pressure the attendant must know the weight of the car to be braked, for which purpose scales are provided at the top of the inclined part of the track, the weight indicated by the scales being transmitted to the attendant. By means of my improved apparatus the said weight is automatically set on a movable member preferably in the form of a rotary drum and transmitted therefrom to the attendant slightly before the car arrives in the brake.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawings, in which the same reference characters have been used in all the views to indicate corresponding parts.

In said drawings,

Fig. 1, is a diagrammatical elevation showing an apparatus for weighing railway cars and certain parts of my improved registering and transmitting apparatus,

Fig. 2, is a sectional elevation showing my improved registering apparatus,

Fig. 3, is a sectional elevation taken on the line 3—3 of Fig. 2,

Fig. 4, is a detail sectional view taken on the line 4—4 of Fig. 3,

Fig. 5, is a development of the disks shown in Fig. 4,

Fig. 6, is a horizontal sectional view taken on the line 6—6 of Fig. 2,

Fig. 7, is a detail sectional view showing one of the setting members on an enlarged scale, and

Fig. 8, is a detail view showing the mechanism for intermittently rotating the apparatus.

Fig. 9 is a diagrammatic view illustrating certain electrical connections.

As appears from Fig. 1, at the top end of an inclined part of the track 41 a weighing apparatus is provided which has been indicated in a diagrammatical way, and which as shown comprises a platform 42 supported on powerful springs 43. The said platform is connected by levers 44 with an electric switch 35 by means of which the signs are transmitted to the registering apparatus. In the example shown in the drawings the apparatus is constructed for transmitting four different signs, the weight of the cars being transmitted in rough values sufficient for the object aimed at, the apparatus transmitting for example weights of 5, 10, 15 and 20 tons. Accordingly the switch 35 comprises four terminals 36, 37, 38, 39 (cf. Fig. 3).

The registering apparatus comprises a casing 45 in which the shaft 46 is rotatably mounted. To the said shaft a drum 47 is keyed, which drum comprises a disk 48 keyed to the shaft 46, a ring 49, and rods 50 connecting the said ring with the disk 48. As shown in Fig. 2 sixteen rods 50 are provided, and on each rod four pawls (corresponding in number to the terminals 36, 37, 38, 39) d, e, f, g are rockingly mounted. As appears more particularly from Fig. 7, each pawl is made integral with an arm i projecting outwardly from the drum 47, and in a bore of the pawl a spring-pressed plunger h is located which is adapted for engagement with notches 51 made in the rods 50 for holding the pawl in either one of two positions. Below the drum 47 four electromagnets k, m, n, o are located, which are secured to a frame 52 mounted on a transverse bar 53. The armatures 54 of the said electromagnets are in the form of rods rockingly mounted on the frame 52 and jointed at their inner ends each to a push rod p, r, s, t guided in bores of the frame 52 and the

