

Aug. 10, 1926.

W. E. WOODARD

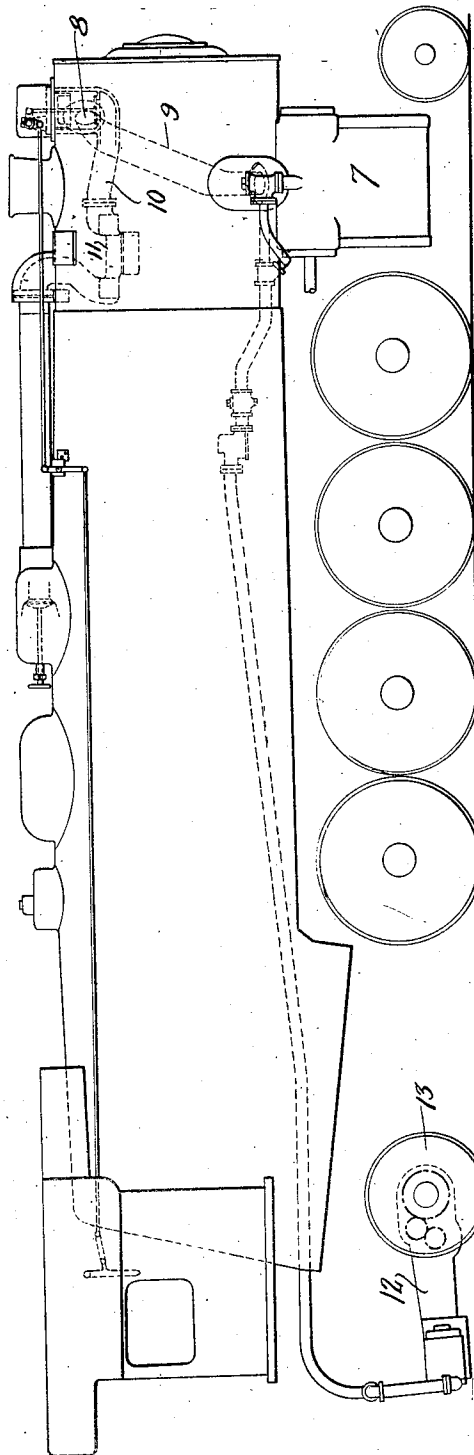
1,595,536

LOCOMOTIVE

Filed March 29, 1924

2 Sheets-Sheet 1

Fig. 1.



WITNESS

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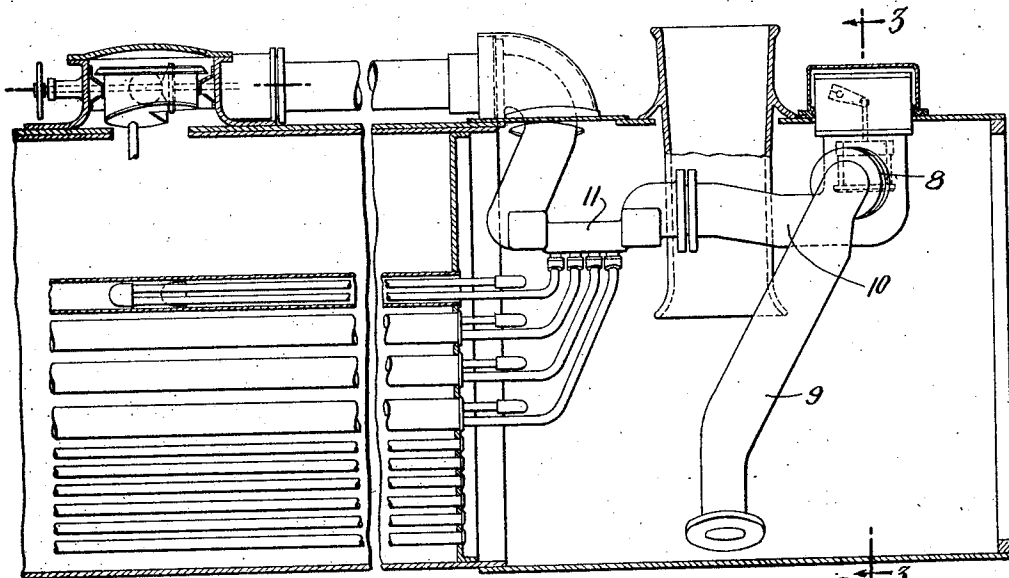


Fig. 2.

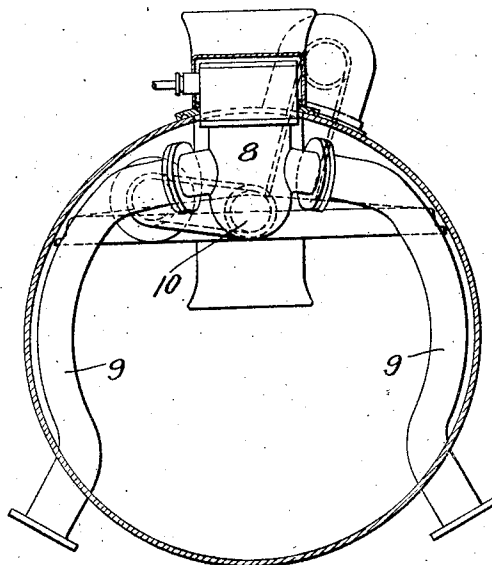


Fig. 3.

