Aug. 15, 1939 D. ARMSTRONG-TAYLOR 2,169,822

TRANSMISSION DEVICE

Filed Oct. 16, 1937 2 Sheets-Sheet 1

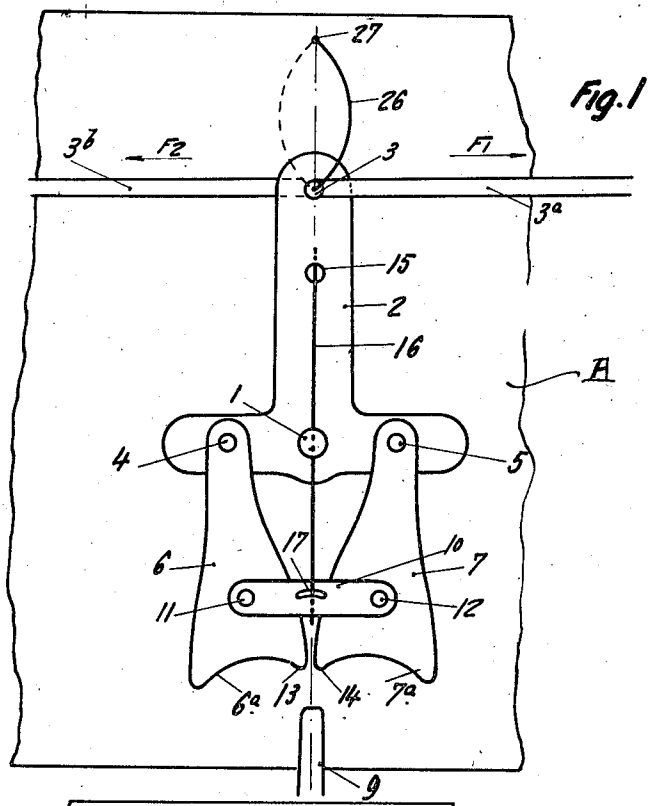


Fig. 1

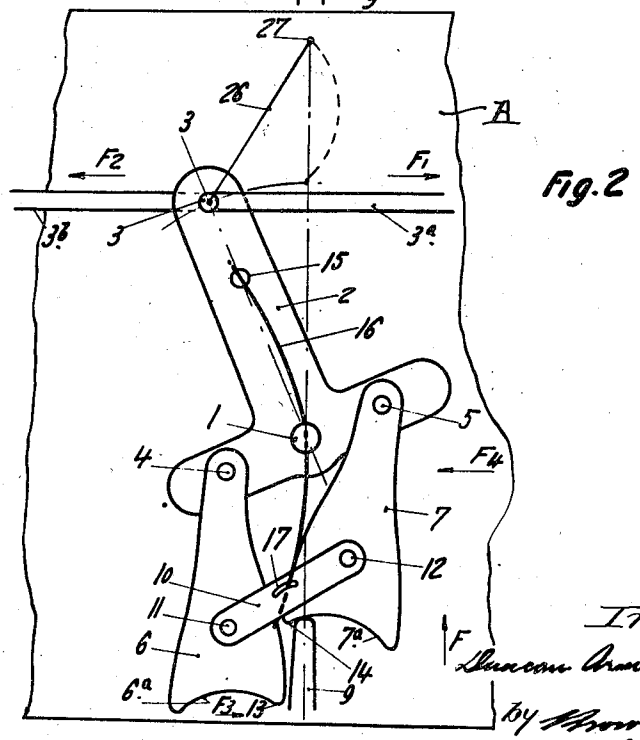


Fig. 2

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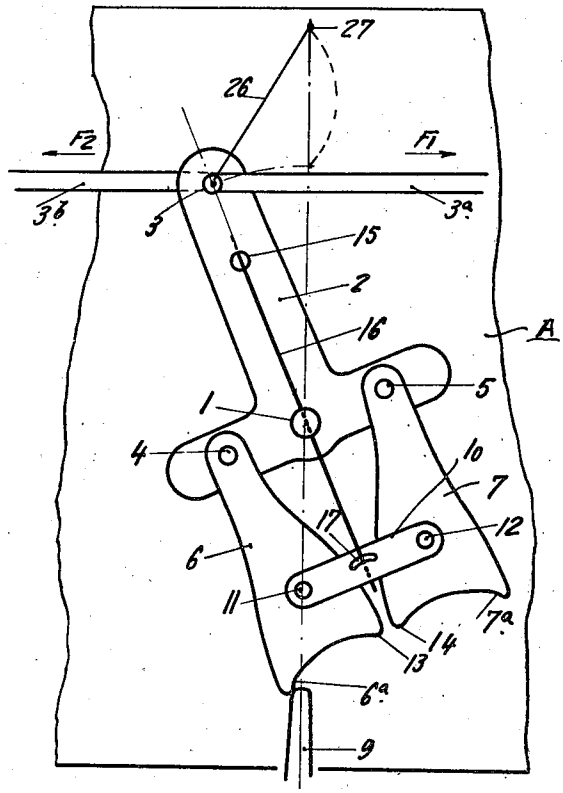