bar 53, springs 55 being connected with the said armatures for normally retracting the same from the electromagnets. The push rods p, r, s, t are in positions for engagement with the arms i of that set of pawls d, e, f, g which in the course of drum turning has come to the lowermost position as seen in Fig. 2. These push rods are adapted to rock the said pawls. In Fig. 2 three of the pawls are shown. The two to the left are in inactive position and the one to the right is in active position, and the push rods, of which one is shown in Fig. 2, by engagement of the pawl upon it, has shifted the pawl from inactive to active position. The movement of the pawl from inactive to active position is by rotation clockwise as seen in Fig. 2, upon the rod 50 which carries it; and, as has been intimated, such rotation of the pawl is effected by its engagement with the rod p when the drum 47 is rotated in counter-clockwise direction. The inner end of the pawl when it is so shifted from inactive to active position approaches more nearly to the center of drum rotation, and by virtue of shifting to a position nearer to the center of rotation it becomes effective to close a certain switch, presently to be described. So long as it remains in inactive position it is not so effective. In the particular embodiment of the invention here shown, each set of pawls is a set of four, aligned each set upon one of the rods 50, and each set of push rods is correspondingly a set of four, one push rod for each of the four pawls which constitute a set. Selective operation of the push rods, therefore, will effect selective operation of the pawls of that set which then in the course of drum turning passes across the ends of the rods. The drum 47 is adapted to be intermittently rotated counter-clockwise, in the direction of the arrow x, for successively causing the rows of pawls d, e, f, g to pass across the ends of the push rods and in so doing to be set for subsequent operation. In the example shown in the figures pawl and ratchet mechanism is provided for this purpose. See particularly Fig. 8. A ratchet wheel v is keyed to the shaft 46, and a pawl w is mounted on an arm y rockingly supported at 56. The pawl w is held in engagement with the ratchet wheel v by means of a spring 57, and a spring z attached to the rear end of the lever y tends to rock the said lever with the pawl upwardly. The lever y is in the form of an armature acted upon by an electromagnet 2 mounted on a bracket 58. Thus, when the electromagnet 2 is energized the lever y is rocked downwardly, so that the pawl w engages the next tooth of the ratchet wheel v. When, after energizing, the electromagnet is deenergized the spring z returns the lever y into initial position, and the lever carries the ratchet wheel v with it, rotating shaft 46 and advancing drum 47 one step, so that the next set of pawls d, e, f, g passes across the ends of the push rods p, r, s, t. For holding the ratchet wheel against backward turning a pawl 59 is provided.

Such one of the pawls d, e, f, g of a given row as has by means of the push rods p, r, s, t been rocked to operative position is adapted, on the further turning of drum 47, to operate a switch 3, 4, 5, 6 mounted on and insulated from arms 60 made integral with a tubular shaft 26 mounted on the shaft 46. (The tubular shaft 26 and the shaft 46 which carries it are, but for the connection to be described, independently rotatable.) The switch arms 3, 4, 5, 6 carry cam members 61 adapted for engagement with the pawls d, e, f, g. At its outer end the tubular shaft 26 is made integral with a disk 23 provided at its opposite faces with lugs 24 and 25 uniformly distributed all around the circumference of the disk and corresponding in position to the position of the sets of pawls d, e, f, g. Therefore, in the example shown in the figures, sixteen lugs 24 and 25 are provided, the lugs 24 and 25 being displaced with relation to each other in circumferential direction. At the left of the disk 23 a disk 20 is splined to and movable longitudinally upon the shaft 46, which disk carries one or more U-shaped stop members 22. The hub of the disk 20 is formed with a circumferential groove 19 engaged by an arm 18 rockingly mounted at 62. The arm 18 is made integral with an armature 63 of an electromagnet 17 mounted on a bracket 64, a spring 65 tending to rock the arm 18 to the left thus bringing the U-shaped stop member 22 into the path of advance of lugs 25. When the electromagnet 17 is energized, the arm 18 is rocked to the right, and the U-shaped stop member 22 moves out of the path of advance of lugs 25 and immediately thereafter it comes into the path of advance of lugs 24. The shaft 26 carries a rope pulley 66 having a rope 67 trained thereon, which rope has a weighted body 27 attached thereto. Thus, when the disk 20 and stop members 22 are shifted to the right, the disk 23 is by the weight 27 rotated one step, until the lugs 24 or one of them engages the stops 22. When the electromagnet 17 is deenergized again, the arm 18 is rocked to the left by the spring 65, the engagement which lug 24 had made with the stop 22 is broken, and disk 23 turns in response to weight 27, until the next lug 25 engages stop 22. Thus it appears that disk 20 with its stop and its shifting device becomes an escapement for the tubular shaft 26 in its rotation under the influence of weight 27. On the tubular shaft 26 insulated metal rings 7, 8, 9, 10, 11 are mounted, which are engaged by brushes 12, 13, 14, 15, 16. The rings 8, 9, 10, 11 are

electrically connected with the switch arms 3, 4, 5, 6, and the ring 7 is electrically connected with all the switch arms 68. See Fig. 9. The brushes 12, 13, 14, 15 are connected with leads 69 including electric lamps 29, 30, 31, 32, the other terminals of the said lamps being connected by a lead 70 with a suitable source of electric energy 28 and the brush 16.

