J. B. & A. LILLIBRIDGE.

FLUE EXPANDER.

APPLICATION FILED MAY 25, 1909.

1,015,447.

Patented Jan. 23, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

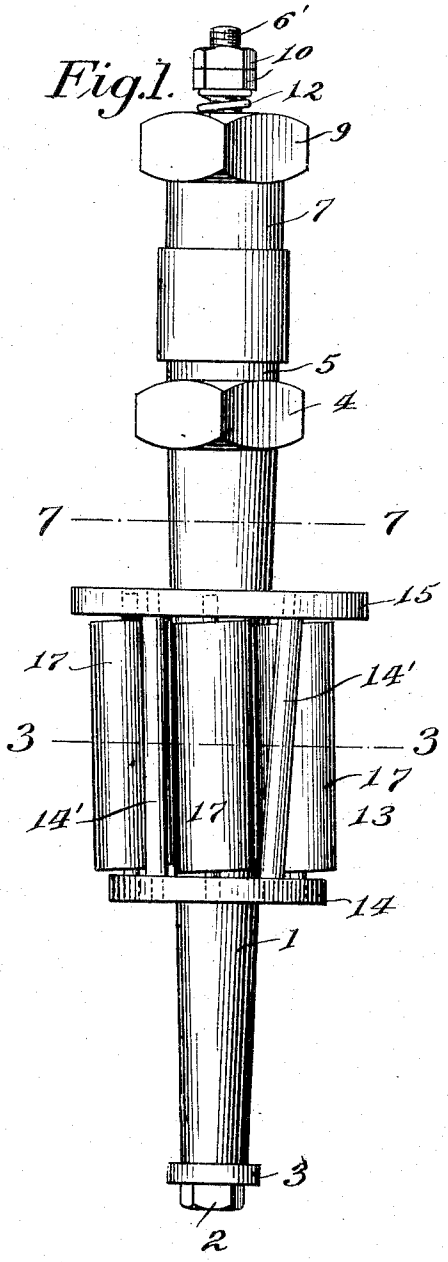
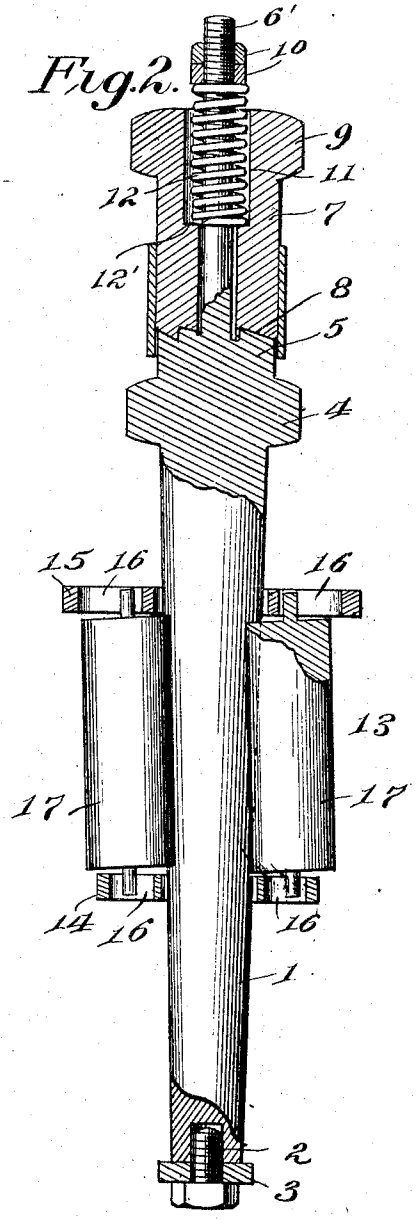


Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

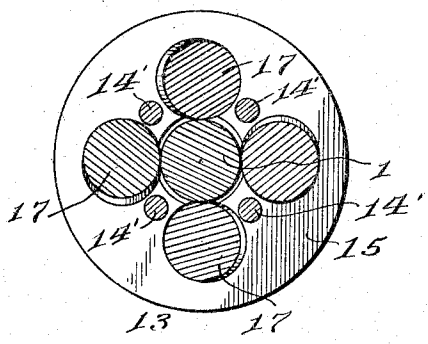


Fig. 6.

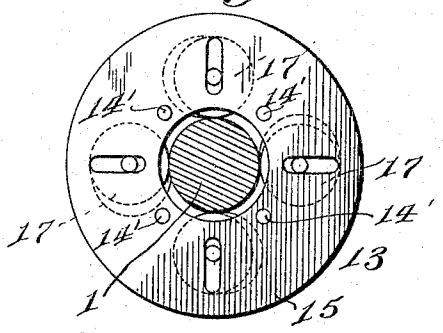


Fig. 5.

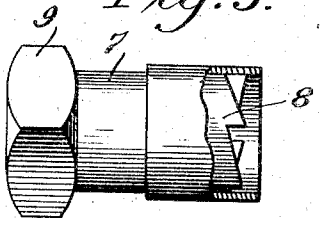
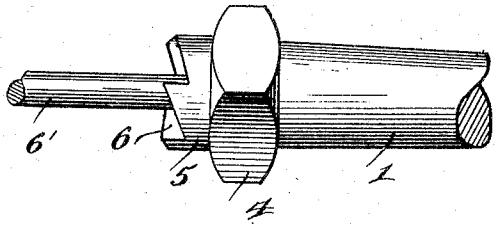


Fig. 4.



