No. 785,892. PATENTED MAR. 28, 1905.

W. H. KINNEY.

TUBE EXPANDER.

APPLICATION FILED APR. 9, 1904.

Fig. 1,

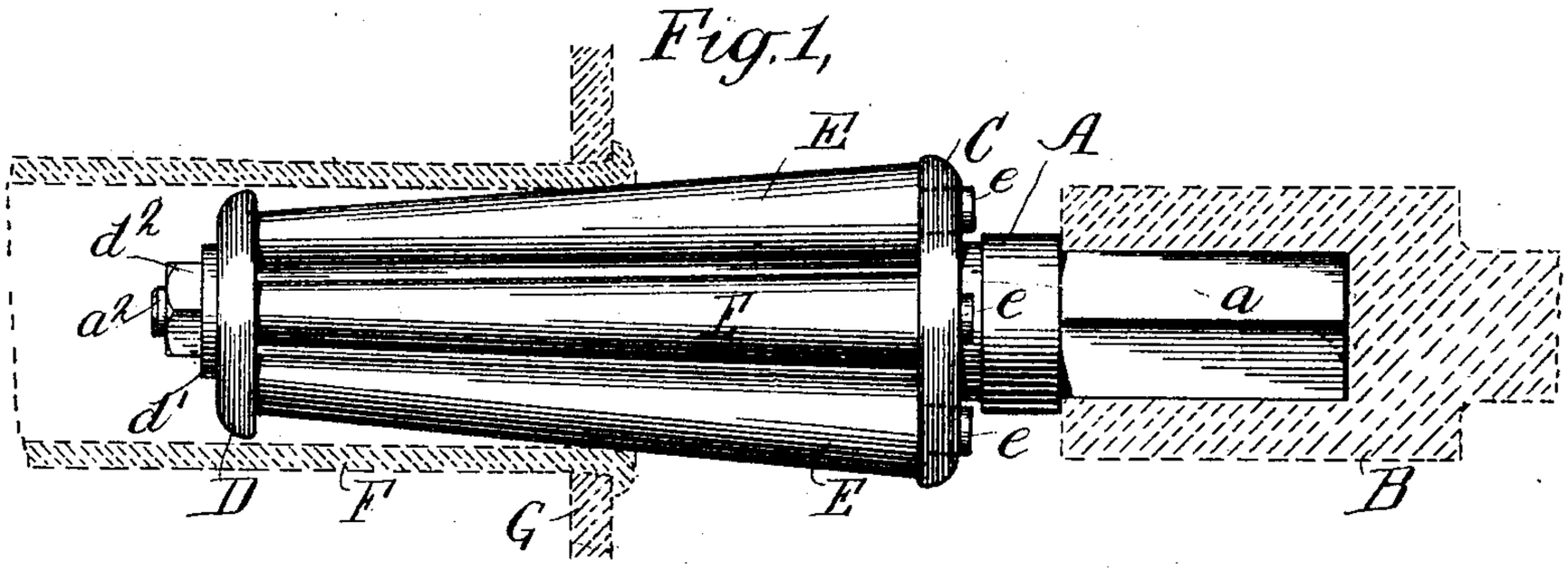


Fig. 2,

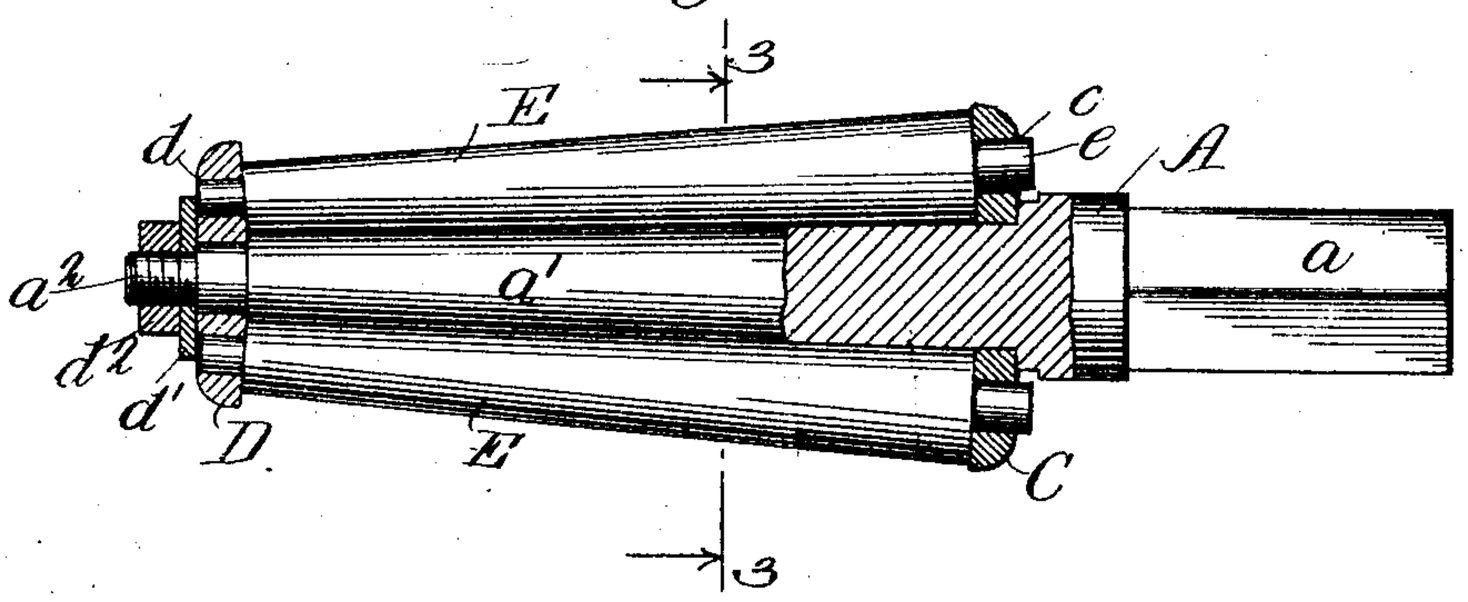
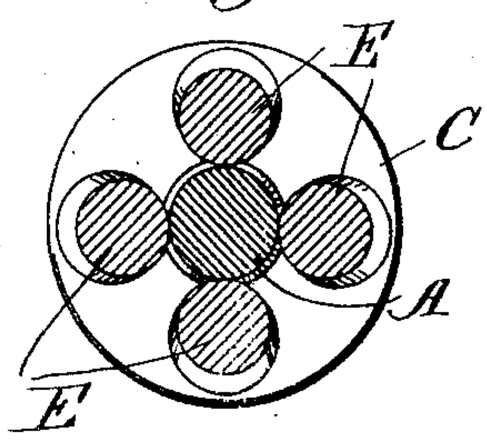


Fig. 3,



WITNESSES:

~~Harry Goss~~

L. McIntosh

INVENTOR

William H. Kinney

BY

J. O. Edmonds

ATTORNEY

No. 785,892. Patented March 28, 1905.

UNITED STATES PATENT OFFICE.

WILLIAM H. KINNEY, OF CARBONDALE, PENNSYLVANIA, ASSIGNOR TO RUSSELL B. WILLIAMS, OF SCRANTON, PENNSYLVANIA.

TUBE-EXPANDER.

SPECIFICATION forming part of Letters Patent No. 785,892, dated March 28, 1905.

Application filed April 9, 1904. Serial No. 202,477.

To all whom it may concern:

Be it known that I, WILLIAM H. KINNEY, a citizen of the United States, residing at Carbondale, in the county of Lackawanna and State of Pennsylvania, have invented a certain new and useful Improvement in Tube-Expanders, of which the following is a specification.

The object of the present invention is to provide simple, durable, and efficient mechanism for expanding the ends of tubes. Such invention is applicable particularly for use in expanding the ends of the flues either of stationary or locomotive boilers.

Much difficulty has heretofore been experienced in the use of tubular boilers, and particularly those employed in locomotives, because of the loosening of the tubes or flues at the points where the same are secured to the boiler-head, this resulting in leakage, the effect whereof is to impair the efficiency of the boiler and in many instances to require the drawing of the fire. By my invention I am enabled upon the discovery of a leak in the junction between a flue and the boiler-head to quickly and permanently remedy the same by the introduction into the end of the flue of my improved expanding apparatus, the operation requiring no drawing of the fire or substantial reduction in its heat-generating capacity. Moreover, said expanding apparatus is of such simple character as that the same may be effectively employed for the purpose stated by unskilled help, thereby making it unnecessary to suffer a leaky flue to remain until the services of an expert machinist can be procured.

