G. AUSTIN.

FLUE EXPANDER.

APPLICATION FILED JULY 16, 1908.

943,907. Patented Dec. 21, 1909.

Fig. 1

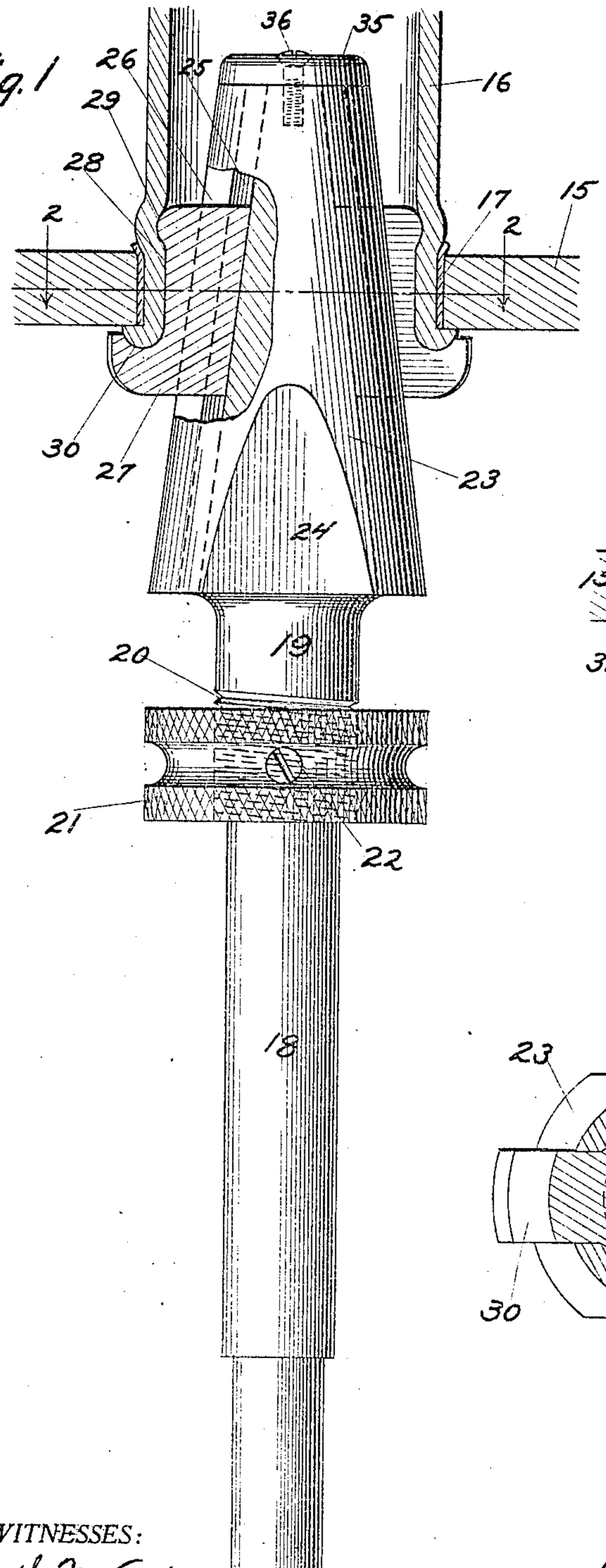


Fig. 3.

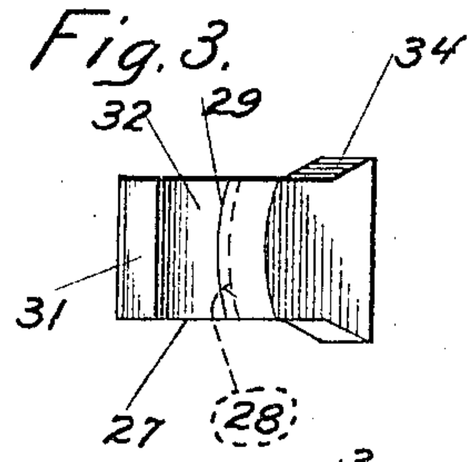


Fig. 4.