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UNITED STATES PATENT OFFICE.

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FLUE-EXPANDER.

1,015,447. Specification of Letters Patent. Patented Jan. 23, 1912.

Application filed May 25, 1909. Serial No. 498,380

To all whom it may concern:

Be it known that we, JEROME B. LILLIBRIDGE and ANDREW LILLIBRIDGE, residing at Elk City, county of Montgomery, and State of Kansas, have invented a new and useful Tool for Use in Expanding Boiler Flues and Tubes, and give herewith the following specification of same.

This invention relates to flue expanders, and carries as its principal object a novel form of movable expanding member and a mandrel-supporting and expanding member, the said expanding member being provided with a plurality of revolving bodies which are arranged at an acute angle to the axis of the mandrel so that in revolving the mandrel the expanding member can be accurately fed into the flue.

A further object of the invention is to provide an expanding member with a plurality of revolving bodies which are mounted for movement radially of the axis of the expanding member.

A still further object of the invention resides in the provision of ratchet mechanism on the mandrel which will enable the operator to revolve it in one direction during the feeding operation of the expanding member.

In the drawings, forming a portion of this specification and in which like numerals of reference indicate similar parts in the several views:—Figure 1 is a side elevation of our improved flue expander. Fig. 2 is a longitudinal section therethrough. Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1. Fig. 4 is a detail side elevation of a portion of the mandrel showing the ratchet face thereon. Fig. 5 is a detail side elevation of the actuating sleeve showing the ratchet face thereon. Fig. 6 is a transverse section taken on the line 7—7 of Fig. 1.

Our improved flue expander consists of a mandrel 1 which is tapered approximately throughout its length, its reduced end being disposed outermost as is obvious. The said reduced end of the mandrel is formed with a threaded passage for the reception of a screw or its equivalent 2 upon which is mounted a stop 3, the same being of a construction whereby its marginal edge portion extends radially beyond the reduced end portion of the mandrel for a purpose to be hereinafter described. The enlarged end portion of the mandrel is provided with angularly disposed wrench-engaging surfaces 4 from which extends a ratchet member 5 provided with an annular toothed surface 6. From the central portion of the member 5 extends a stem 6′ upon which is mounted a sleeve or ratchet member 7 whose inner end is formed with an annular toothed ratchet surface 8 whose teeth coöperate with those upon the member 5. The opposite end of the member 7 is formed to provide a square member 9 with which is adapted to be engaged a wrench so that the desired rotary movement may be imparted to the mandrel. The stem is threaded to receive clamping nuts 10. The sleeve 7 is formed to provide a socket 11 in which is disposed one end of an extensile spring 12, the spring bearing at one of its extremities against the shoulder 12′ of the socket 11, and at its other end against the innermost nut 10.

An expanding member 13 is mounted on the mandrel and it consists preferably of circular disks 14 and 15, the latter being considerably larger than the former for a purpose to be hereinafter described. The disks are spaced from each other by spacing bolts 14′ whose ends are suitably seated in the disks. The disks are provided with elongated slots 16 which radiate from the mandrel as shown in Fig. 6 of the drawings. These slots receive the trunnions at the ends of revolving bodies or rollers 17. The rollers extend at an acute angle to the axis of the mandrel.

The construction of the flue expander herein described and shown is such that the member 7 is mounted on the mandrel for longitudinal movement so that its ratchet surface can be moved out of engagement with the ratchet surface upon the member 5. Under spring tension the member 7 has its ratchet surface normally engaged with the ratchet surface upon the member 5 and by means of a wrench or other suitable tool which may be applied to the head portion 9 the mandrel may be rotated toward the right. The construction of the expanding member is such that its rollers frictionally engage the surface of the mandrel, and incident to the fact that the rollers are each arranged at an acute angle to the axis of the mandrel upon rotation of the latter toward the right, the rollers will be revolved toward the left and the expanding

member fed longitudinally on the mandrel. As the rollers or revolving bodies 17 are fed on the enlarged portion of the mandrel their engagement therewith will cause them to move radially to expand the flue in a very effective manner. The expanding member will be revolved and the flue may be expanded in a uniform manner. The stop at the reduced end of the mandrel serves to hold the expanding member against displacement.

We claim:—

In a flue expander, a pair of disks formed with radial disposed slots and centrally disposed openings, rods connecting said disks and located between the slots thereof, a series of rollers having trunnions movable in the slots of the disks, a conical expanding member movable through the central openings of the disks and adapted to contact with the rollers, a stop on one end of said expanding member, the other end of the expanding member being reduced to form a threaded extension and being formed with ratchet teeth, a sleeve disposed on said extension and provided with ratchet teeth to engage the first ratchet teeth, said sleeve having an enlarged bore forming a shoulder, lock nuts threaded on the extension, a spring disposed in the enlarged bore and bearing its inner end against the shoulder of the sleeve and at its outer end against the lock nuts whereby the ratchet teeth of the sleeve are held in normal engagement with the ratchet teeth of the expanding member, and a collar mounted on the sleeve and straddling the ratchet teeth of said sleeve and expanding member.

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