Aug. 18, 1936. H. B. TAYLOR 2,051,400

MECHANICAL BRAKE FOR RAILWAY SWITCH MACHINES

Filed Dec. 23, 1931 2 Sheets-Sheet 1

FIG. 2.

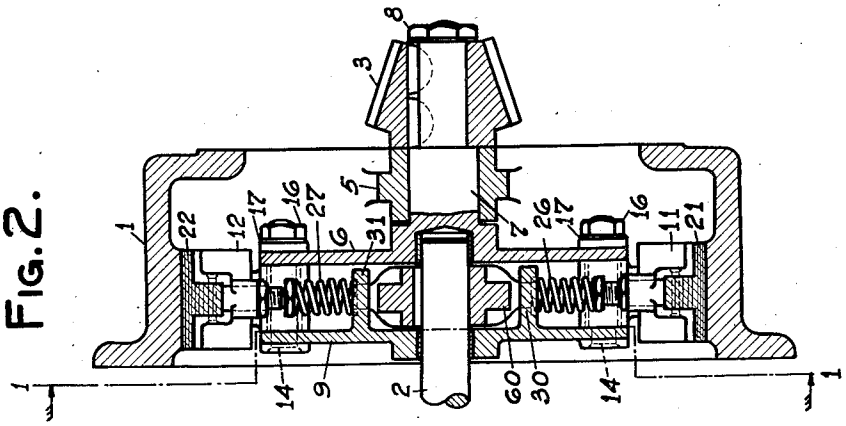
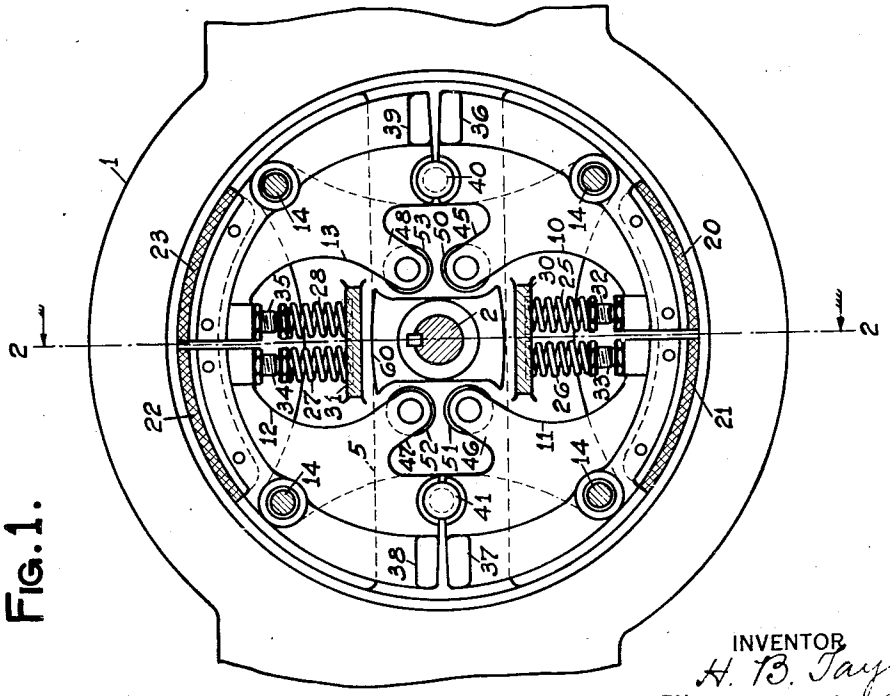


FIG. 1.



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FIG. 3.

