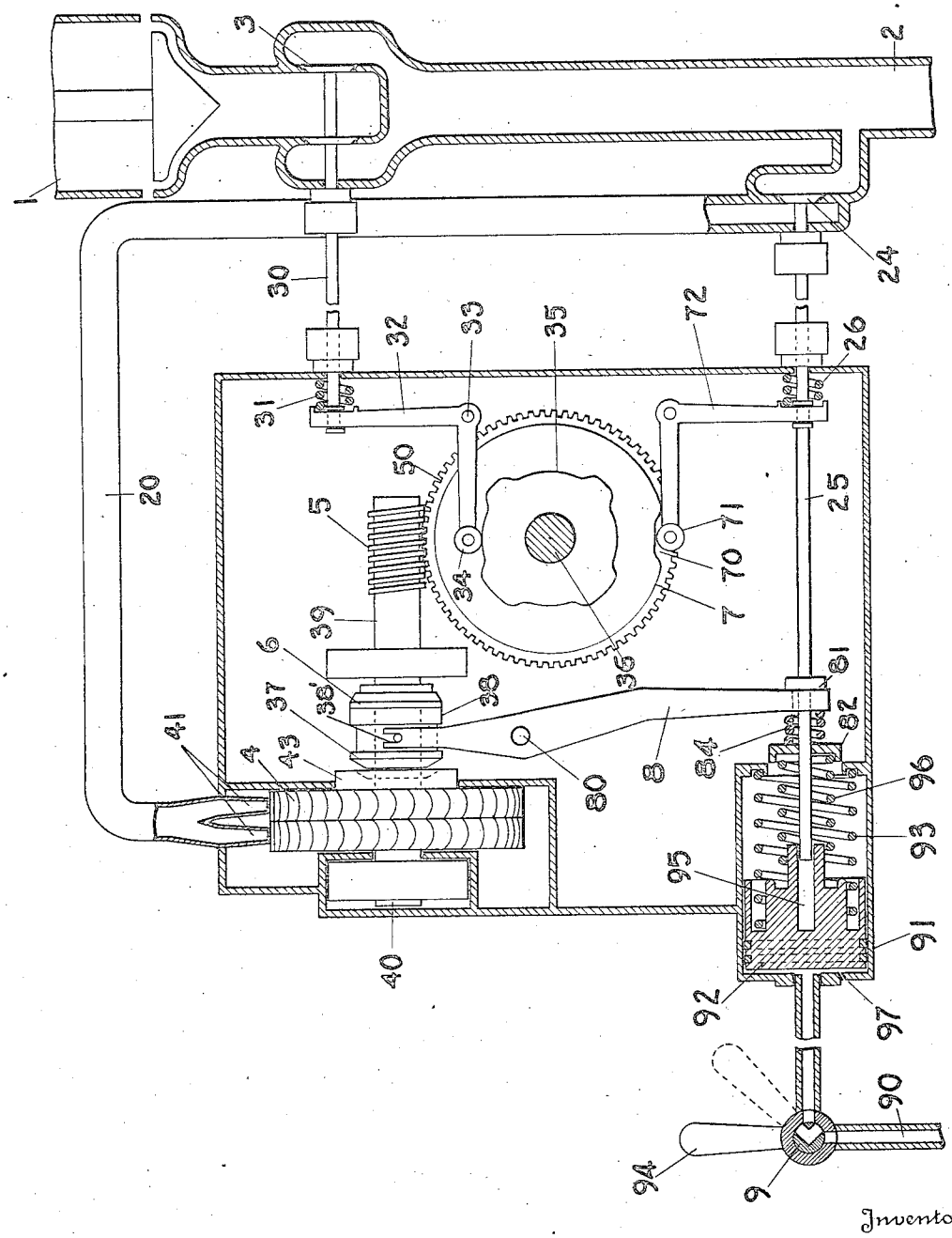
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AUTOMATIC WHISTLE CONTROL FOR LOCOMOTIVES

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AUTOMATIC WHISTLE CONTROL FOR LOCOMOTIVES

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My invention relates to locomotive whistles, and particularly to means for effecting the automatic sounding of such a whistle in a predetermined fashion, to give a recognized signal following initiation of such action by the engineman and without further attention on the part of the engineman after the operation has been initiated.

