To all whom it may concern:

Be it known that I, JOSEPH H. STANNARD, a citizen of the United States, residing at Columbia, in the county of Richland and State of South Carolina, have invented new and useful Improvements in Draft-Regulators and Spark-Arresters, of which the following is a specification.

This invention relates to steam boilers for engines, and the like, and has particular reference to a combined spark arrester and draft regulator.

This invention has as its objects to provide a spark arrester which will effectively prevent vent burning cinders and the like from being thrown from the boiler or engine and which might result in a disastrous fire; to provide means for obtaining proper draft through the engine and thus provide an economy in the consumption of coal or other fuel; to provide means for so regulating the draft that the upper flues of the boiler as well as the lower flues may at all times be employed; and generally to obtain a better, more equalized and stronger draft through the fire box and fire flues.

Other objects of the invention are to prolong the life of the flues or other parts of the boiler by preventing rapid burning out of the same due to improper drafts, and to provide means whereby the draft may be easily and quickly regulated.

The above and other objects of the invention are obtained in the structure described in the following specification and illustrated in the accompanying drawings, and wherein—

Figure 1 is a central longitudinal sectional view taken through the front end of a locomotive engine and showing my invention applied thereto, although it is to be understood that my invention is applicable for use in engines other than locomotives.

Fig. 2 is a sectional view taken on line 2-2, Fig. 1, and

Fig. 3 is a sectional view taken on line 3-3, Fig. 1.

Referring to the drawings, wherein like numerals represent like parts in the several views, 10 designates the usual boiler having a front tube sheet 11 through which the forward ends of the fire flues 12 project. 13 designates the casing of the smoke box which may be of any improved construction, and into which the fire tubes 11 discharge, the box having the usual front door 14 whereby access to the interior of the boiler or engine may be had. The usual steam pipe 15 leads from the upper part of the boiler 10 to the engine cylinder (not shown) and the discharge nozzle 16 is connected to the exhaust ports thereof. The exhaust steam from the cylinder is discharged through the discharge nozzle 16 into the usual lifting pipe 17 which is located centrally beneath the smoke stack 18. The lifting pipe is adjustably carried by the brackets 19 so that it may be adjusted vertically relative to the nozzle 16.

20 designates a baffle plate connected at its upper end to the tube sheet 11 immediately above the uppermost fire tube 12 and extending downwardly and forwardly of the smoke box to a distance approximately one-half that between the uppermost and the lowermost flue. Connected to the lower end of the baffle plate is a table plate 21 which extends horizontally and forwardly to within a short distance of the front end of the smoke box, thus providing a narrow draft passage or opening 22. The exhaust nozzle 16 projects through an opening in the table plate 21 as shown.

The baffle plate 20, as shown in the drawings, is provided with a plurality of perforations which preferably are about one-fourth inch in diameter, and located about one inch apart, although, of course, the size or exact location of the openings may be varied to suit the particular engine to which my invention is applied. The baffle plate may be perforated throughout its entire height, but by preference, means for closing some of these perforations when desired, is provided, and while this means may be varied, I have illustrated the same as comprising a plurality of strips 23 extending transversely of the smoke box and secured over the lower end of the baffle plate by means of suitable nuts 24.

With the above arrangement, when it is found that a proper draft is not obtained and a larger number of holes or perforations should be employed, it is merely necessary to remove one or more of the strips 23.

The draft opening 22 is regulated or controlled by means of a damper 25 which comprises a flat plate lying upon the upper outer edge of the table plate and slidably movable thereon. The table plate and
damper are supported by angle irons secured to the sides of the smoke box, and I have also disclosed a bracket 26 which is secured at its forward end to the front wall of the smoke box, and which has its rear end resting on a shoulder of the exhaust nozzle 16. The damper or plate 22 may be moved forwardly or backwardly to vary the size of the opening 22, and it may be secured in adjusted position in any suitable manner, but in the present instance, I have shown the damper as having parallel slots 27 which receive suitable bolts 28 passing through the table plate. By this construction, when adjusting the damper, it is merely necessary to remove or loosen the nuts upon said bolts and then slide the damper into desired position.

It is to be noted that the table plate 21 extends forwardly of the smoke box to within a very short distance of the front wall thereof, so that the damper opening 22 in comparison with the length of the smoke box is relatively very narrow. No depending obstructions, such as baffle plates or the like, project downwardly from the table plate, for I have found that obstructions of this sort impair the draft, in that they shut off the top flues of the boiler.

To prevent cinders and the like from escaping from the smoke box of the engine, I provide a screen 29 which may be of any suitable construction, and which is shown in the drawings as extending upwardly and forwardly from the table plate to the front wall of the smoke box, and, of course, this screen or a part thereof may be removable to permit access to the interior of the front end of the engine.