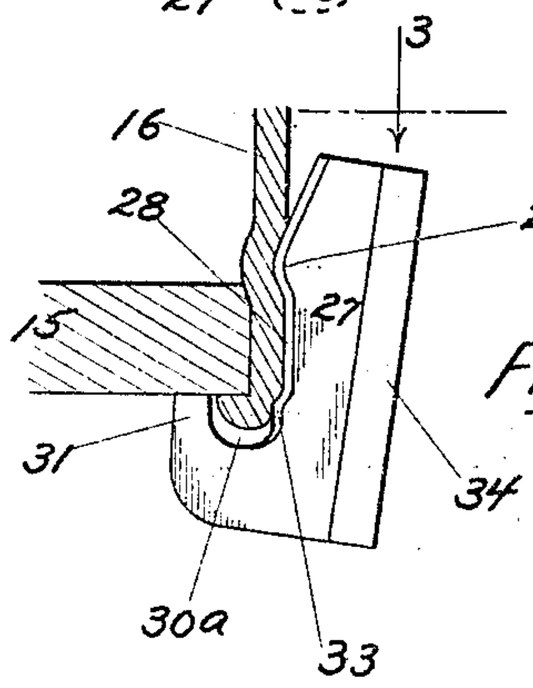
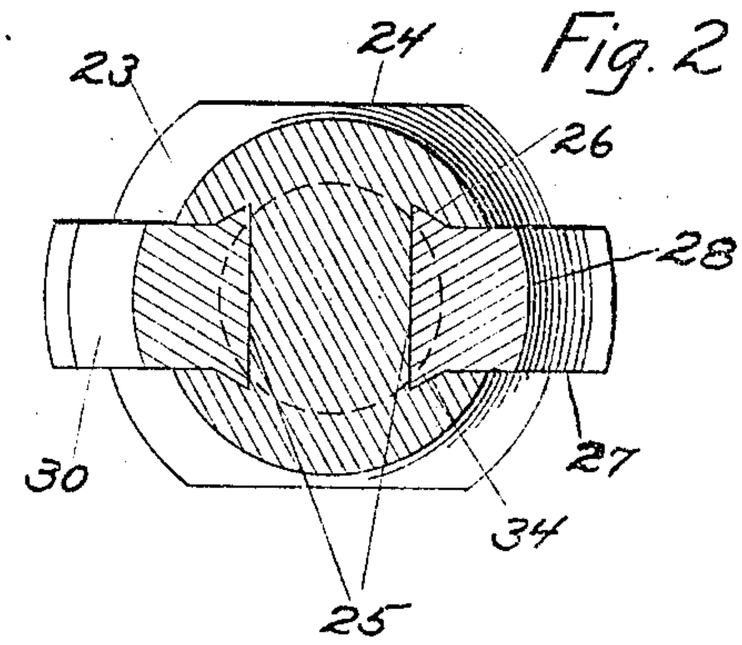


Fig. 2



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FLUE-EXPANDER.

943,907. Specification of Letters Patent. **Patented Dec. 21, 1909.**

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To all whom it may concern:

Be it known that I, GEORGE AUSTIN, a citizen of the United States, residing at Arkansas City, in the county of Cowley and State of Kansas, have invented certain new and useful Improvements in Flue-Expanders, of which the following is a specification.

The object of my invention is to provide a new and improved device for expanding the ends of flues where they enter and project through the flue sheets. This object and other objects in connection therewith will be made apparent in the following specification and claims, taken in connection with the accompanying drawings, in which—

Figure 1 is a general view of my device, certain parts being shown in section. Fig. 2 is a cross section taken on the line 2—2 in Fig. 1, looking in the direction of the arrows. Fig. 3 is a view of a modified detail, this view being taken looking in the direction of the arrow 3 in Fig. 4. Fig. 4 is a side view of the same modified detail illustrated in Fig. 3.

I will proceed at once to a description of the particular embodiment of my invention which I have chosen to illustrate in the accompanying drawings. Thereafter, I will point out how this device works and will direct attention to some of the advantages of my invention.

The usual flue and flue sheet are represented by the respective reference numerals 16 and 15. It is a more or less common practice to insert a copper shim 17 between the flue and flue sheet, as I have shown in Fig. 1. The shaft 18 has an enlarged shoulder 19 screw threaded at 20 and carrying the milled collar 21 locked in place by means of the set screw 22. This collar is adapted to act as a handhold. On the end of the shoulder 19 is the conical head 23, having two opposite sides 24 flattened adjacent to the base of the cone. On opposite sides of this conical head 23 are the straight longitudinal grooves 25 with overhanging lips 26. In each groove is a member 27 which is adapted to slide therein having under reaching toes 34, which, by their engagement with the overhanging lips 26, confine the member to the respective groove. Each member 27 has an outer surface 28 which is parallel to the axis of the conical head 23, but is slightly curved in a circumferential direction. At one end of this surface 28, there is a curved overhang 30 and at the other end there is a circumferential ridge 29. The extremity of the conical head 23 has a cap 35 secured in place by the screw 36 which closes the ends of the grooves 25, thus preventing the escape of the members 27 in that direction. The milled collar 21 acts as a stop to prevent the escape of the members 27 at the opposite ends of the grooves 25.

