

(No Model.)

W. H. BROWN.

MANUFACTURE OF COPPER TUBES.

No. 348,718.

Patented Sept. 7, 1886.

Fig. 1.

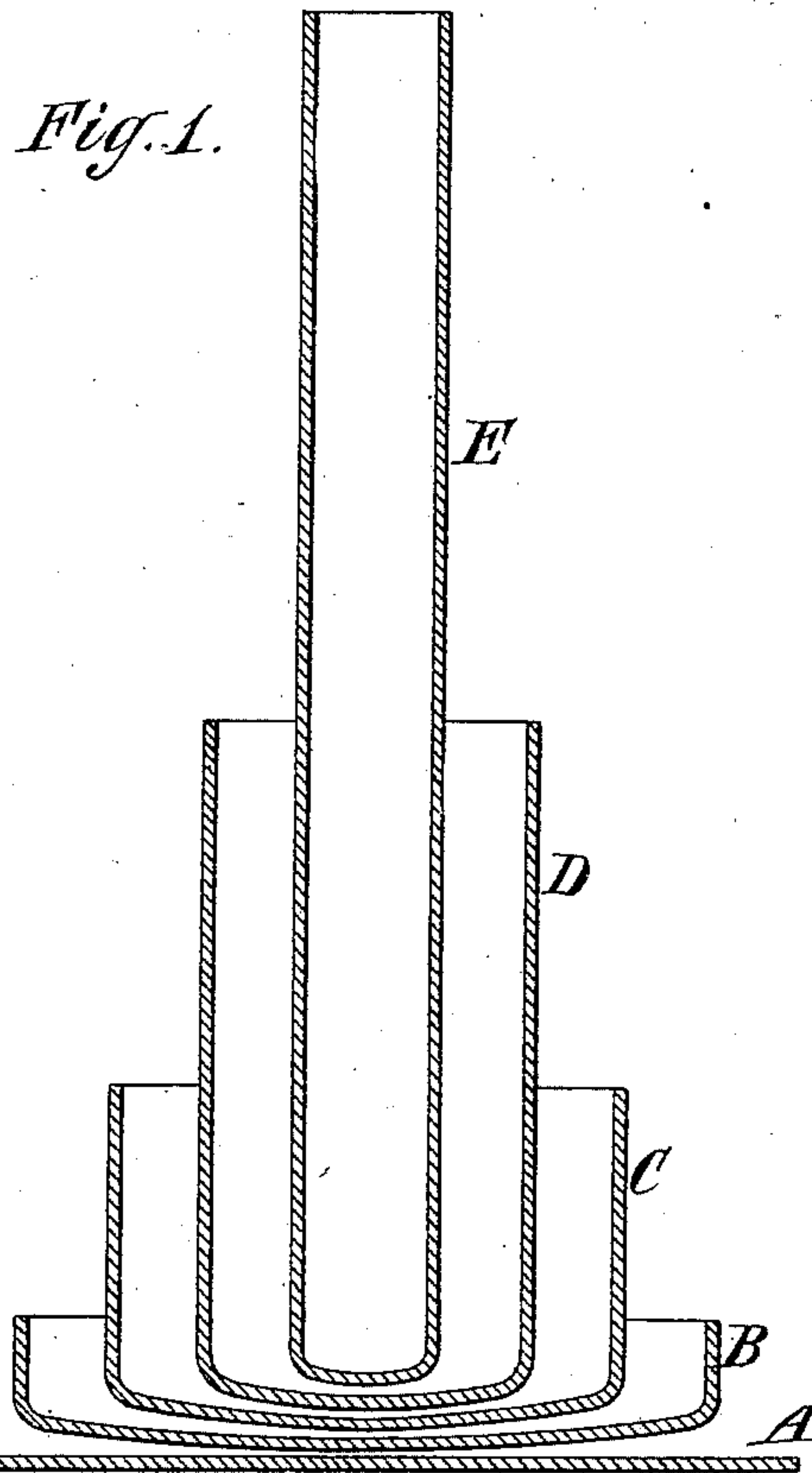


Fig. 2.