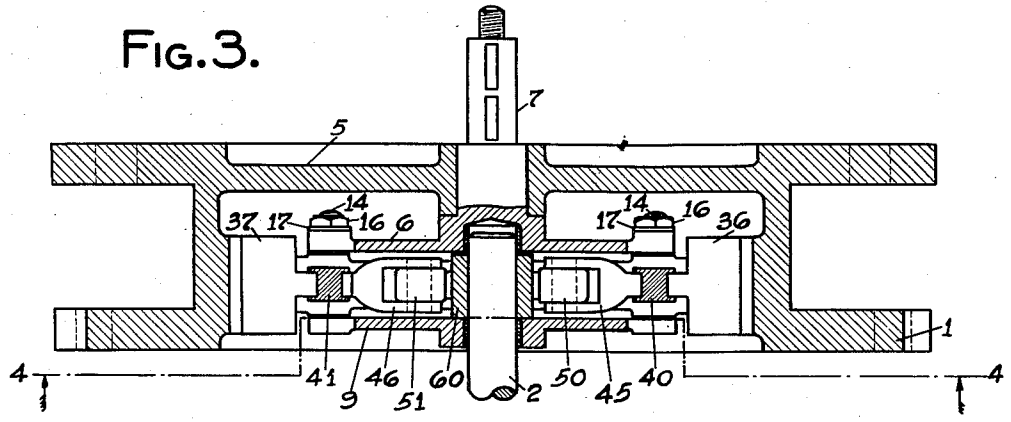
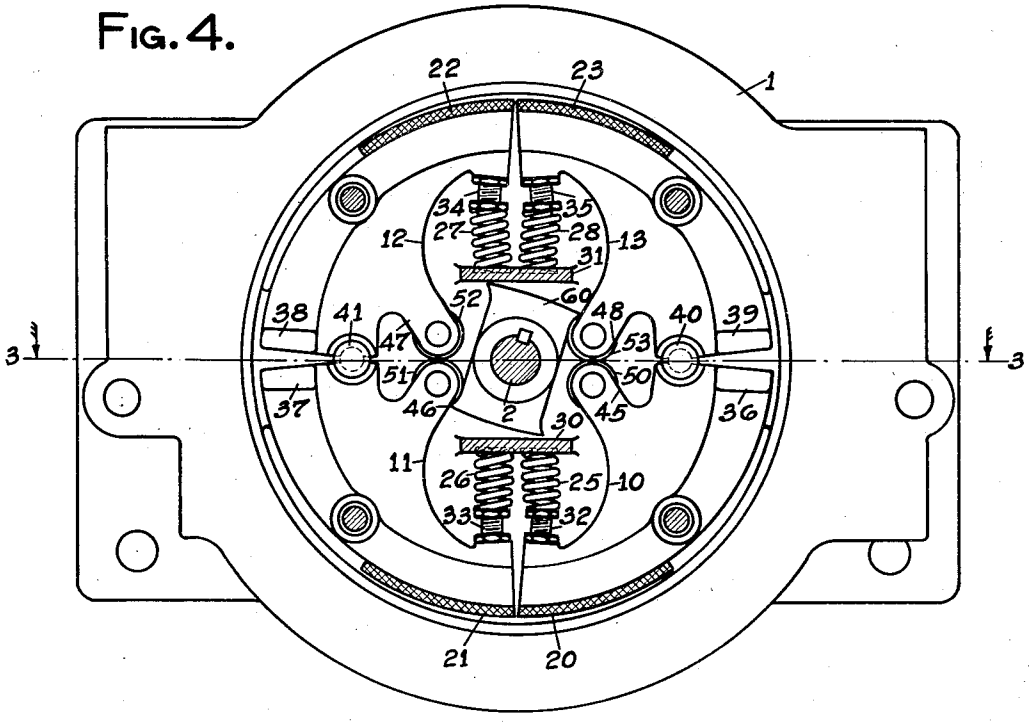


FIG. 4.



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UNITED STATES PATENT OFFICE

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MECHANICAL BRAKE FOR RAILWAY SWITCH MACHINES

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Application December 23, 1931, Serial No. 582,745

14 Claims. (Cl. 192—8)

This invention relates to devices used for the control of railroad track switches, and more particularly pertains to a mechanical brake employed with power driven switch machines for operating such switches.

In the operation of track switches by power driven switch machines, it is desirable that the track switch be prevented from movement at all times except under authorized control. The usual track switch operating mechanism or switch machine is provided with means for positively locking a track switch in its extreme operated positions. However, it may happen that the switch points are operated to the desired extreme position, but the switch machine for one reason or another fails to positively lock the track switch. Even in such a case, the switch machine should be so arranged as to prevent movement of the track switch should a train pass thereover.