The modification disclosed in Figs. 3 and 4 differs from the one that has been described in two respects, namely, (1) there is a shoulder 33 which crowds laterally against the beaded end of the flue; and (2) the overhang 30^a is much deeper and more extended than the corresponding overhang 30 in Fig. 1, thus providing an annular rim 31 which is adapted to rest against the flue sheet outside the beaded end of the flue. It will be obvious that the member 27 might be given various other forms, as desired, and that the two modifications illustrated in the drawings are mere examples.

In using my flue expander, the two members 27 are first slipped along the respective grooves 25 until they lie at the ends thereof adjacent to the cap 35. Then they are inserted in the end of the flue and the overhanging lip 30 catches on the beaded end of the flue and the members 27 slide outwardly along the grooves 25 until the conical head 23 wedges them tightly within the flue. Then a pneumatic hammer of suitable weight is applied to the stem 18 being held with the right hand by the operator while his left hand grasps the handhold collar 21. By means of this collar the operator slowly rotates the conical head 23, thus bringing the faces 28 of the members 27 to bear against every part of the end of the flue. It will be observed that the members 27 are pushed out radially in the plane of the flue sheet 15, thus avoiding all tendency to thin the shim 17 down more on one edge than the other. The circumferential ridge 29 creases the flue on the inside immediately adjacent to the flue sheet. The lateral knocking that is delivered by the members 27 to the flue 16 serves to break the accumulated scale away from the outside of the flue adjacent to the flue sheet. The modification disclosed in Figs. 3 and 4 operates in substantially the same way, except that the shoulder 33 serves to crowd the beaded end of the flue tightly over the outside edge of the opening in the flue

sheet, while the annular overhanging projection 31 serves to definitely guide and position the members 27.

There are various flue expanders now in use, among them being the plain tapered mandrel. This is objectionable because it has a tendency to compress the shim 17 more at the part which is near the outer face of the flue sheet, thus pinching the shim to a knife edge at this part. My improved flue expander presses radially outward in the plane of the flue sheet, thus having no tendency to distort the shim 17 in the manner described. The roller flue expander which is somewhat common has the same tendency to a certain extent, but my device jars the flue laterally at each impact of the hammer on the stem 18 and this has a tendency to break the scale away from around the flue 16 adjacent to the flue sheet 15. Inasmuch as the accumulation of scale at this point is a potent cause for the common burning out of flues at the joints, I consider this jarring feature of my device to be an advantageous one. The sectional expander which commonly has eight sections arranged circumferentially around a tapered mandrel is very objectionable because it is immensely powerful and there is great danger in using it that the flue sheet may be wrenched and distorted. Still another advantage of my device over the sectional expander is that my device can be constructed to work for flues of a wide range of diameters, whereas, the sectional flue expander has a very narrow range.

My flue expander has been given an extensive practical trial, and in a general way, as well as in the particular respects that have just been pointed out, it does superior work. By squaring the end of the shaft 18 and making a square socket in the hammer to correspond, it becomes possible to rotate the expander by rotating the hammer.

I claim:

1. In a flue expander, a tapered head, two longitudinal grooves on opposite sides of the head, each of the said grooves having a uniform cross section along its length and the two said grooves converging together toward the point of the tapered head, and opposed coöperating expanding members mounted to slide in said grooves.

2. In a flue expander, a tapered head, longitudinal grooves on opposite sides thereof, each groove having overhanging edges and being uniform in cross section throughout its length, the two grooves converging together toward the extremity of the tapered head, and opposed coöperating expanding members adapted to slide along said grooves and being confined therein by said overhanging edges.

3. In a flue expander, a tapered head, longitudinal guide grooves on said head, opposed coöperating expanding members adapted to reciprocate in said guide grooves but confined against lateral escape therefrom, a collar fastened near the larger end of the head so as to prevent the escape of the said members from the grooves at that end, and a cap attached to the smaller end of the tapered head and covering the other ends of the grooves.

In testimony whereof, I have subscribed my name.

GEO. AUSTIN.

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