The electromagnets *k*, *m*, *n*, *o* are connected by leads 71 with the terminals 36, 37, 38, 39 of the switch 35 and by leads 72 with the electromagnet 2. The said electromagnet is further connected by a lead 73 including a switch 33 and a source of electric energy 34 with the movable arm 74 of the switch 35. Normally, the switch 33 is opened by a spring 75, and the switch arm 74 is in inoperative position. The lamps 29, 30, 31, 32 are provided with differently colored glass-bulbs, for example red, green, blue and white, the said different colors indicating the aforsaid weights of 5, 10, 15 and 20 tons. It will be understood that the said lamps are located at the station of the attendant controlling the track brake. The apparatus included in the casing 45 may be located at the said station while the switch 35 is located near the scales, or the said apparatus is located near the scales.

The operation of the apparatus is as follows: When a car 76 moves over the platform 42 it presses the said platform downwardly more or less according to its weight. Thereby the switch arm 74 is set in any one of its four operative positions and into engagement with any one of the terminals 36, 37, 38, 39. Suitable means are provided for preventing the switch arm 74 from being set in positions intermediate the said terminals, such means being for example similar to the spring-pressed plunger *h* and notches 51 described with reference to the pawls *d*, *e*, *f*, *g*. While the switch arm 74 is thus moved over the terminals 36, 37, 38, 39 it does not yet energize the electromagnets, because the circuit 73 is open at 33. The switch 33 is temporarily closed for example by means of an arm 77 provided on the car 76, and (the car advancing) immediately thereafter it is again opened by the spring 75. Thus the circuit including one of the electromagnets *k*, *m*, *n*, *o* and the electromagnet 2 is temporarily closed, so that one of the push rods *p*, *r*, *s*, *t* is thrown upwardly. Further, the electromagnet 2 has pulled the pawl *w* downwardly and into engagement with the next tooth of the ratchet wheel *v*. After the arm 77 has passed the switch arm 33, and the circuit 73 is opened again, the spring *z* returns the lever *y* into initial position thus rotating the ratchet wheel *v*, the drum 47 and the tubular shaft 26 one step, the shaft 26 being coupled with the shaft 46 by means of the disks 20 and 23. In this rotation one of the pawls *d*, *e*, *f*, *g* of that set which then passes above the push rods is swung to operative position. Now the apparatus is in position for having another sign set on the next set of pawls *d*, *e*, *f*, *g*. The operation may then be repeated until the sixteen sets of pawls have passed the push rods *p*, *r*, *s*, *t*. The weights of sixteen cars advancing in succession over the platform 42 may by the means described be registered in the setting of particular pawls in the sixteen rows of pawls with which the drum 47 is equipped. Of course, the weight of any number of cars less than sixteen may be registered, and in the registration a corresponding number of rows of pawls will be involved.

