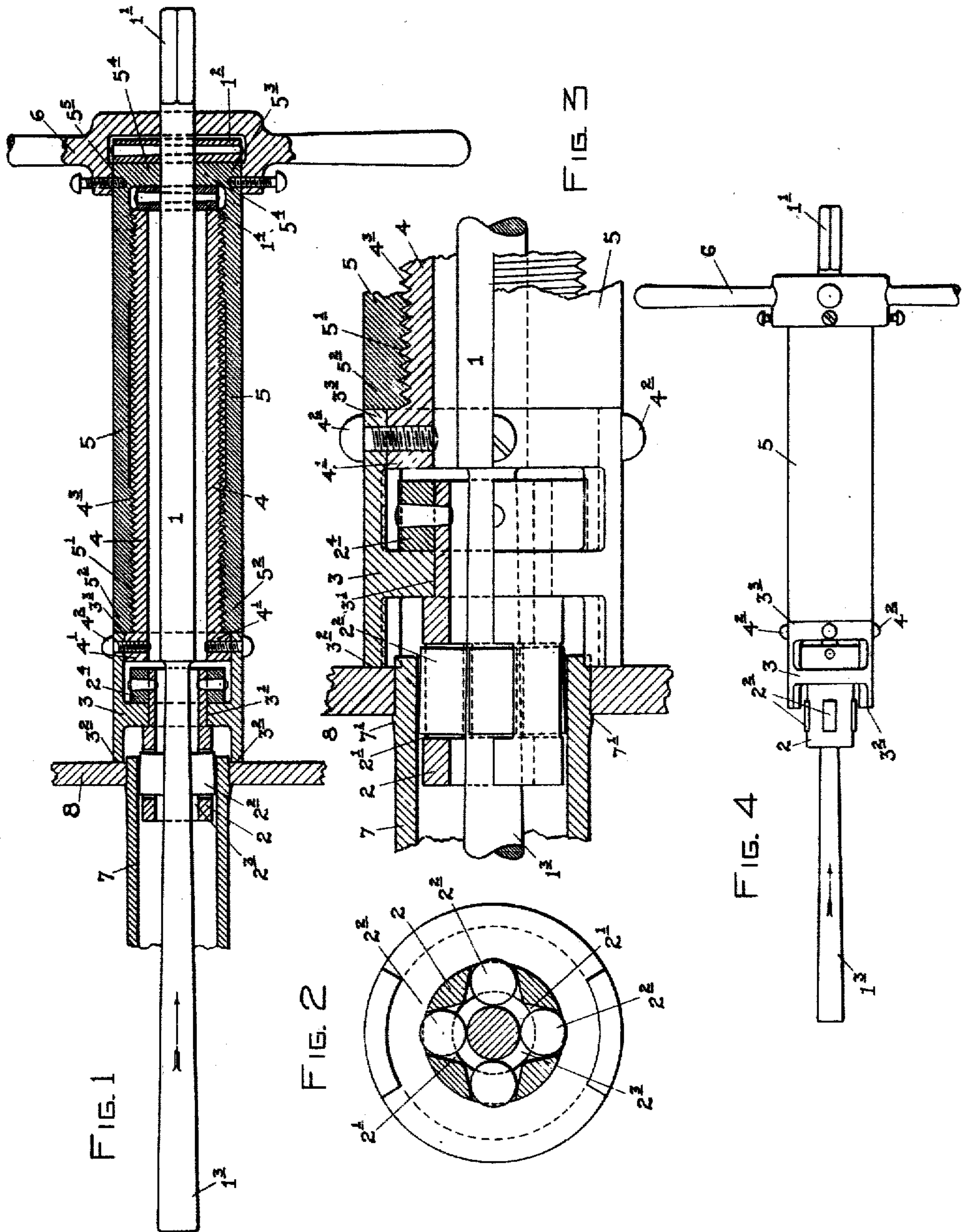


No. 814,248.

PATENTED MAR. 6, 1906.

O. SWANSON.  
FLUE EXPANDER.  
APPLICATION FILED APR. 7, 1904.



WITNESSES  
*And Anderson*  
*Carl Metzger*

INVENTOR  
*Olof Swanson*



# UNITED STATES PATENT OFFICE.

OLOF SWANSON, OF CHICAGO, ILLINOIS.

## FLUE-EXPANDER.

No. 814,248.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed April 7, 1904. Serial No. 202,060.

*To all whom it may concern:*

Be it known that I, OLOF SWANSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Flue-Expander, of which the following is a specification.

My invention relates to improvements in flue-expanding tools in which revolving rollers gradually force the pipe-flue against the periphery of the holes in the boiler-plate by means of a circular wedge-rod; and the objects of my invention are, first, to provide an expanding-tool which allows a very large variety of sizes of flues to be expanded with the same tool; second, to increase the absolute safety of flues after they are inserted and expanded, and, third, to create a shoulder on the flue on the inner side of the boiler-plate, thereby clenching the plate from both sides. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of the tool, showing a piece of pipe in position to be expanded into a plate, both pipe and plate also being shown in section. Fig. 2 is an end view of the roller-nest, showing the expanding-rod in section. Fig. 3 is a sectional view illustrating the part of the tool nearest to and including the roller-nest, showing the flue expanded into the plate; and Fig. 4 is a side elevation of the tool in its entirety.