The engineman of a train is responsible for causing a series of blasts by the whistle when approaching a crossing. Frequently such crossings occur in more or less congested territory and the engineman's attention must be directed to the control of the locomotive. To remind him to sound the whistle, a whistle post is usually located about a quarter of a mile before the crossing, and the whistle should be sounded approximately from the whistle post until the locomotive has passed the crossing, so that at a speed of sixty miles an hour this would require the sounding of the whistle for about fifteen seconds, during which time, according to present practice, the engineman must keep his hand on the whistle cord or lever. It is therefore a principal object of my invention to relieve the engineman of the necessity of holding onto the whistle cord or lever during such a period, and to make it possible to give the prescribed signal, consisting of a regular pattern of successive blasts, merely by initiating the sounding of the whistle, after which he may be free to attend to other things while the whistle signal is continuing automatically.

It is a further object to provide mechanism to the end above which will be quickly responsive, which will initiate and carry through the cycle of operation without fail, and which at the end of the cycle will automatically become inoperative, and which will permit no appreciable overrun in the parts of the mechanism.

It is a further object to provide such mechanism which shall be strong and rugged, and contain few parts likely to wear out, or dependent upon precise adjustment, and to provide mechanism which is readily operable by power means available on a steam, electric, Diesel or otherwise powered locomotive.

Throughout this specification the whistle will be described as a steam whistle, but it will be obvious that the same principles may be employed in operating an air or vibrating whistle, hence air or electricity may be substituted for the steam, and vice versa, without essential change in the mechanism or mode of operation.

My invention comprises the novel parts, and the novel combination and relative arrangement of the same, as shown in the accompanying drawings, described in the specification, and as will be more particularly pointed out by the claims which terminate the same.

In the accompanying drawing I have shown in diagrammatic fashion the manner of arrangement of the several elements contributing to the automatic sounding of a whistle.

The figure is in general a sectional view, illustrating the several cooperating parts and their relationship.

The whistle **1** is mounted on the end of a steam pipe **2**, which may be taken as the source of supply of steam or other type of power source. Sounding of the whistle is controlled by suitable valve means such as the balanced valve **3**, controlled by a valve stem **30**. The valve is normally held closed by spring means, indicated at **31**, and is opened by movement of a bell crank lever **32** fulcrumed at **33**, and carrying upon one end a cam follower **34** in engagement with a rotative cam **35** carried upon a shaft **36**. This cam is provided with a series of high spots suitably spaced and of such angular extent as will cause the valve **3** to be opened and closed in regular succession according to a predetermined plan. In the arrangement shown, the whistle valve **3** will be opened and closed to give two long and two short blasts, the recognized crossing signal. It is obvious that the cam might be arranged to give any desired signal in accomplishing a cycle, which in this instance consists of one complete rotation of the cam.

The cam is suitably rotated from a power source, which may be the same source as that which sounds the whistle, or a different source. It is illustrated as the steam turbine **4**, carried upon a shaft **40** and driven by dual nozzles **41**, steam being supplied to these nozzles by a steam pipe **20**, the supply to which is controlled by a valve **24**. The turbine is not shown as directly connected to the cam **35**, although this is not outside the scope of my invention, but the connection is preferably through a clutch element **43** on the turbine and a cooperating clutch element **37**, the latter being keyed to a shaft **39** coaxial with the shaft **40**, the shaft **39** carrying a worm pinion **5** meshing with a worm gear **50** fast upon the shaft **36**. The connection between **5** and **50** is irreversible and speed reducing. The clutch elements are interengaged by movement of the loose collar **38** to push the element **37** along the shaft **39** into contact with the member **43**. When the clutch elements **43** and **37** are thus engaged, the cam **35** is driven at a speed which is a fraction of the speed of the turbine,

and when the clutch elements are disengaged, the cam and associated parts, having small mass and being close to the center of rotation, will have little or no effect to drive the pinion 5, but will quickly stop. To further insure quick stopping of the cam, once the cycle has been completed, I may provide a brake element 6 fixed on the shaft 39 adjacent the slide 38. The braking surface on the left face of this element 6 is engaged by a braking surface on the right end of the slide as shown in the drawing, upon movement of the latter to disengage the clutch element. Thus the turbine, which may have some residual rotational inertia, may continue to rotate, but the cam will be quickly stopped.

