

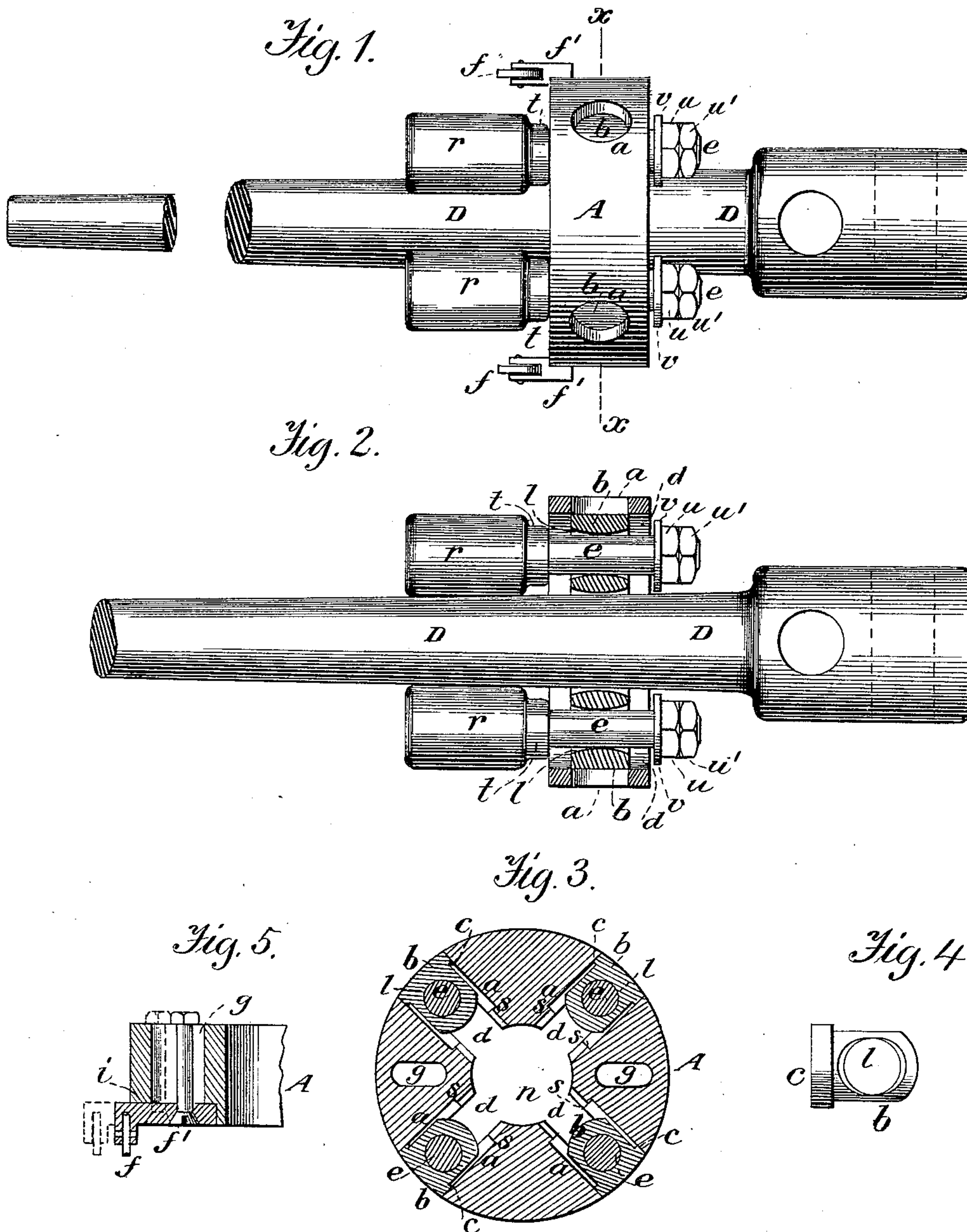
(No Model.)

W. H. TEBEAU & M. N. DE LONG.

TUBE EXPANDER.

No. 386,728.

Patented July 24, 1888.



Witnesses.

A. Ruppert.

Wm. H. Doolittle.

Inventors:

William H. Tebeau.  
Marshall N. De Long.  
per W. C. Raymond,  
their Attorney.



# UNITED STATES PATENT OFFICE.

WILLIAM H. TEBEAU AND MARSHALL N. DE LONG, OF SYRACUSE,  
NEW YORK, ASSIGNORS OF ONE-FOURTH TO JACOB F. BENTZ,  
OF SAME PLACE.

## TUBE-EXPANDER.

SPECIFICATION forming part of Letters Patent No. 386,728, dated July 24, 1888.