Similar numerals refer to similar parts throughout the several views.

The inner shaft or rod 1 has its end 1' adapted to be connected with a coupling for revolving same by compressed air or other suitable power. A collar 1<sup>2</sup> is rigidly attached near that end, so as to prevent the rest of the mechanism to be described later from sliding off. The opposite end 1<sup>3</sup> is turned inwardly, tapering to about one-half of the length of the whole shaft or rod 1. Over and around said tapering end 1<sup>3</sup> the roller-nest 2 is slidingly and loosely movable when out of operation. The roller-nest 2 has a number of apertures 2' cut into it, where the rollers 2<sup>2</sup> are inserted. They are arranged to be inserted from the inside of the bore 2<sup>3</sup>, through which the rod 1 passes, in such a manner that they can be gradually forced outwardly through the movement of the taper end 1<sup>3</sup> of the rod 1 in the direction of the arrow shown on said rod 1<sup>3</sup>. The apertures 2' are made wider in the center of the

nest and smaller at the periphery, so as to prevent the rollers from falling out when the tool is not in use. The rollers 2<sup>2</sup> are preferably made with flat ends and oblong. The roller-nest 2 has its inner portion reduced, as at 3', to fit in the sleeve 3 and is held in place thereon by an internal collar 2<sup>4</sup>, the inner face of the enlargement of said nest bearing against the face of said sleeve. One end or face 3<sup>2</sup> of the sleeve 3 sits up against the plate into which the pipe or flue is to be expanded, while the other end 3<sup>3</sup> fits over and around the end 4' of the inner sleeve 4 and is rigidly secured thereto by means of screws or pins 4<sup>2</sup>. The other end of the inner sleeve rests against the collar 1<sup>4</sup>, which is also rigidly secured to the rod 1. The whole length of the outside of the sleeve 4 has a thread 4<sup>3</sup> thereon and is adapted to screw on and inside of the outer sleeve or shell 5, having a corresponding thread 5' at its end 5<sup>2</sup>. At its other end 5<sup>3</sup> a collar 5<sup>4</sup> is formed to permit said sleeve to turn over the rod 1 between the collars 1<sup>2</sup> and 1<sup>4</sup>. The outside end 5<sup>5</sup> is made in any suitable shape to permit a wrench 6 to be used for turning the expanding-tool.

The operation is as follows: After the pipe 7 is inserted loosely in the plate 8 the operator inserts the tool into the pipe after the roller-nest has been slid down to the point where the diameter of the tapering end of the rod 1 is smallest, permitting the rollers to rest exactly at the place where the thickness of the plate surrounds the pipe to be expanded. The power connected with shaft 1 is turned on, revolving said shaft at a high rate of speed. By means of the wrench 6 the outer sleeve 5 is revolved, and through the engagement of threads 5' and 4<sup>3</sup> the sleeve 4 is caused to move in the opposite direction from the movement of the sleeve 5, and inasmuch as the collars 1<sup>2</sup>, 2<sup>4</sup>, 3', and 5<sup>4</sup> prevent any forward or backward motions and the end 3<sup>3</sup> of the sleeve 3 sits against the plate 8 the taper end 1<sup>3</sup> of the rod 1 is forced in the direction of the arrow, thus forcing the rollers outwardly as it does so, said rollers expanding the pipe or flue 7 tightly into the plate 8. The taper of the rod 1 will of course force to place the rollers in the same line as its own surface, and consequently a greater pressure will be exerted at the larger diameter of the rod 1, thus forcing the metal of the pipe 7 outwardly, as indicated in Fig. 3, and forming a shoulder 7'. After the expanding of the flue 7 the handle 6 is turned in the oppo-



site direction, thereby releasing the pressure of the rollers against the inside of the circumference of the pipe and permitting the expanding-tool to be taken out. The end of the pipe 7 is then riveted, as usual.

It will be seen that my tool expands the pipe much more securely and rigidly into the boiler-plate, making it especially tight not alone by expansion, but also by forming a shoulder, thereby clenching the plate tightly.

What I claim, and desire to secure by Letters Patent, is—

In a flue-expander, the combination of a rod or shaft tapered inwardly from one of its ends and adapted at its other end to engage means for imparting rotary motion thereto, with a pair of collars spaced apart and fixed on said shaft near its power-engaging end, an internally-screw-threaded outer sleeve having at its outer end a collar interposed be-

tween said pair of collars and loosely surrounding said shaft, an externally - screw-threaded inner sleeve surrounding said shaft and located in the outer sleeve and having on its end adjacent to the taper of the shaft an annular enlargement, an auxiliary sleeve fixed on said enlargement and extending therefrom toward the tapered portion of the shaft, a roller-nest secured within the auxiliary sleeve and having a series of openings extending beyond the outer end of the said sleeve, and a roller loosely mounted in each of said openings, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

OLOF SWANSON.

Witnesses:

AXEL ANDERSON,  
CARL MELTZER.