In view of the above and other considerations, the present invention proposes to provide a mechanical brake associated with the switch machine in such a manner, as to prevent the movement or operation of the switch machine mechanism at all times except when power is applied to its motor. In other words, this brake is made effective to hold the switch points in the last position to which they are operated, irrespective of whether or not the switch machine has positively locked the track switch in the usual manner.

Other objects, purposes and characteristic features will be in part obvious from the accompanying drawings and in part pointed out, as the description of the invention progresses.

In describing the invention in detail, reference will be made to the accompanying drawings, in which like reference characters indicate corresponding parts throughout the several views, and in which:—

Fig. 1 is a sectional view of a mechanical brake constructed as one embodiment of the present invention, as taken on the lines 1—1 of Fig. 2;

Fig. 2 is a sectional view taken on lines 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on lines 3—3 of Fig. 4; and,

Fig. 4 is similar to Fig. 1 except certain parts have been illustrated in their operated or released positions.

Although the mechanical brake of the present invention is contemplated as employed with a suitable switch machine, such for example as disclosed in the patent to W. K. Howe, Patent No. 1,466,903, dated September 4, 1923, with the brake of the present invention interposed between the driving motor and the operating mechanism of the switch machine, it is considered sufficient for an understanding of the present invention to know that the brake casing 1 is stationary with respect to the switch machine housing, that the shaft 2 is driven by the switch machine motor in one direction or the other depending upon the operation to be accomplished, and that the pinion gear 3 suitably drives the gearing of the switch machine when the motor rotates the shaft 2.

Also, it is to be understood that suitable means may be employed in connection with a switch machine equipped with the brake of the present invention, so as to permit the hand operation of the track switch, but the operation of such means is unnecessary for an understanding of the present invention which more particularly relates to the structure and character of the brake.

With reference to the drawings, the brake casing 1 is formed so as to be securely attached to the switch machine housing, and is provided with a web portion 5 which extends across the cavity within the casing (see Figs. 1 and 3). A plate member 6 has a protruding shaft 7 which extends through the web portion 5 forming a bearing therefor. This shaft 7 is provided with a shoulder formed thereon against which the pinion gear 3 is securely pressed by a suitable nut 8 (see Fig. 2). The pinion gear 3 is prevented from turning on the shaft 7 by suitable keys located in a keyway.

Another plate 9 is secured in spaced relation with the plate 6 so that certain of the operating parts of the brake may be mounted on the inside. More specifically, four brake shoe sectors 10, 11, 12 and 13 are located between the plates, and pivoted at the four points at which the plates 6 and 9 are connected together. For example, the plates 6 and 9 are separated by a shouldered bolt 14 which is riveted at one end to plate 9 but is detachably secured by a nut 16 and a suitable lock washer 17 to the plate 6. Thus, a bearing surface is formed by the shoulder of the bolt 14 for the brake shoe sector 11. In a similar manner, the remaining brake shoe sectors 10, 12 and 13 are supported between the plates 6 and 9 at corresponding points in the remaining quadrants of the brake.

On adjoining portions of the brake shoe sectors 10—11 and 12—13 suitable brake linings 20, 21, 22 and 23 are secured for engaging the inside of the casing 1 which acts as the stationary brake drum. These portions of the brake shoe sectors having the brake lining are pressed

outwardly against the brake drum by springs 25, 26, 27 and 28. The springs 25 and 26 are supported at one end by the extending portion 30 of the plate 9; and similarly the springs 27 and 28 are supported at one end by the extending portion 31 of the plate 9. The opposite ends of the respective springs press against their respective brake shoes, but they have intervening therebetween suitable adjusting studs 32, 33, 34 and 35, which serve as means for adjusting the tension of the springs to give the required braking characteristics.

The opposite portion of each brake shoe sector is enlarged to act as a counter-balancing weight. Each of these weights 36, 37, 38 and 39 is of such a value that the center of the centrifugal force acting on each brake shoe sector falls on that side of each sector extending from its pivot point toward the weighted or enlarged portion of the sector. In other words, as the brake shoe sectors are revolved while the motor is acting to drive the switch machine mechanism, the centrifugal force acting upon the brake shoe sectors is effective to counter-act to the desired degree the effect of the spring members of the respective brake shoe sectors.

