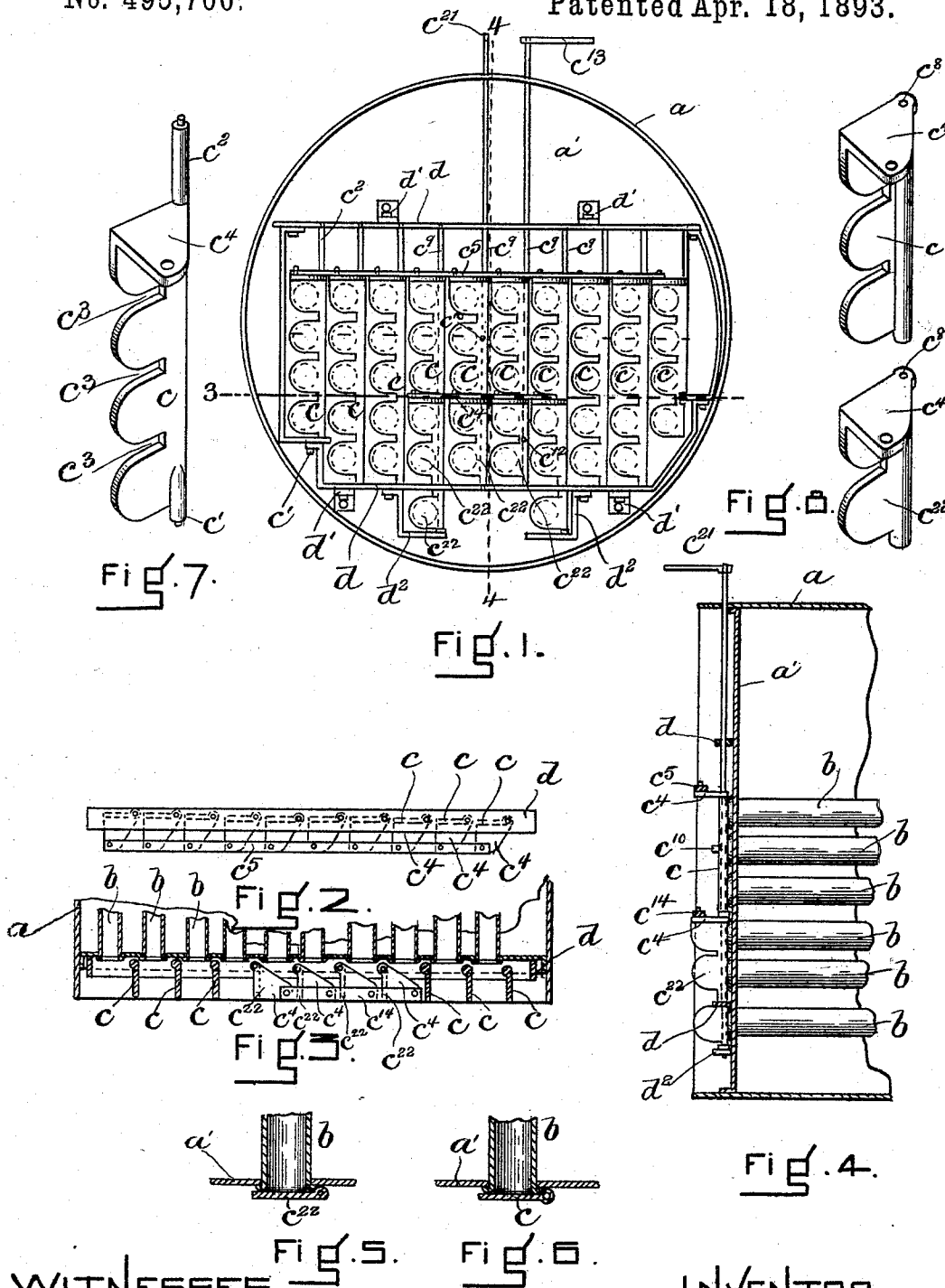


(No Model.)

G. C. HICKS.
TUBE CLOSER FOR STEAM BOILERS.

No. 495,700.

Patented Apr. 18, 1893.



WITNESSES

A. D. Hanson.
M. W. Jackson

INVENTOR
Geo. C. Hicks
by Knight Brown & Company
Attys.

UNITED STATES PATENT OFFICE.

GEORGE CLEVELAND HICKS, OF BOSTON, MASSACHUSETTS.

TUBE-CLOSER FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 495,700, dated April 18, 1893.

Application filed June 15, 1892. Serial No. 436,756. (No model.)

To all whom it may concern:

Be it known that I, GEORGE CLEVELAND HICKS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Tube-Closers for Steam-Boilers, of which the following is a specification.