It will be remembered that the turbine 4 will rotate so long as the valve 24 is open, and I provide means to hold the valve 24 open throughout the cycle, and to close it immediately upon reaching the end of the cycle. Such means must be positive in action, yet not dependent upon any fine adjustment, nor subject to appreciable wear. Such means are conveniently a cam 7 secured upon the shaft 36 to rotate with the cam 35, and containing a single low spot 70, this cam being engaged by a cam follower 71 upon one end of a bell crank lever 72, the opposite end of which is movable with the stem 25 of the valve 24. A spring 26 normally urges the valve 24 toward closed position, and it is held open only by engagement of the cam follower 71 with the high periphery of the cam, and the valve is closed when the cam follower drops into the low spot 70 at the completion of the cycle.

The clutch and brake slide 38 is likewise controlled by movement of the valve stem 24. To this end a lever 8, fulcrumed at 80, has one end engageable at 38' to the slide 38, and its other end is engageable by spaced collars 81 and 82 upon the valve stem 25. When the valve 24 is opened, the clutch means are engaged; when the valve 24 is closed, the slide 38 engages the fixed brake 6, and the cams immediately stop rotating. To accommodate any slight adjustment, or to compensate for such wear as may occur in the clutch and brake surfaces, a spring 84 may be interposed between the lever 8 and the collar 82 by which the latter is moved, or any other flexible arrangement may be interposed between the collar 82 and the slide 38, so that regardles of the extent of travel of the valve stem 25 the clutch will be engaged.

To initiate the action I prefer to employ a control valve 9, whereby communication between an air line 90, which may be considered to be a source of air under pressure, may be brought into communication with a cylinder 91 in which is movable a piston 92. The piston is normally held to the left, as seen in the figure, by the spring 93, but upon movement of the control valve 9, under the influence of its handle 94, to the dotted line position, the piston 92 is forced to the right, compressing the spring 93, and in the final portion of its movement the end of a socket 95 in the piston engages the end of the stem 25, forcing it to the right and opening the valve 24. Before this engagement with the stem 25 a spring 96 comes into action to force the lower end of the lever 8 to the right, thereby engaging the clutch elements.

Thus, after the piston has commenced to move, the lever 8 is swung on its fulcrum, engaging the clutch elements 43 and 37, and disengaging the brake 6. When the piston and valve stem have completed their movement to the right the turbine 4 has received steam and has commenced to rotate, and this causes rotation of the shaft 36 and the two cams mounted thereon, the cam follower 71 having been previously raised from the low spot 70. As the cams rotate, the high periphery of the cam 7 engages the follower 71, preventing the valve 24 from closing, whereupon the turbine continues to drive the cams through one complete cycle, the whistle being sounded as the high spots of the cam 35 open the valve 3. Meantime the valve 9 has been thrown to the full line position, it requiring but an instant to accomplish movement of the piston, the spring 96, however, serving to hold the valve 24 open, even while the piston 92 is receding, and until the piston has nearly reached the left hand end of its cylinder, such retrograde movement being under the influence of the spring 93 primarily; the pressure in the cylinder is relieved through a small bleeder port 97.

At the end of the cycle the cam follower 71 drops into the low spot 70 of its cam, the valve 24, being now held only by the cam 7, closes under the influence of spring 26, cutting off the supply of steam to the turbine, and the lever 8 is swung to disengage the clutch elements and to engage the braking surface of member 6 by that of element 38, whereupon the cams cease to rotate and remain in the position shown in the drawings, with the valve 3 closed.