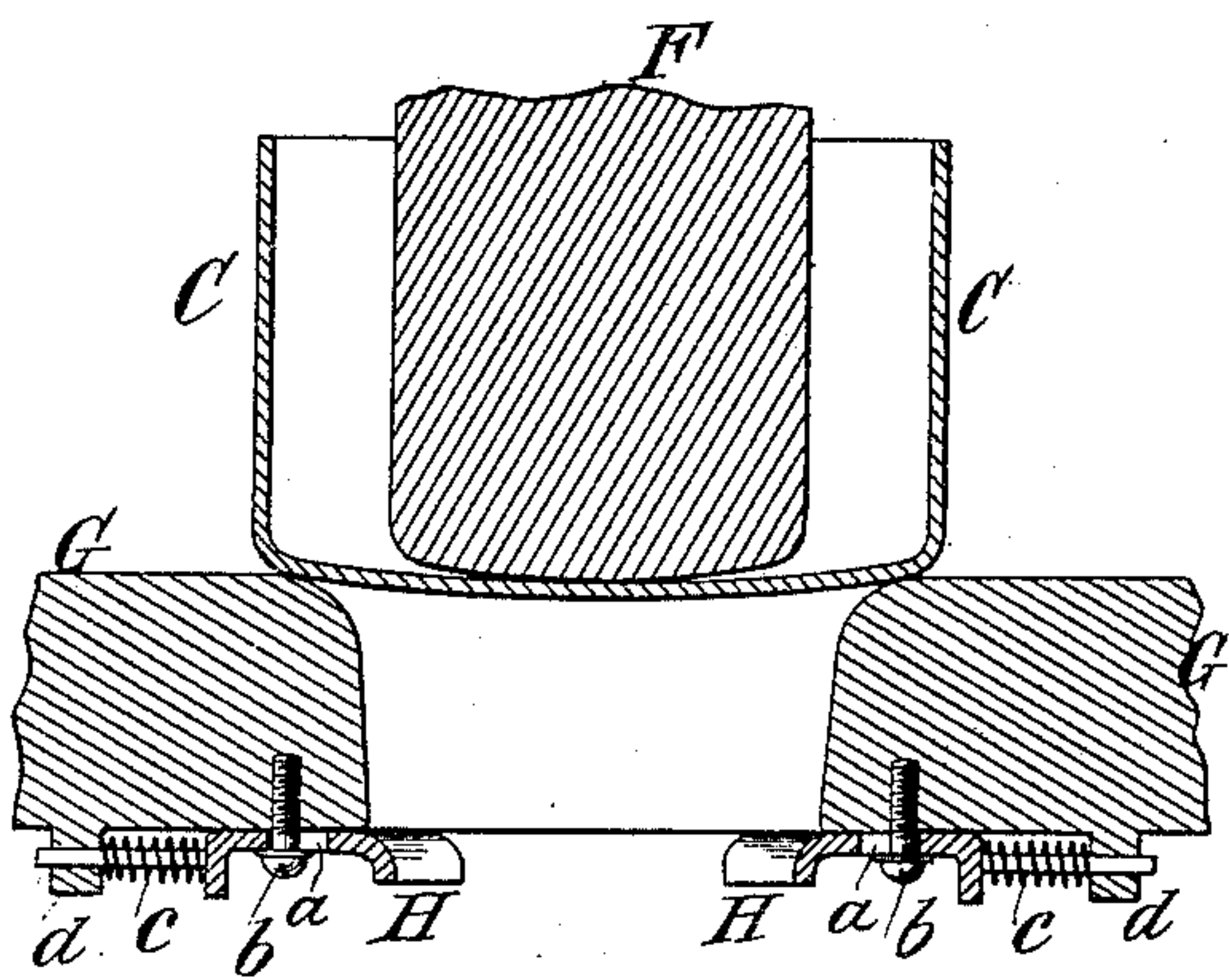
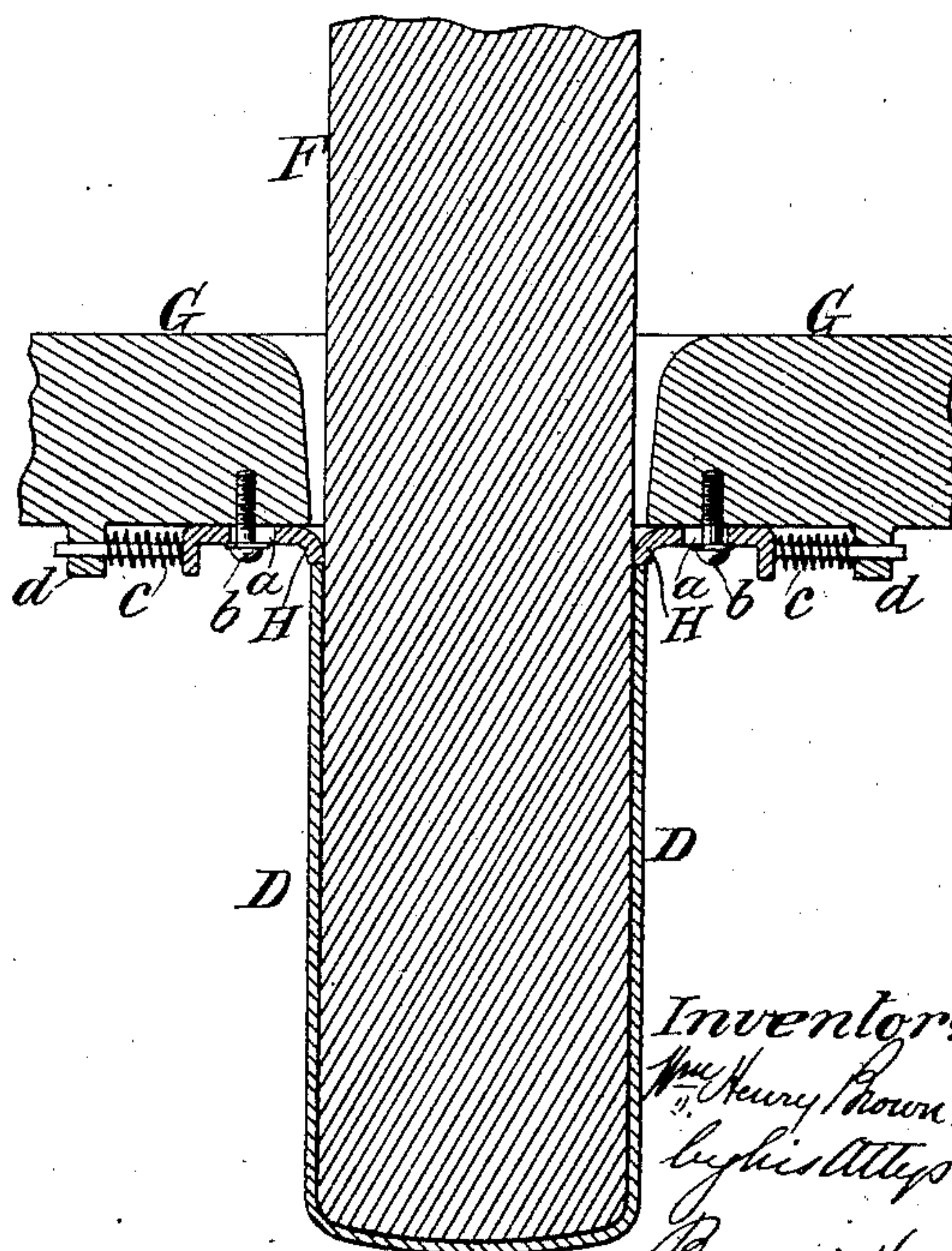


