To all whom it may concern:  

Be it known that I, WILLIAM J. McLEAN, a citizen of the United States, and resident of Bellingham, Whatcom county, State of Washington, have invented certain new and useful Improvements in Locomotive-Throttles for Superheating Devices, of which the following is a specification.

My invention relates to superheating devices as used on locomotives, and comprises certain improvements in connection with the throttle and its location, whereby the superheating pipes are, at all times, kept filled with steam and it is unnecessary to cut the superheating pipes out of the heating system when the engine is standing still.

The features of novelty in this invention will be hereinafter described and then particularly pointed out in the claim. In the accompanying drawings I have shown my device in the form of construction which is now most preferred by me.

Figure 1 is a transverse section taken upon an irregular plane through the smoke box and the parts of the superheater of a locomotive having my improvements embodied therein.

Figure 2 is a longitudinal section also taken upon an irregular plane and showing the same parts.

I have shown my invention as applied to a type of superheater for locomotive boilers in which a certain section of the space of the boiler occupied by the flues, is provided with flues of a larger size than those ordinarily used and in all of which flues are placed smaller pipes, which pipes act as the superheater, and through which all the steam drawn from the boiler is passed on its way to the engine cylinders.

In the drawings, 1 represents the shell of the boiler and 10 the ordinary flues thereof. A portion of these in the upper and central parts of the boiler, are replaced by flues 3, which are of a larger size. Each of these flues 3 are shown as provided with four superheating pipes 20, which pipes are connected at the ends where the return is made by return bends 21.

The collecting pipe 3 is, or may be, of the type of construction ordinarily employed in locomotives. In the usual type of construction the throttle valve is placed at the receiving end of this pipe, that is, within the boiler adjacent the steam dome. The other end of this pipe, as it emerges through the front sheet 11, is caused to enter a header 30, which header is provided with a passage 31, extending longitudinally the header and transversely across the boiler, in position to be connected with the superheating pipes from all of the flues 2. In addition, this header is provided with another similar passage 32, of substantially the same extent, and extending in the same direction. Each one of these passages, 31 and 32, is connected, each with its particular series of passages, 33, which extend transversely of the header and with which the superheating pipes 20 are connected by upward extending ends 22. One end of each of these superheating pipes 20 is thus connected with the passage 31, and its other end with the passage 32. In consequence, the steam flowing from the collecting pipe 3 enters one end of all of the superheating pipes 20, passes through the same and back and discharges into the other set of chambers 33, which connect with the other passage 32, and this passage is connected with the down pipes 4, which conduct the steam to the engine cylinders. Two of these pipes 4 are employed, each supplying the engine on the respective side of the locomotive.

The above construction of the header 30 is the construction which has been previously employed. It has, however, been customary heretofore to connect the down pipes 4 from the header to the engine, directly with the header without the intervention of any valve. Instead of doing this, I place a throttle valve 5 in the connection between the down pipes 4 and the header. I thus employ, as herein shown, two throttle valves, one for each side of the engine. The stems 50 of these throttle valves extend upward through suitable guides 51 carried by the shell of the smoke box 13 and are engaged for operation in any manner which is found suitable.

The two throttles at opposite sides of the locomotive should be connected so as to work synchronously. The means which I have illustrated for doing this consist in mounting a shaft 7 to extend across the top of the smoke box and providing this with two crank arms 70, which engage, each with the rod 50 of one of the throttle valves. This shaft may be operated by means of a crank arm 71 and a rod 72 which extends backward to the cab and which is actuated in any suitable manner.
By reason of locating the throttle valves at the point illustrated, namely, between the superheater and the engine cylinder, the superheating pipes may at all times be kept full of steam and the danger of burning them out is therefore much lessened. It is customary and necessary, with the old type of construction, where the throttle is located at the intake of the collecting pipe, to provide a damper to close the space between the baffle plate 6 and the tube sheet 11, so that when the throttle valve is closed, the flues 2 in which the superheating pipes are placed, are closed and the hot gases of combustion from the furnace do not act upon these pipes. In consequence, a large percentage of the heating capacity of the engine is cut out. This part of the engine must be cut out while steam is being raised and also while the engine is standing still and not working, or the superheating pipes will be burned out.

By placing the throttle valve in the manner herein described, the benefit of this heating surface may be obtained while getting up steam. It is, of course, evident that a single throttle valve might be employed, especially, if this throttle valve is so constructed as to deliver steam to both engine cylinders. It should, however, be located between the superheater and the engine cylinders, rather than between the boiler and the superheater. The baffle plate 6 forms a part of a casing which comprises a bottom 6' and a perforate front wall 6f, the entrance to the stack 41 being located within said casing and the throttle valves 5 likewise being located within said casing. The location of the parts in the manner described causes the products of combustion passing through flues 2 to pass downwardly over the portions 22 of the super-heating pipes, thence through the front wall 6f and out through stack 41. The throttle valves are located in a protected position within the casing and at such a high level that the hottest and driest of the steam is delivered to the engine cylinders.

What I claim as my invention is:

1. In a locomotive construction, the combination with the boiler, and its smoke box, of a plurality of superheating pipes extending through some of the boiler flues, a casing spaced from the front tube sheet of the boiler and located within the smoke box, a two chamber header located transversely of the boiler and between the front tube sheet and the casing and above the plane of the superheating pipes, the opposite ends of the superheating tubes being respectively connected with the chambers of the header, a pair of throttle valves located within the casing and located substantially in the plane of the header, connections between the casings of said valves and one of the chambers of the header, means to supply steam from the boiler to the other chamber of the header, means for conducting steam from the throttle valves to the cylinders of the locomotive and means located outside of the smoke box and projecting thereinto for controlling the throttle valves.

Signed at Penticton, B. C., Canada this first day of June, 1917.

WILLIAM J. McLEAN.