WITNESS

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UNITED STATES PATENT OFFICE.

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LOCOMOTIVE.

Application filed March 29, 1924. Serial No. 702,728.

This invention relates to locomotives and it is the primary object of the invention to effect economies in the operation of the locomotive. I bring these economies about by deliberately constructing the locomotive so as to have a lower factor of adhesion than normal or standard for the particular class of locomotive. I prefer to decrease the factor of adhesion below normal by employing cylinders of larger diameter than normal. This enables me, once the train is well under way, to operate at shorter cut offs than normally employed, i. e., I obtain a greater ratio of steam expansion than is possible to obtain in a locomotive constructed in the usual way.

While the advantages above set forth have been appreciated, it has been impossible to realize them with the ordinary construction of locomotive because of the recognized fact that the locomotive, as so changed, would be very slippery and, therefore, incapable of proper operation at low speeds.

I propose to make it possible to construct the locomotive so as to realize these advantages at any speed by making it possible to operate it properly at low speeds; I accomplish this by controlling or governing the slippage of the locomotive in such a way as to enable me to secure effective operation at low speeds.

A further object of the invention is to provide a locomotive having a factor of adhesion as described, together with means for controlling the extent of slippage, in combination with an auxiliary motor device, adapted to assist or carry the locomotive over the torque peaks.

How the foregoing, together with such other objects as may hereinafter appear, or are incident to my invention, are obtained is illustrated in the accompanying drawings, wherein—

Fig. 1 is a diagrammatic side elevation of the locomotive embodying my improvement;

Fig. 2 is a longitudinal section thru the front part of the locomotive of Fig. 1, drawn on an enlarged scale; and

Fig. 3 is a section taken on the line 3—3 of Fig. 2.

Although there is a slight variation in the factor of adhesion for locomotives of a given class, nevertheless the factor of adhesion which has come to be recognized as

standard for any given type of locomotive is very well defined.

I intentionally design the locomotive so as to have a factor of adhesion considerably lower than is normal in standard practice, for the particular locomotive, this being accomplished preferably by over-cylindering the locomotive as above indicated, by increasing the boiler pressure, or otherwise altering one of the basic factors upon which adhesion is dependent. For the purpose of this invention it is immaterial which one of these factors is altered over standard practice, but I prefer to over-cylinder the locomotive.

With this in mind, I have illustrated a locomotive of the 2—8—2 type having the cylinders 7 of the main engines larger than is customary for locomotives of this type, whereby the factor of adhesion is considerably lower than is standard. When a locomotive slips, it is customary for the engineman to close or partly close the throttle, usually the former, so as to cut off the supply of steam. The effect of closing the throttle, however, is not immediately felt in the cylinders and, therefore, slippage continues over an appreciable period, this being so for the reason that there is a considerable stretch of piping from the valve chests back to the dome of the locomotive, where the throttle has been located as a result of which there is a comparatively large volume of steam available to be drawn upon by the cylinders. The slippage of the wheels results in loss of momentum of the train and is injurious not only to the tires of the driving wheels but also to the rails.

I propose to overcome these difficulties and make it possible to lower the factor of adhesion by so locating the throttle that the volume of steam available to be drawn upon by the cylinders is reduced to a minimum, to which end I locate the throttle 8 in the front end of the locomotive, as closely as possible to the valve chests. In the arrangement shown, I have illustrated a single throttle which would be placed at the juncture of the pipes 9 with the length of piping 10 which leads from the discharge side of the superheater header 11.

By this arrangement, the slippage begins, the enginemen by closing the throttle can effectively control the amount of slippage by reducing the extent thereof to a point

where there is not sufficient time interval for the effects of slippage to become appreciable.

The control of the extent of slippage thus afforded by the arrangement of throttle, makes it possible to lower the factor of adhesion of the locomotive without material sacrifice in the starting capacity of the locomotive and its ability to maintain heavy trains in slow motion, while, at the same time, the advantages to be gained at higher speeds from the large cylinders or increased pressure are obtained.

As a further refinement, I may provide a booster motor device 12 which may be utilized in driving normally idle wheels, such as the wheels 13 of a trailer axle or trailer truck. Such normally idle wheels are of smaller diameter than the drivers and can be utilized to assist the main engine in starting and sustaining the train at slow speed. The relation between the driven normally idle wheels, the main drivers, and the particular location of throttle is as follows. The booster device will carry the main drivers over the torque peaks and, in case there should be slippage of the main drivers, the immediate control afforded by the arrangement of throttle makes the main drivers more effective in assisting in starting the train and in sustaining it at slow

speed, by minimizing the extent of slippage. Thus both the booster device and the arrangement of throttle make it possible to lower the factor of adhesion, and thus make it possible to maintain full effective tractive power during starting and at slow speed, and obtain the advantages incident to the larger ratio of steam expansion at higher speeds.

The advantages of the arrangement will be readily understood by those skilled in the art.

I claim:

The hereindescribed method of operating a locomotive so that it may be deliberately constructed to have a factor of adhesion of its driving wheels appreciably lower than normal for the particular class of locomotive which consists in controlling the steam supply for such a locomotive from a point near the chests whereby slippage of the wheels is brought under immediate control and full steam for the particular speed is immediately reestablished after control of slippage, and in driving in starting and at low speeds normally idle wheels of the locomotive which have a high factor of adhesion.

In testimony whereof, I have hereunto signed my name.

WILLIAM E. WOODARD.