During the operation of the engine or boiler, smoke and other products of combustion are discharged from the fire flues into the lower portion of the smoke box. Exhaust steam is discharged from the exhaust nozzle 16 into the lifting pipe 17 and due to the pressure of the steam and the expansion thereof, a vacuum is created in the upper portion of the fire box and the products of combustion are drawn from the lower portion of the smoke box through the openings in the baffle plate 20 and the draft opening 22. A portion of the products of combustion are entrained in the opening between the lifting pipe and the table plate, and the remaining portion of the products of combustion is drawn or entrained into the smoke pipe, due to the partial vacuum created at the upper end of the lifting pipe. By extending the table plate to within a short distance of the front end of the smoke box an extended chamber is provided in the upper half of the box in which a partial vacuum is maintained when steam is discharged from the exhaust nozzle.

It will be seen that the draft may be controlled by adjusting or regulating the lifting pipe, the damper 25, or the openings through the baffle plate 20. Each of these regulating means are dependent on the others, and the adjustment of all of them should be such that a strong and equalized draft is obtained through all of the fire flues. If it is found that the upper flues do not draw properly, the damper 25 is moved toward the front of the smoke box so as to make the draft opening 22 smaller, and thus a stronger draft is obtained through the opening 22, resulting in a strong suction through the openings in the baffle plate 20, so that the draft through the various fire flues is equalized and the upper as well as the lower flues are equally employed. On the other hand, if it is found that the lower flues do not draw properly, the opening 22 is made larger. By properly adjusting the damper 25, 22, a strong draft is obtained which results in the proper heating of the water within the boiler, proper consumption of the fuel, and the elimination to a great extent of burning cinders and the like.

Should, however, any burning cinders pass into the smoke box, these are prevented from passing through the smoke stack by means of the screen 29. It will be further noted that the draft beneath the baffle plates is uninterrupted, and yet this space is of sufficient length to cause most of the cinders to fall to the bottom of the smoke box.

This invention is susceptible of various modifications and changes which would be within the spirit of my invention without departing from the scope of the following claims.

What I claim is:
1. The combination with a smoke box, of a baffle plate extending forwardly and then depending downwardly of the smoke box and having draft openings in the downwardly directed portion through which the products of combustion may pass from the boiler tubes to the smoke stack, said draft openings opening directly into the upper portion of the smoke box, and an imperforate table plate connected to the lower end of the baffle plate and extending horizontally and forwardly of the smoke box to a point adjacent the front end thereof, a draft opening of relatively small area being provided at the front end of the smoke box to regulate the draft through the tubes of a boiler to which the device is applied.

2. The combination with a smoke box, of a baffle plate extending forwardly and then downwardly of the smoke box and having draft openings through which the products of combustion may pass from the boiler tubes to the smoke stack, said draft openings opening directly into the upper portion of the smoke box, an imperforate table plate extending from the lower end of said baffle.
1,245,284

3. The combination with a smoke box, of a baffle plate extending forwardly and then depending downwardly of the smoke box and having a plurality of draft openings opening into the upper portion of the smoke box, means for closing some of said openings, an imperforate table plate connected to the baffle plate and extending horizontally and forwardly of the smoke box and almost to the front end thereof, a draft opening at the front of the smoke box being thus provided, and a damper for regulating said draft opening.

4. The combination with a smoke box, of a baffle plate extending forwardly and then depending downwardly of the smoke box and having draft openings through which the products of combustion may pass from the boiler tubes to the smoke stack, an imperforate table plate connected to the lower end of the baffle plate and extending horizontally and forwardly of the smoke box to a point adjacent the front end thereof, a draft opening of relatively small area being provided at the front end of the smoke box, and a damper for regulating said draft opening.

5. The combination with a smoke box, of a baffle plate extending forwardly and depending downwardly of the smoke box and having draft openings, a plurality of strips overlying said baffle plate to close some of the openings therein and being independently removable to regulate the number of openings, an imperforate table plate connected to the lower end of the baffle plate and extending horizontally and forwardly of the smoke box to a point adjacent the front end thereof, a draft opening of relatively small area being provided at the front end of the smoke box, and a damper comprising a slide plate adjustably connected to the table plate for regulating said draft opening.

6. The combination with a smoke box, of an exhaust nozzle, a lifting pipe, means for regulating said pipe and a stack, of a baffle plate extending forwardly and depending downwardly of the smoke box and having a plurality of draft openings through which the smoke may pass from the boiler tubes to the smoke stack, means for closing some of said openings, an imperforate table plate connected to the baffle plate and extending horizontally and forwardly to within a short distance of the front end of the smoke box, a relatively narrow draft opening at the front end of the smoke box being thus provided, and a damper for regulating said draft opening.

7. The combination with a smoke box of a baffle plate extending forwardly and then depending downwardly in the smoke box and having draft openings, a plurality of strips overlying said baffle plate and being independently removable to regulate the draft openings, an imperforate table plate connected to the lower end of the baffle plate and extending horizontally and forwardly in the smoke box to a point adjacent the front end thereof, and a draft opening of relatively small area located at the front end of the smoke box.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOSEPH H. STANNARD.

Witnesses:
B. McBride,
H. T. Sheffey.