This invention is an improvement upon that class of devices shown in Letters Patent of the United States, Nos. 287,829 and 287,931, both granted to me November 6, 1883. In said patents, I have shown a method of and means for retaining the heat of steam boilers, when in temporary disuse, said method consisting in suppressing the circulation of local gaseous currents between the boiler tubes or flues and the cooler escape passages or chimney stack, during periods of temporary disuse. In said patents, I show certain forms of tube-closing devices, all of which are of such construction that it is necessary to remove them when the boiler is in use, and apply them again when the use of the boiler is temporarily discontinued, thus involving the necessity of opening the boiler front to remove and replace the tube-closing devices. Said devices are usually more or less covered with soot, and are therefore objectionable to handle, especially at night, when the engineer is preparing to leave his work.

My present invention has for its object to provide means permanently connected with the boiler, for temporarily stopping the exit ports of the boiler flues, and to enable said stopping devices to be operated from the exterior of the boiler without the necessity of opening the boiler front and of handling soot-covered surfaces.

My invention also has for its object to provide for a limited escape of the products of combustion during periods of temporary disuse of the boiler, for the purpose of preventing the escape of gases in the boiler room, and also for the purpose of keeping the fires ready for full work.

To the above-mentioned ends, my invention consists in the several improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming part of this specification: Figure 1 represents an elevation of the front end of a tubular boiler, the front or bonnet being removed to

show the tube-closing devices. Fig. 2 represents a top view of the series of tube-closing devices or shutters and their holding frame, removed from the boiler. Fig. 3 represents a section on line 3—3, Fig. 1, showing the tube-closing shutters opened. Fig. 4 represents a section on line 4—4, Fig. 1. Figs. 5 and 6 represent sectional views of the delivering ends of two of the tubes, showing said ends obstructed by the closing shutters. Fig. 7 represents a perspective view of one of the shutters. Fig. 8 represents a perspective view, showing two shutters, one belonging to one series and the other to another series, said series being adapted to be independently operated so that one can be wholly or partially opened while the other is closed.

The same letters of reference indicate the same parts in all the figures.

In the drawings, *a* represents the shell of an ordinary tubular steam boiler.

a' represents the tube sheet, which receives the delivering ends of the tubes *b b b*, said tubes being secured to the tube sheet at their delivering ends in the usual or any suitable way.

In carrying out my invention, I provide a series of shutters or valves *c*, which are pivotally connected to supports, suitably affixed to the boiler, and are connected in a series, so that they can be moved simultaneously, said shutters being arranged so that they can be closed upon the exit ports of the flues to cover the same, as shown in Figs. 1, 2, 5 and 6; or removed from said exit ports to permit the escape of the products of combustion therefrom, as shown in Fig. 3. Each shutter is preferably composed of a plate of metal, formed to cover several of the tubes *b*, the shutters being here shown as arranged vertically, so that each shutter covers a vertical row of tubes. The shutters *c*, excepting those in line with the other series of shutters hereinafter described, are here shown as provided at their ends with trunnions *c' c'*, which are mounted to turn in sockets or bearings formed in a frame *d*, affixed in any suitable way to the boiler, said frame being preferably affixed by means of brackets *d'* to the tube sheet *a'*. For the sake of lightness, I prefer to cut away one side of each shutter between the tubes which it covers, thus forming a series

of recesses c^3 , as shown in Fig. 7. If desired, however, each shutter may be made continuous at both edges, instead of being recessed as shown. The several shutters of the series
 5 are preferably coupled together, so that they may be opened and closed in unison; and to this end each shutter is shown as provided at its upper end with an ear c^4 , and the ears of the series of shutters are pivotally connected
 10 to a connecting-rod c^5 , so that, when force is applied to either of the shutters to swing it in its bearings, the same swinging movement will be imparted to all the other shutters of the series.

15 I prefer to provide means whereby the series of shutters may be operated from the exterior of the boiler, and to this end, I provide at the exterior of the boiler a handle c^{21} , which is suitably connected, as hereinafter described,
 20 with the shutters, the arrangement being such that, when said handle is turned, the shutters will be simultaneously moved.

When the shutters are open, as shown in Fig. 3, they offer no obstruction to the escape
 25 of products of combustion from the flues, there being sufficient space between the flue sheet a' and the boiler front for the reception of the shutters when in their open position. When the shutters are closed, they bear closely upon
 30 the exit ports of the tubes, and practically seal the same, and prevent the escape of gases and products of combustion.

As it is desirable at times to provide for a limited escape of products of combustion when
 35 the boiler is in temporary disuse, for example when the fire has been banked, shortly after a fresh charge of fuel has been introduced, or when it is desired to keep the fire in such a condition that it can be readily quickened to
 40 do its full work, I subdivide the series of shutters, or in other words provide two series, one of which covers a greater number of the flues than the other, each series being adapted to be operated independently of the other.

45 Considering the shutters already described as one series, the shutters of the other series are represented at c^{22} . The shutters c^{22} are or may be of the same general form as the shutters c , and are similarly provided with
 50 trunnions c' c^2 . They are preferably located so as to cover a small number of tubes at the lower and central portion of the end of the boiler. I have here shown the shutters c^{22} as arranged to cover ten (10) tubes, but it is
 55 obvious that this number may be either increased or diminished.