Fig.3

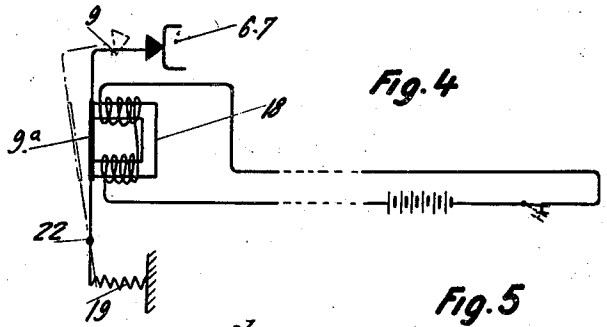
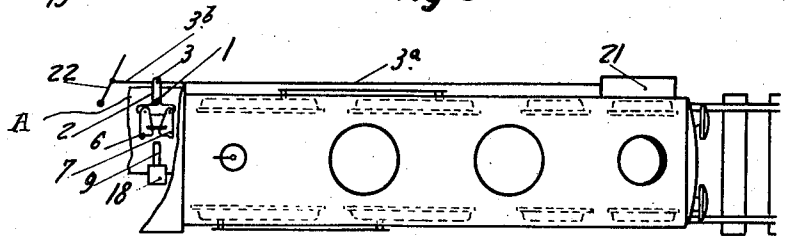


Fig.4

Fig.5



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TRANSMISSION DEVICE

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5 Claims. (Cl. 74—100)

The present invention relates to mechanical transmission devices, and its object is to provide a device of this kind capable of transforming impulses always of the same direction into movements taking place alternately now in one direction now in the opposite direction.

According to the essential feature of the present invention, this device includes a pivoting element, intended to receive these movements in alternately opposed directions, a structure movably carried by said element including two parts adapted to be alternately acted upon by the reciprocating control element which supplies the successive impulses all in the same direction in accordance with their respective positions with respect to said pivoting element, and elastic means for reversing said positions when said structure is released by said control member after every impulse. The direction of the movement of the pivoting element varies according to which of these two parts is cooperating with said control member.

According to a preferred embodiment of the invention, the pivoting member consists of an element pivoted about a stationary axis, and two levers, belonging to the above mentioned movable structure are pivoted to said pivoting element on either side of said axis. These two levers, which constitute the two parts above mentioned, are linked together by a connecting rod, in such manner that the pivots of said connecting rod with said levers respectively and the pivots of said respective levers with said pivoting member constitute the apexes of a quadrilateral which is deformed in response to relative movements of said levers and said pivoting element.

As for the control member, it consists, preferably, of a reciprocating piece, advantageously operated by an electro-magnet, with the armature of which it is coupled, said piece being returned, through any suitable means, into its inactive position, after every impulse (for instance when the electro-magnet ceases to be energized). During its forward stroke, said control member actuates the lever which, at this time, is positioned across the line of operation of said control member.

In the course of this forward stroke, the lever in question transmits an angular displacement in one direction to the pivoting element, and at the same time it moves angularly with respect to said pivoting element, thus producing a deformation of the quadrilateral above referred to. As soon as the control member is moved backwardly so as to release the lever in question, elastic means interposed between said pivoting element and said levers bring the whole of these two levers and their connecting rod into a relative position, with respect to said pivoting element, which is not moved, such that the other lever is now located opposite said control member.

It will be readily understood that this device can be applied in a general manner whenever it is desired, by acting, always in the same manner, on a single organ, to produce alternately opposed successive action.

The device according to the invention has the advantage that any mistake in operating the single organ above referred to is wholly impossible.

Furthermore, it is clear that the operation is always ensured by the actuation of the control organ in the proper direction, whatever be the intensity or the duration of the action effected on said control organ.

An advantageous embodiment of the invention concerns the control of steam chests for reversing steam in steam engines and especially on locomotives for braking purposes. This arrangement is especially adapted to permit reliable tele-control.

Other features of the present invention will result from the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described, with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 is a diagrammatic plan view of an embodiment of the device according to the invention, the pivoting element being shown in an intermediate position which it does not actually occupy when the device is working;

Fig. 2 is a similar view showing the parts in a different position corresponding to the positive action of the control member on one of the aforesaid levers;

Fig. 3 is a similar view showing the parts in still another position obtained, under the action of the elastic means, after the control member has ceased to act on said lever;

Fig. 4 is a diagrammatical view in lateral elevation of the means for actuating the control member in a possible embodiment of the invention;

Fig. 5 diagrammatically shows an embodiment of the invention as used in connection with the control of the steam chest of a locomotive.