In carrying out the invention in a preferred form I employ a rotary spindle carrying two roller-heads and having preferably a cone-shaped body between said heads. Journaled in said heads are suitable rollers, also preferably cone-shaped and so coacting with such body as to receive rotary movement therefrom. Said spindle may be revolved by any suitable means—as, for instance, by means of a wrench—and the reduced forward end thereof having been inserted into the end of a flue and said rollers having been brought into contact with the extreme end thereof the material of said flue may be readily expanded, so as to assure contact between the same and the orifice in the boiler-head in which the end of such flue is made fast.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved tube-expander, a wrench for operating the same and a portion of a tube and boiler-head being illustrated in dotted lines. Fig. 2 is a central longitudinal section, partly in elevation, of the expander alone; and Fig. 3 is a cross-section on the line 3 3, Fig. 2.

Referring to the drawings, in which similar letters denote corresponding parts, A designates the central spindle, here shown as provided at one end with a portion *a*, which is rectangular in cross-section, for coaction with a wrench B. Where it is designed to employ the expander in connection with a locomotive-boiler, such wrench may have a handle sufficiently long to extend over the fire-box. The body portion *a'* of the central spindle A is preferably cone-shaped for the purpose hereinafter described.

C designates a roller-head mounted loosely upon said central spindle A, said head being provided with orifices *c* for the purpose hereinafter referred to. D designates another head, similar to the head C, but of less diameter, the same being also mounted loosely upon the body portion of said central spindle A, said head D being provided with orifices *d* and the same being held in position upon said central spindle A by any suitable means—as, for instance, those shown in the drawings and comprising the washer *d'* and the nuts d^2, engaging with the threaded end a^2 of the central spindle A.

E E designate rollers provided with trunnions *e*, journaled in the orifices *c d* of the roller-heads C D. Said rollers are preferably formed cone-shaped, as shown in the drawings, and are mounted in such relation to the body portion *a'* of the central spindle A as to have frictional contact therewith, whereby rotary movement is transmitted to the same upon the turning of said central spindle A.

The application of the tube-expander dis-

closed herein to a boiler-tube is illustrated in Fig. 1. Upon the discovery of a leak in the junction between a boiler-tube F and the boiler-head G the expander may be introduced into such flue until the rollers E are brought into contact with the end of such flue adjacent to such junction. Upon rotary movement being transmitted to the central spindle A and communicated thereby to the rollers E, the expander being meanwhile pressed into the flue, the end of such flue may readily be tightened or brought into more intimate contact with the orifice in the boiler-head, thereby at once stopping the leak at such junction in quick and reliable manner and with substantially permanent result. By giving to the rollers E the shape of truncated cones the expander further exerts a tendency when rotated as described to work its way into the open end of the tube, thereby adding to its efficiency in expanding such tube in its orifice in the boiler-head. By forming the coacting body portion a' also in the shape of a truncated cone, engaging from end to end with the similarly-shaped rollers E, great strength and reliability of the mechanism are assured. I do not, however, desire to be limited with regard to the shape of such body portion a', as it is obvious that possibly at the expense of slightly decreasing the strength of the mechanism the body portion a' may be otherwise shaped, it being essential only that the same shall transmit to the rollers E rotary movement imparted to the central spindle A.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

In a tube-expander, the combination with a central spindle having a cone-shaped body portion, of disk-like heads of different diameter provided with bearings and mounted on said spindle, means for securing the same in position, and cone-shaped rollers, arranged in planes parallel, and in contact, with said spindle and having trunnions mounted in said bearings, said rollers having open and unobstructed spaces between them and being longitudinally fixed relatively to said spindle, substantially as set forth.

This specification signed and witnessed this 28th day of March, 1904.

WILLIAM H. KINNEY.

Witnesses:
CHAS. H. HORTON,
RUSSELL B. WILLIAMS.