The shutters c^{22} may be mounted entirely independently of the shutters c ; but, for the sake of convenience, I prefer to provide
 60 shutters c^{22} and the shutters c that are in line therewith, with longitudinal orifices or sockets c^3 (Fig. 8), in which are loosely inserted rods c^9 , which are mounted to turn in bearings in the supporting-frame. One of the
 65 rods c^9 is rigidly connected by a set-screw c^{10} (Figs. 1 and 4) with one of the shutters c , and the same rod is extended upwardly through

the boiler shell, and is affixed to the handle
 c^{21} , said rod and the set-screw c^{10} constituting the above-mentioned connection between the
 70 handle c^{21} and the series of shutters c . The other shutters c that are located in line with the shutters c^{22} turn loosely on the rods c^9 , the latter serving only to support said shutters c . One of the shutters c^{22} is attached by a set-
 75 screw c^{12} (Fig. 1) with one of the rods c^9 , and said rod is extended upwardly through the shell of the boiler and provided at its upper end with a handle c^{13} . The shutters c^{22} are connected in a series by a rod c^{14} , pivoted to
 80 the lugs c^4 formed on the upper ends of said shutters. It will be seen, therefore, that the shutters c^{22} can be moved simultaneously by the handle c^{13} , the rod c^9 supporting the latter being rigidly attached to one of the shut-
 85 ters c^{22} , but passing loosely through the corresponding shutter c , so that the movement of the handle c^{13} has no effect on the shutters c . In like manner, the movement of the handle c^{21} operates the shutters c without mov-
 90 ing the shutters c^{22} , the rod to which the handle c^{21} is attached being rigidly secured to one of the shutters c and passing loosely through the corresponding shutter c^{22} . I am therefore enabled to operate either series of
 95 shutters independently of the other.

It will be seen that, by providing the series of shutters adapted to be independently operated, I am enabled to either wholly close
 100 all the tubes during the temporary disuse of the boiler or to wholly close the majority of the tubes, leaving some of them wholly or partly open for the purpose of maintaining a light draft. It will also be seen that the permanent connection of the tube-closing de-
 105 vices to the boiler, and the provision of means for operating said devices from the exterior of the boiler obviates all the annoyance and objection heretofore caused by the necessity of directly handling the tube-closing devices
 110 and removing the boiler front to obtain access thereto.

I do not limit myself to the described details of construction of the shutters or to the described manner of supporting and operat-
 115 ing the same; neither do I limit myself to the division of the shutters into two series. I believe it to be new with me to permanently connect to a boiler a series of tube-closing devices, adapted to be operated to open and close
 120 the exit ports of the tubes from the exterior of the boiler and without the necessity of handling the closing devices. Hence I reserve the right to modify the details of construction and means of operation, without limitation.
 125

In the construction here shown, the frame d supports all the shutters, there being a permanent connection between the shutters and the frame, so that the shutters are applied to the boiler simply by the act of attaching the
 130 frame thereto. This arrangement is a very convenient one for applying and removing the shutters, as will be readily seen. In Fig. 1, I show the frame d provided with brackets

$d^2 d^2$ at its lower portion, to support the lower ends of the rods on which the shutters c^{22} that cover the extreme bottom tubes are mounted.

I claim—

5 1. The combination with a boiler, of a series of independently pivoted shutters arranged to open or close the exit ports of the boiler tubes, arranged to bear, when closed, directly on the ends of a row of tubes, the pivots being located between the rows of tubes, so that, when the shutters are opened, the tubes are entirely unobstructed, as set forth.

15 2. The combination with a boiler, of a series of independently pivoted shutters arranged to open or close the exit ports of the tubes, each shutter being arranged to be seated directly on the ends of a row of tubes and having its pivot located between two rows of tubes, connections between said shutters whereby they may be moved in unison to open or close the exit ports of the boiler tubes, and an operating device at the exterior of the boiler whereby the shutters may be simultaneously moved, as set forth.

25 3. The combination with a boiler, of two independent series of pivoted shutters, one series arranged to open or close some of the exit ports of the boiler tubes while the other series is arranged to open and close the exit ports of the other tubes, the shutters of each series being connected and adapted to be operated independently of the shutters of the other series, and two external operating devices, one

connected with one series of shutters and the other with the other series of shutters, as set forth. 35

4. The combination with a tubular boiler, of a frame attached to the boiler close to the tube sheet, and a series of shutters independently pivoted to said frame and arranged to be seated directly on the exit ports of the tubes, the pivots of said shutters being between the rows of tubes, as set forth. 40

5. The combination of a frame adapted to be attached to a boiler, a series of rods c^9 extending across said frame, two of said rods being elongated and provided with operating handles, a series of shutters mounted on said rods and connected in a series, one of said shutters being rigidly attached to the rod on which it is mounted while the others are loose on their rods, and another connected series of shutters some of which are mounted on said rods and the others independently pivoted to the frame, one of the rod-supported shutters of the last-mentioned series being rigidly attached to one of the elongated rods, while the others are loose on their rods, as set forth. 50 55

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 11th day of June, A. D. 1892. 60

GEORGE CLEVELAND HICKS.

Witnesses:

C. F. BROWN,

A. D. HARRISON.