In the embodiment shown by Figs. 1 to 3, the control device according to the invention includes the following parts: A pivoting lever 2

(constituting the above mentioned pivoting element, and having, in the specific example, the shape of an inverted T) mounted about a fixed axis 1 carried by a support A (said axis being located substantially at the point of intersection of the two branches of the T.

This pivoting lever 2 may be used to operate any desired structure or mechanism, which is connected thereto at the top at point 3, through rods such as 3a and it may itself be connected to a manual control through rod 3b.

To the respective ends of the bar of the T I pivot levers 6 and 7, about axes 4 and 5, respectively. The other ends of said levers 6 and 7 are provided with curved edges adapted to cooperate with control member 9, which acts always in the same direction (arrow F).

These levers 6 and 7 are linked together by a connecting rod 10, pivoted thereto at 11 and 12 respectively.

Points 4, 5, 11 and 12 constitute the apexes of a deformable quadrilateral, which, in Fig. 1 is shown in its symmetric position. A spring 16, fixed at 15 to lever 2 and kept in axial position with respect to said lever 2 by engaging through axis 1, engages in an eye 17 provided in connecting rod 10, with respect to which it is slidable, so as to urge levers 6 and 7 toward a position which corresponds to quadrilateral 4, 5, 11, 12 being symmetric with respect to line 15—1. In this position, spring 16 is rectilinear and without stress.

The device works in the following manner: Starting from the position of Fig. 1 (neutral) in which parts 2, 6 and 7 are symmetrical with respect to the median line of the apparatus, it is assumed that the system is deformed by the action of the manual control means transmitted by rod 3_b in such manner as to bring lever 7 across the line of action of control member 9.

If now control member 9 is moved in the direction of arrow F, it pushes lever 7 into the position shown by Fig. 2. Quadrilateral 4, 5, 11, 12 is deformed and causes lever 2 to turn about axis 1 in an anticlockwise direction, thus bringing it into the position of Fig. 2. This oscillation of lever 2 moves pin 3 in the direction of arrow F_2, thus pulling rod 3a, which acts in one direction on the mechanism to be controlled, for instance bringing the valve gear of a locomotive into one of two predetermined positions.

At the same time, as a consequence of the deformation of quadrilateral 4, 5, 11, 12, spring 16 is bent, as shown by Fig. 2, exerting upon connecting rod 10 a reaction tending to move it toward the right.

When the impulse on control member 9 ceases, said member, under the effect of the return means acting thereon, is moved backwardly, in the direction of arrow F_5.

As soon as lever 7 is released by control member 9, spring 16 brings the whole of levers 6 and 7 and connecting rod 10 into the position of Fig. 3, in which quadrilateral 4, 5, 11, 12 is again symmetric with respect to line 15—1. In this position of the system, the curved edge 6a of lever 6 is now located along the line of action of control member 9, so as to be ready to cooperate therewith on the next forward stroke of said member.

Therefore, the next time member 9 is pushed in the direction of arrow F, it pushes lever 6 just in the same manner as it pushed lever 7 precedingly, thus producing a rotation of member 2 in the direction of arrow F_1, the operation being the same as above mentioned but in the opposite direction. Spring 16 is bent in a direction opposed to that shown by Fig. 2 so as to bring the whole into a position symmetrical to that of Fig. 3. The curved edge 7a of lever 7 is thus brought along the line of action of member 9, and the operation above described can be repeated.

It should be well understood that, during the relative displacements of levers 6 and 7 with respect to lever 2 under the influence of spring 16, said lever 2 remains stationary, as a consequence of the fact that the resistance to be overcome for displacing said lever 2 is much more considerable than the resistance to the movement of levers 6 and 7, which are of very light weight.

Of course, the shape and size of the curved edges 6a and 7a are chosen in such manner that, when each of these edges is acted upon by control member 9, the corresponding lever 6 or 7 transmits to lever 2 an angular displacement of the desired amplitude. It will be noted that these curved edges have sharp ends 13 and 14 so as to prevent member 9 from slipping past them.

Fig. 4 shows an example of means for operating member 9, illustrating the possibility of obtaining a remote control by means of the device. Member 9 is carried by the movable armature 9a of an electro-magnet 18. This figure shows, in section, the ends of levers 6 and 7, which cooperate with member 9. Armature 9a is pivoted at 22 and submitted to a suitable return action, such as that of spring 19.