The brake shoe sectors 11 and 12 are interconnected by a bearing joint (see Figs. 1 and 3) which provides that movement of one sector transmits the same motion to the other. In other words, a bearing shaft 40 shouldered at either end fits in the semi-circular recesses provided in each of the brake shoe sectors. Similarly, a bearing shaft 41 shouldered at either end fits in the semi-circular recesses located in the brake shoe sectors 10 and 13 so that the motion transmitted to one brake shoe sector is imparted to the other.

Each of the brake shoe sectors 10, 11, 12 and 13 has inwardly extending bifurcated arms 45, 46, 47 and 48, within which the roller bearings 50, 51, 52 and 53 respectively, are suitably mounted.

A cam member 60 is suitably keyed to the shaft 2 and located between the plate members 6 and 9 so as to engage in pairs the roller bearings 50, 51, 52 and 53 depending upon the direction in which the cam is rotated. When the cam is turned in a clockwise direction (see Fig. 1), the cam member 60 engages the roller bearings 51 and 53 turning the brake shoe sectors 11 and 13 in counter-clockwise directions, so as to move their respective brake linings 21 and 23 away from the brake drum, as illustrated in Fig. 4. This movement or force transmitted to the sectors 11 and 13 is imparted to the sectors 12 and 10 respectively through the interconnecting bearing shafts 40 and 41, so that the sectors 12 and 10 turn in clockwise directions, which moves the brake linings 20 and 22 away from the inside of the brake drum. Thus, the frictional contact between the brake shoe sectors and the brake drum is released allowing the plates 6 and 9 to rotate in a clockwise direction.

The force or power imparted to the shaft 2 is now passed on to the pinion 3, inasmuch as the brake sectors can be rotated around their pivot points only a limited distance which is determined by the bearings 51—52 and the bearings 50—53 making contact. In other words, the cam member 60 is rotated with respect to the plates 6 and 9 only so long as the brake shoe sectors turn on their pivot points and when they cease turning and the respective pairs coincide at their bearings, then the cam member is stationary with respect to plates 6 and 9, but the plates 6 and 9 together with the shaft 2 rotate with respect to the brake drum or casing 1, thereby transmitting the motion of the motor armature to the pinion gear 3.

In this connection it is noted, that the shape of the cam member 60 is such that its circular portions which engage the roller bearings 50, 51, 52 and 53 are concentric with the roller bearings when the parts are in their operated positions (see Fig. 4). This definitely determines the limits of the cam movement, as well as properly directing the forces both for rotational effectiveness and for releasing effectiveness.

The operation accomplished when the cam 60 is turned in a counter-clockwise direction is similar to that already described, and will be understood by analogy.

The rotation of the brake mechanism imparts centrifugal force to each of the parts. These centrifugal forces are preferably balanced except in the case of the brake shoe sectors, as previously mentioned. When the motor has reached the usual operating speed, the centrifugal forces, thus transmitted to the brake shoe sectors added to the releasing effect imparted by the cam 60 due to the reaction of the load, counterbalance the force of the springs with sufficient margins to positively maintain the brake released.

But when the power is withdrawn, as applied by the motor, the centrifugal force alone is insufficient to maintain the brake shoes in released or retracted positions and they are pressed by their respective springs against the brake drum. This serves to stop the rotation of the motor and switch machine mechanism with a minimum amount of overrun by absorbing the momentum of the parts in the friction created.

Also, it will be obvious from the above description that any force applied to the pinion 3 in either direction when the motor is not actuated, will be transmitted directly through the brake shoe members to the brake drum 1 through the frictional contact between the brake linings and the drum, thus preventing movement of the pinion 3.

The actual weight, the degree of balancing, the forces, the moments of torque, and the like are of course considered as engineering details and adjustment, the particular values of which are not necessary for an understanding of the present invention.

This brake when applied to switch machines, as contemplated in accordance with the present invention, will adequately prevent the movement of the track switch points due to externally applied forces, but will allow proper operation when forces are applied thereto through the medium of the switch machine mechanism as driven by its power operated motor. The brake of the present invention also serves to limit the overrun at the end of an operation.