Application filed August 27, 1887. Serial No. 248,068. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM H. TEBEAU and MARSHALL N. DE LONG, respectively of Syracuse, county of Onondaga, in the State of New York, and citizens of the United States, have invented certain new and useful Improvements in Tube-Expanders, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to the class of tube-expanders in which two or more rollers are supported rotarily and movable laterally in a suitable head or body adapted to be introduced in the end of the tube to be expanded, and a tapering mandrel is inserted between the rollers to push them outward against the inner sides of the tubes and expand the same circumferentially, so as to fit tightly in the hole provided for it in the flue-sheet.

20 The invention consists in an improved construction and combination of the head or body of the expander with the expanding rollers and certain devices for retaining the rollers in the supporting-body, and also in novel devices connected with the roller-supporting head for supporting the latter on the exterior of the flue-sheet, so as to prevent said head from pressing against the end of the tube; and it also consists in other peculiarities of the details of the expander, all tending to render the tool more convenient and efficient in its operation.

In the accompanying drawings, Figure 1 is a side view of our improved tube-expander. Fig. 2 is a longitudinal section through the center of the expander-body. Fig. 3 is a transverse section on line *x x*, Fig. 1. Fig. 4 is a detached view of one of the bolts by which the expanding-rollers are retained in the head, and Fig. 5 is a sectional view of the device by which the body is supported on the flue-sheet during the operation of the expander.

Similar letters of reference indicate corresponding parts throughout the several views.

45 A represents the head or body of the expander, said body being composed of a rigid block of cast-steel or other suitable metal, and formed with an axial eye, *n*, and radial slots *d d*, extending from the eye part way toward the periphery of the body; and in the longi-

tudinal central portion of each of said slots, 30 and parallel therewith, is formed a way, *a*, which is extended completely through to the periphery of the body, and is of uniform size and shape from its outer end part way inward, and formed with inward projections, *s*, which 55 serve to stop the excessive inward movement of a bolt, *b*, which is introduced into the way *a* from the outer end thereof, and is provided with shoulders *c c*, by which it encounters the projections *s s*, and is thus prevented from 60 entering the central eye, *n*, and dropping out of the body when the mandrel is withdrawn therefrom.

*r r* denote the expanding-rollers, which are formed with spindles *e e*, passing through the 65 slots *d d* of the body A and through the eyes *l l*, extending transversely through the bolts *b b*. The interior of each eye *l* is formed flaring toward opposite ends of the eye, so as to allow the tube-expanding end of the roller *r* to yield 70 to a certain degree laterally when encountering projections on the inner surface of the flue to be expanded. The rollers are formed with shoulders *t t*, by which they abut against the face of the body or head A, and the spindles 75 *e e* of the rollers protrude at the back of the aforesaid head, and are screw-threaded and provided with nuts *u* and jam-nuts *u'*, to retain the rollers in the head A. In order to allow the rollers to freely turn on the head A, we 80 interpose between the nuts *u* and back of the head A rotatable disks or washers *v v*.

D represents the usual tapering mandrel or spindle, which, in the operation of the expander, is inserted into the eye *n* of the head 85 A, and after the rollers *r r* are introduced into the end of the tube to be expanded and the head A brought to rest against the flue-sheet the aforesaid spindle is forced inward to crowd the rollers *r r* laterally against the interior of 90 the tube, and simultaneously with the inward pressure of the mandrel it is turned and by its frictional contact with the rollers it imparts rotary motion to the latter, and thereby expands the end portion of the tube, so as to 95 cause it to tightly fit the hole provided for it in the flue-sheet.

In order to prevent the body A from press-



ing on the protruding end, and thus guard  
against the splitting of the tube incident to  
said pressure, and also to relieve the aforesaid  
body from undue friction, we connect to the  
5 face of the body A guards, which project from  
said face and are adapted to bear on the exterior  
of the flue-sheet near the end of the flue  
to be expanded. Said guard we prefer to form  
of rollers *f f*, pivoted on lugs *f' f'*, which are  
10 movably seated in radial grooves *i i* in the  
face of the body A, and are adjustably secured  
in their positions by screws passing through  
the lugs and through radial slots *g g* in the  
body A, and provided on their ends with nuts  
15 by which to tighten said screws with the lugs  
on the head A, as shown in Fig. 5 of the drawings.  
The grooves *i i* and slots *g g* allow the  
lugs to be set a greater or less distance from  
the center of the body, according to the size  
20 of the tube to be expanded.

Having thus described our invention, what  
we claim as new, and desire to secure by Letters Patent, is—

The combination of the rigid expander-body  
A, provided in its face with the radial grooves 25  
*i i*, and having slots *g g* extending through  
it, the lugs *f' f'*, seated movably in the said  
grooves, and bolts passing through the slots  
and adjustably securing the lugs in their positions,  
substantially as described. 30

In witness whereof we have hereunto set our  
hands this 23d day of August, 1887.

WILLIAM H. TEBEAU.  
MARSHALL N. DE LONG.

In presence of—

JACOB F. BENTZ,  
WM. C. RAYMOND.