When the first one of the cars, after leaving platform 42, approaches the brake, it closes a switch 40 included in the circuit of the electromagnet 17. Thereby the said electromagnet is energized and the disk 20 is shifted to the right (Fig. 3), so that the disk 23 is for the moment released. Disk 23 then, in response to weight 27, advances, as has been described above. Thereby the tubular shaft 26 and the switch arms 3, 4, 5, 6 and 68 are turned clockwise, in a direction opposite to the arrow *x* (Fig. 2). While the shaft 26 and the switch arms integrally borne by shaft 26 are so turned clockwise the drum 47 with its pawls *d*, *e*, etc., is by the pawl *w* held stationary. In consequence, one of the switch arms 3, 4, 5, or 6 is engaged by that one of the pawls *d*, *e*, *f*, or *g* which has before been set into operative position, and the circuit of that switch arm is closed. Thereby the corresponding one of the electric lamps 29, 30, 31, or 32 is illuminated, indicating the weight of the car to be braked to the attendant. As the car advances, switch 40, momentarily closed, opens again. The electromagnet 17 is immediately deenergized, and disk 20 is shifted to the left. The engagement between lugs 24 and stop 22 is broken, and shaft 26 turns in response to weight 27, until one or more of the lugs 25 on the other side of the disk 23 engages the stop 22. In such further turning of the shaft 26 clockwise, as seen in Fig. 2, the set of switch arms 3, 4, 5, 6 passes to rearward of that row of pawls *d*, *e*, *f*, *g* which had just cooperated with it, and comes to position in front of the next succeeding row of pawls *d*, *e*, *f*, *g*, ready to be acted upon by that next row of pawls when, shaft 26 remaining stationary, drum 47 shall by the action of the pawl *w* next be shifted through the proper interval in counter-clockwise rotation. When the set of switch arms so passes to rearward of a row of pawls, the switch which had been closed opens, and the light goes out. It will then be perceived that as cars advance

over platform 42 their weights are successively registered upon rows of swinging pawls, and that as the cars successively close momentarily the switch 40, their respective weights are indicated at 29, 30, 31, and 32; and it will be observed that any number of cars (up to sixteen) may advance in succession down the incline from platform 42 to switch 40, and that as they successively come to the switch 40 their individual weights will be indicated in turn by the flashes of the lamps in proper succession.

Before the pawls *d*, *e*, *f*, *g* have completed one revolution they are engaged by a rod 81 mounted on a bracket 80 and returned to inoperative position. Therefore, the apparatus may be continuously operated.

In describing the invention I have made reference to the use of the apparatus in connection with a track brake and a weighing apparatus. But I wish it to be understood that I do not limit myself to such use, and that the apparatus may be used generally for registering signs and transmitting the same after a certain period of time.

While in describing the invention reference has been made to a particular example embodying the same I wish it to be understood that my invention is not limited to the construction shown in the drawings, and that various changes may be made in the general arrangement of the apparatus and the construction of its parts without departing from the invention. For example I do not limit myself to the cylindrical form of the registering apparatus shown in the drawings. Further, in some cases hand-operated means are provided for operating the switches 35, 33 and 40. Further, the apparatus may be constructed for simultaneously operating a plurality of pawls *d*, *e*, *f*, *g* of each series, the said pawls and corresponding lamps or other signs being capable of numerous combinations representing different signs.

I claim:

1. An apparatus for registering and reproducing signs, comprising a rotary registering member provided with several series of operating devices, means for rotating said registering member in forward direction, a rotary transmitting member mounted coaxially with said registering member, movable means for transmitting forward rotation from registering member to transmitting member and alternately leaving said transmitting member free to independent and backward rotation, the said transmitting member being provided with a series of operating devices controlled by the operating devices of each series of the registering member, means to set selectively the operating devices of the registering member, and means to rotate backwardly said transmitting member when left free by the movable means mentioned, for bringing the operating devices of the transmitting member into engagement with the operating devices of the registering member.

2. An apparatus for registering and reproducing signs, comprising a rotary registering drum provided with several series of operating devices succeeding one another in the direction of the rotation of the drum, a rotary transmitting member carrying a series of operating devices controlled by the series of operating devices of said drum, means for alternately imparting to the transmitting member rotation in unison with said registering drum and leaving said transmitting member free to rotate in retrograde direction, means for rotating said transmitting member in retrograde direction for successively bringing the operating devices thereof into engagement with the operating devices of said drum.