Having thus shown a brake for railroad switch machines, as one specific embodiment of the present invention, it is desired to be understood that this form is selected to facilitate in the disclosure of the invention rather than to limit the number of forms which it may assume; and, it is to be further understood that various modifications, adaptations and alterations may be applied to the specific form shown to meet the requirements of practice, without in any manner departing from the spirit or scope of the present invention except as limited by the appended claims.

What I claim is:—

1. For use with a power driven switch machine

for railroad track switches, a mechanical brake including, a fixed brake drum, a pinion drive member, a plurality of brake shoes pivotally attached to said pinion drive member, coil springs for biasing said brake shoes to engage said fixed brake drum, a power driven shaft, operating means connecting said power driven shaft to said plurality of brake shoes for compressing said coil springs to disengage said brake shoes from said brake drum and for rotating said pinion drive member with said power driven shaft after said brake shoes are disengaged, and means responsive to the synchronous rotation of said shaft and said pinion drive member for maintaining said coil springs compressed.

2. For use with a power driven switch machine for railroad track switches, a mechanical brake including, a fixed brake drum, a pinion drive member, a plurality of brake shoes pivotally attached to said pinion drive member and normally biased to engage said brake drum, a shaft, operating means connecting said shaft with a plurality of brake shoes for disengaging said brake shoes from said brake drum and for rotating said pinion drive member when power is applied to said shaft, and means effectively only while said pinion drive member is being rotated for maintaining said brake shoes disengaged from said brake drum.

3. For use with a power driven switch machine for railroad track switches, a mechanical brake including, a fixed brake drum, a pinion drive member, a plurality of brake shoes each having an unbalancing weight on one end and a braking surface on the other end, and each being pivotally attached to said pinion drive member at a point between its unbalancing weight and its braking surface, means normally biasing said brake shoes so that their respective braking surfaces engage said brake drum, a shaft, and operating means connecting said shaft with said plurality of brake shoes for initially disengaging said brake shoes from said brake drum and for rotating said pinion drive member when power is applied to said shaft, whereby the revolving of said pinion drive member and said unbalanced brake shoes is effective to counteract said normal bias on said brake shoes.

4. In combination, a driven member, a driving member, a brake for preventing operation of said driven member, means for releasing said brake when power is applied to said driving member, said means operatively connecting said driving member to said driven member when said brake is released, and means dependent upon the speed of operation of said driven member for maintaining said brake released during operation.

5. For use with a power driven switch machine for railroad track switches, a mechanical brake including; a fixed brake drum; mounting means rotatably supported with respect to said brake drum; a pinion gear attached to said mounting means; a plurality of brake shoe sectors pivotally supported on said mounting means; brake linings on each brake shoe sector for engaging said fixed brake drum, said linings being on one side of the pivot point of each brake shoe sector; weight means on the other side of the pivot point of each brake shoe sector; spring biasing means for normally causing said brake shoe linings to engage said brake drum; a power driven shaft; and operating means connecting said power driven shaft and said brake shoe sectors for compressing said spring biasing means and for rotating said brake shoe sectors, said mounting means and said pinion gear being in synchronism with said power driven shaft when power is applied thereto; whereby said pinion gear is prevented from rotation except when power is applied to said shaft; and whereby the centrifugal force acting on said unbalanced brake shoe sectors due to the rotation thereof is effective to counter-act said spring biasing means.

6. For use with a power driven switch machine for railroad track switches, a mechanical brake including; a fixed brake drum; mounting means rotatably supported with respect to said brake drum; a pinion gear attached to said mounting means; a plurality of brake shoe sectors pivotally supported on said mounting means; brake linings on each brake shoe sector for engaging said fixed brake drum, said linings being on one side of the pivot point of each brake shoe sector; weight means on the other side of the pivot point of each brake shoe sector; spring biasing means for normally causing said brake linings to engage said brake drum; a power driven shaft; and a cam on said shaft adapted to engage said brake shoe sectors for compressing said spring biasing means and for rotating said brake shoe sectors, said mounting means and said pinion gear being in synchronism therewith when power is applied thereto for rotation in either direction; whereby said pinion gear is prevented from rotation except when power is applied to said shaft; and whereby the centrifugal force acting on said unbalanced brake shoe sectors due to the rotation thereof is effective to counteract said spring biasing means.