It will be seen that the engineman needs only to move the control handle 94 forward and back, and through the delayed-action mechanism including the piston 92 the cycle is started, and continues through the cycle. The only wearing parts are the clutch and brake elements, which, indeed, may be omitted if desired, and if used they do not depend upon any precise adjustment of parts. This mechanism may supplement the direct manual control of the whistle, for the whistle valve 3 may well be operated by a manual control, if desired, without any interference with the automatic control.

What I claim as my invention is:

1. In combination with a whistle and a source of power to sound the same, means controlling the supply of power to the whistle, a cam movable through a given cycle and operatively connected to said control means to open and close it in a predetermined fashion through such cycle, power means to effect movement of the cam, a second cam movable with the first, means operatively connected to and controlled by said second cam to supply power to the power means throughout such cycle and to cut off the power supply at its end, and means movable at will to initiate the power supply to said power means, to start the cycle.

2. In combination with a whistle and a source of steam to sound the same, a valve controlling the supply of steam to the whistle, a cam movable through a given cycle and operatively connected to said valve to open and close it in a predetermined fashion through such cycle, a steam engine to effect movement of the cam, a second cam movable with the first, a valve between the steam engine and the steam source, and operatively connected to and controlled by said second cam to supply steam to the steam engine throughout such cycle, and to cut off such engine's steam supply at the end of the cycle, and means movable at will to open said second valve to supply steam to the engine, thereby to start the cycle.

3. In combination with a whistle and a source

of steam to sound the same, a valve controlling the supply of steam to the whistle, a cam movable through a given cycle and operatively connected to said valve to open and close it in a predetermined fashion through such cycle, power means to effect movement of the cam, a second cam movable with the first, means operatively connected to and controlled by said second cam to supply power to the power means throughout such cycle and to cut off the power supply at its end, means movable at will to and from a position to initiate the power supply to said power means, to start the cycle, and delayed-action means to retain in power-supplying position said means which supplies power to the power means, until after the cycle has commenced.

4. In combination with a whistle and a source of steam to sound the same, a valve controlling the supply of steam to the whistle, a cam movable through a given cycle and operatively connected to said valve to open and close it in a predetermined fashion through such cycle, a steam engine to effect movement of the cam, a second cam movable with the first, a valve between the steam engine and the steam source, and operatively connected to and controlled by said second cam to supply steam to the steam engine throughout such cycle, and to cut off such engine's steam supply at the end of the cycle, means movable at will to open said second valve to supply steam to the engine, thereby to start the cycle, and delayed-action means interposed between the last-mentioned means and the second valve to hold the latter open until after the cycle has commenced.

5. In combination with a whistle and a source of steam to sound the same, a valve controlling the supply of steam to the whistle, a cam rotatable through a given cycle and operatively connected to said valve to open and close it in predetermined succession through such cycle, a steam turbine operable to rotate said cam, a second cam rotatable with the first, a second valve operatively connected to the second cam to supply steam to the turbine throughout the cycle, and to cut off said supply at the end of the cycle, a control valve governing the supply of a fluid pressure medium, and a piston movable by such medium when said control valve is opened, and operatively connected to the second valve to open it when so moved, and means to delay return of said piston, and to hold said second valve open, after closing of the control valve, thereby to initiate the cycle.

6. In combination with a whistle and a source of steam to sound the same, a valve controlling the supply of steam to the whistle, a cam rotatable through a given cycle and operatively connected to the valve to open and close it in predetermined succession through such cycle, a steam turbine, clutch operating means, clutch means engageable thereby between the turbine and cam to rotate the latter, a second cam rotatable with the first, means operatively connected to and controlled by said second cam to engage said clutch means and to supply steam to the turbine throughout such cycle and to disengage the clutch means and to cut off such steam supply at the end of the cycle, and means movable at will to initiate the supply of steam to the turbine, and to engage said clutch means, thereby to initiate such cycle.

7. The combination of claim 6, wherein irreversible drive means are interposed between the clutch means and the cams.

8. The combination of claim 6, including brake means rotatable with the cams, and complemental brake means operable by the clutch operating means to engage the first brake means to stop rotation of the cams upon disengagement of the clutch means.

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