It will be readily understood that, every time electro-magnet 18 is energized, it attracts its armature 9a (thus causing member 9 to act upon one of the levers 6—7) and holds it in this position as long as it remains energized, to wit as long as its circuit is closed by switch 23. As soon as said switch is opened, armature 9a is released and member 9 is moved backward under the action of spring 19. The next time electro-magnet 18 is energized, member 9 is moved back toward the right (thus acting upon the other of these levers 6—7).

It will be noted that, in Figs. 1 to 3, a blade spring 26 is pivoted at one end to a fixed point 27 and at the other end to a point of lever 2, for instance pin 3. When said lever 2 is pivoted in the manner above described, spring 26 first opposes this movement (when the action of electro-magnet 18 is strongest), then, after lever 2 has turned through a certain angle, spring 26, which has been gradually bent, snaps and pushes lever 2 in the direction of its rotation, thus helping the action of the electro-magnet. At the end of this movement, spring 26 is in a position symmetrical with respect to its initial position, ready to act in the opposite direction.

Fig. 5 discloses an embodiment of the present invention as applied to the control of the valve gear of a steam locomotive.

This figure shows all of the elements above mentioned in Figs. 1 to 4, to wit electro-magnet 18, armature 9a, control member 9, levers 6 and 7, and lever 2. The latter is connected through rod 3a with the valve gear 21 and through rod 3b with the manual control means 22.

In such a device, lever 2 can bring the valve gear 21 into either of two predetermined positions. According to the invention, these positions may be chosen at will to obtain any desired result. For instance they may correspond to full admission of steam on opposite sides of the piston respectively. In this case, supposing

the locomotive to be running in one direction, for instance in the forward direction, the closing of the electro-magnet circuit permits of reversing steam admission from a remote control station connected to said circuit. Advantageously, the track of the locomotive includes means, such for instance as one rail **25**, for feeding current to electro-magnet **18**. This will permit of immediately stopping all the locomotives running along a track section corresponding to said circuit, no matter whether the locomotives are running frontward or backward.

In another case, one of the above mentioned predetermined positions of the valve gear may be its neutral position, so that the locomotive can either be started from standstill, or have its steam admission cut off when it is running.

It is pointed out that the device above described is particularly advantageous when applied to toy steam locomotives adapted to run along an electrified track.

It should be well understood that the invention has many other applications, and in particular the control of electric switches (for instance for lamps) and relays.

It could also be applied to the remote control of steamboats, airplane engines and the like through a radio transmission.

In a general manner, while I have, in the above invention, disclosed what I deem to be practical and efficient embodiments of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition, and form of the parts without departing from the principle of the present invention as comprehended within the scope of the appended claims.

What I claim is:

1. A transmission device of the type described which comprises, in combination, a support, an oscillatable element pivoted to said support about a fixed axis, a control member slidable with respect to said support along a line perpendicular to said axis and passing therethrough, adapted to receive successive impulses always in the same direction, resilient means interposed between said support and said control member for returning said member into its initial position after each impulse, two levers pivoted to said oscillatable element on opposite sides of said axis respectively, and linked together so as to come alternately across the line of action of said control member, when the latter is inclined in one direction or the other, respectively, with respect to a given median position thereof and elastic means carried by said oscillatable element for urging both of said transmitting levers toward a predetermined position symmetric with respect to said oscillatable element, whereby the respective positions of said levers are alternately shifted with respect to said control member at the end of each impulse of said control member.

2. A transmission device of the type described which comprises, in combination, an oscillatable element to be pivoted alternately in opposite directions about an axis, a control member adapted to receive successive impulses always in the same direction, resilient means for returning said member into its initial position after each impulse, two levers pivoted to said oscillatable element on opposite sides of said axis respectively, said levers being provided at their free ends with curved concave edges adapted to cooperate with said control member, for transmitting the movement of said control member to said oscillatable element in opposite directions for said levers respectively, a connecting rod interposed between said levers, whereby said oscillatable element, said levers, and said connecting rod form the four sides of an articulated system, said levers being so made that, when said articulated system is in symmetric position, the curved edge of one of said levers is located opposite said control member when said oscillatable element is in one of its extreme positions, while the curved edge of the other lever is located opposite said control member when the oscillatable element is in the other extreme position, and elastic means urging said articulated system toward its symmetric position.

3. A transmission device according to claim 2 in which said elastic means include a spring blade fixed at two spaced points to said oscillatable element and slidably engaging in said connecting rod.

4. A transmission device according to claim 2 further including a fixed electro-magnet, and a movable armature for said electro-magnet coupled with said control member.

5. A transmission device according to claim 2, further including elastic means, interposed between said oscillatable element and a fixed point, for opposing in a resilient manner the pivoting of said oscillatable element during the first part of each oscillation thereof, and restoring the energy thus absorbed to said oscillatable element, at the end of the movement thereof.

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