3. An apparatus for registering and reproducing signs, comprising a rotary registering drum provided with several series of operating devices succeeding one another in the direction of the rotation of the drum, a rotary transmitting member carrying a series of operating devices controlled by the series of operating devices of said drum, means for intermittently rotating said drum, automatic means tending to impart rotary movement to said transmitting member in a direction opposite to that of the registering drum, escapement mechanism intermediate said drum and transmitting member, means to set said operating devices of the drum into operative positions, means to return said operating devices of the drum into inoperative positions, and operating means for said escapement mechanism.

4. The combination with a track brake, and an apparatus for weighing cars to be braked on said track brake, of an apparatus for registering and transmitting the weight of the cars from the weighing machine to the attendant operating the track brake, said apparatus comprising a rotary registering member provided with several series of operating devices, electrical means controlled by said weighing machine for setting said operating devices in operative positions, a rotary transmitting member taking part in the rotary movement of said drum and provided with a series of operating devices controlled by the operating devices of said registering member, means to move said transmitting member in a direction opposite to the rotary movement of said registering member, electrical means controlled from a point near said brake for operating said moving means, and electrically operated signs controlled by the operating devices of said transmitting member.

5. An apparatus for registering and reproducing signs, comprising a movable carrier, an electric circuit including a switch,

a pawl borne by said carrier and movable thereon from inactive to switching position, a rod movable to and from position in the path of pawl advance and adapted when in pawl-engaging position and when the carrier is moved to effect the swinging of the pawl from inactive to switching position, and means for effecting relative movement of carrier and switch.

6. The structure of claim 5, together with an abutment adapted on carrier movement to be engaged by a pawl in switching position borne thereby and by such engagement to effect the swinging of such pawl to inactive position.

7. An apparatus for registering signs, comprising a rotary cylindrical carrier, a plurality of swinging pawls mounted upon said carrier and arranged in a longitudinal row upon said cylinder, a corresponding plurality of rods arranged adjacent said carrier in parallelism in a common plane, and individually movable longitudinally to and from pawl-engaging position, and means for shifting the said rods individually.

8. The structure of claim 7, the means for shifting the rods consisting of electro-magnets, one for each rod, arranged alternately on opposite sides of the plane in which the rods extend.

9. Apparatus for registering and reproducing signs, comprising a rotary carrier, an electric circuit including a switch rotatable about a common axis with said carrier, separable means for rotating said switch in response to carrier rotation, means for rotating oppositely said switch when released by the means last named, a switch-closing pawl borne by said carrier and movable to and from switch-engaging position, and means rendered effective on carrier rotation for moving said pawl.

10. In apparatus for weighing cars the combination with a weighing platform, an electric circuit having a plurality of branches and including two switches, one of said switches arranged at the point of branching and adapted to be closed through one or another of said branches by the movement of the platform under the weight of the car, the other switch, arranged in the unbranched portion of the circuit, adapted to be closed by the movement of the car over the platform, and registering means including an electro-magnet arranged in each branch of said circuit.

11. The structure of claim 10, together with reproducing means, such reproducing means including an electric circuit having a plurality of branches, a switch arranged in the unbranched portion of said circuit and adapted to be closed by the movement of a car, and a plurality of other switches arranged one in each of the branches of the last-named circuit, means for effecting relative movement between said last named switches and said registering means and being adapted on such movement to be closed severally by engagement with said registering means.

12. In apparatus for weighing cars the combination with a movable weighing platform and a car operated lever, of the apparatus for registering signs defined in claim 7, means operated by conjoint movement of said platform and of said lever for shifting the rods and rotating the carrier of the apparatus of said claim.

13. In apparatus for weighing cars the combination with a movable weighing platform and a car operated-switch, of the apparatus for registering and reproducing signs defined in claim 5, means operated by the movement of said platform for moving the rod and the carrier of the apparatus of the said claim, and the said switch constituting part of the means defined in said claim for effecting relative movement of carrier and switch.

In testimony whereof I hereunto affix my signature.

KARL E. WENZEL.