7. For use with a power driven switch machine for railroad track switches, a mechanical brake including, a fixed brake drum having a cavity, two spaced plates pivotally supported within said cavity, a pinion gear fixed to said plates, four brake shoe sectors each being pivotally supported between said plates at intermediate points near their periphery and having inwardly projecting arms, a brake lining attached to each of said brake shoe sectors on one side of its pivot point, a weight attached to each of said brake shoe sectors on the opposite side of its pivot point, coil springs associated with each of said brake shoe sectors for causing said brake linings to engage the inside of said brake drum, a power driven shaft pivotally supported having the same axis as said plates, and a movement limiting cam on said power driven shaft for engaging said inwardly projecting arms, whereby said coil springs are compressed for disengaging said brake linings from said brake drum, whereby said plates, said brake shoe sectors and said pinion are all rotated when power is applied to said shaft, and whereby the centrifugal force acting on said weights assists in maintaining said coil springs compressed.

8. In combination, a driven member capable of being rotated in either direction, a plurality of unbalanced sectors so pivotally attached to said driven member that their heavier portions move outwardly when said driven member is rotated, biasing means for drawing the heavier portions inwardly when said driven member is not rotated, and a friction brake drum engaged by said unbalanced sectors when their heavier portions are drawn inwardly by said biasing means to thereby prevent rotation of said driven member in either direction.

9. In combination, a driven member capable of being rotated in either direction, a plurality of unbalanced sectors so pivotally attached to said

driven members that their heavier portions move outwardly when said driven member is rotated, biasing means for drawing the heavier portions inwardly when said driven member is not rotated, a friction brake drum engaged by said unbalanced sectors when their heavier portions are drawn inwardly by said biasing means to thereby prevent rotation of said driven member in either direction, and mechanical releasing means for counteracting said biasing means, whereby said brake drum is disengaged by said unbalanced sectors whenever said mechanical releasing means is actuated and whenever said driven member is rotated above a predetermined speed contemporaneously with the actuation of said mechanical releasing means.

10. In combination, a driven member capable of being rotated, a brake for restraining rotation of said driven member in both directions, means for initially releasing said brake, and means dependent upon the speed of rotation of said driven member for maintaining said brake released.

11. In combination, a driven member capable of being rotated, a brake for preventing rotation of said driven member, a driving member, means automatically releasing said brake upon the tendency of said driving member to rotate and then directly transmitting rotation tendency from said driving member to said driven member, and centrifugal means dependent upon the speed of rotation of said driven member for effectively maintaining said brake released during the rotation of said driven member.

12. In combination, a driven member capable of being rotated, a driving member disconnected from said driven member and capable of rotation when power is applied thereto, a friction brake for preventing rotation of said driven member in either direction, means automatically releasing said brake upon the application of power to said driving member to cause it to tend to rotate, whereby said brake is released to allow the rotation of said driven member, means directly transmitting rotational tendency from said driving member to said driven member when said brake is released, and centrifugal means dependent upon the speed of rotation of said driven member for maintaining said brake released by supplementing said automatic releasing means.

13. In combination, a driven member capable of being rotated in at least one direction, a friction brake for preventing rotation of said driven member in said one direction, a driving member, automatic mechanical means for initially releasing said brake when driving torque is applied to said driving member, means operatively connecting said driven member and said driving member for the transference of driving torque from said driving member to said driven member when said brake is released, and centrifugal means dependent upon the speed of rotation of said driven member for effectively maintaining said brake released during said rotation of said driven member.

14. In combination, a driven shaft capable of being rotated, a driving member capable of rotation when power is applied thereto, a friction brake for normally preventing rotation of said driven shaft in both directions while driving torque is removed from said driving member, means automatically releasing said brake upon the application of driving torque to said driving member, whereby said brake is released to allow the rotation of said driven shaft, means directly transmitting torque from said driving member to said driven shaft when said brake is released, and centrifugal means responsive to the speed of rotation of said driven shaft for maintaining said brake released by supplementing the releasing effect of said automatic releasing means, whereby torque can be transferred from said driving member to said driven shaft, but cannot be transferred from said driven shaft to said driving member while driving torque is removed from said driving member.

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