Fig. 3.



Witnesses:
Matthew Pollock
Minor Lindeman

Inventor:
Wm Henry Brown
by his attys
Brown & Hall

UNITED STATES PATENT OFFICE.

WILLIAM HENRY BROWN, OF NEW YORK, N. Y., ASSIGNOR TO BROWN'S SEAMLESS METAL COMPANY, OF JERSEY CITY, NEW JERSEY.

MANUFACTURE OF COPPER TUBES.

SPECIFICATION forming part of Letters Patent No. 348,718, dated September 7, 1886.

Application filed June 4, 1885. Serial No. 167,574. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY BROWN, a citizen of the United States, residing in the city of New York, in the State of New York, have invented a new and useful Improvement in the Manufacture of Seamless Cylinders of Copper and its Alloys, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to the manufacture of seamless cylinders and tubes of copper and its alloys from disks or blanks. In such manufacture, as heretofore practiced, the metal has always been worked in a cold state for the reason that it has not been thought or found to be practicable to effect the necessary operations while the metal was hot, the metal in that state having so little tenacity that it would not withstand the operation of drawing as ordinarily practiced.

20 In the ordinary process of manufacture, which is entirely performed while the metal is cold, if the cylinders and tubes to be produced are of large caliber the earlier stages of the process by which the disk is brought to the form of a cylinder and the cylinder so formed is reduced in size, require an enormous power, and even if the caliber be small the power required in the earlier stages is considerable.

30 With a view to reduce the great power required and so to reduce the cost of manufacture, I have been led to experiment upon heated copper and its alloys in a manner never before practiced—that is to say, to subject the metal to a series of shaping or folding operations which changes its shape from the flat to the cylindrical, and from that of a shorter cylinder of larger caliber to that of a longer cylinder of smaller caliber without subjecting it to any such action as that known as “drawing,” by which its thickness is reduced, and I have successfully demonstrated that the earlier stages of the manufacture may be successfully and very advantageously performed in this way.

45 My invention consists in the manufacture of seamless cylinders and tubes of copper and its alloys by first subjecting the metal in a hot state to a series of folding operations, by which it is brought from the flat to the cylindrical

form without reduction, or material reduction, of thickness, and afterward subjecting it in a cold state to the drawing operations, by which the cylinders or tubes are reduced to the size and thickness required, and by which the desired qualities of density, homogeneity, hardness, tenacity, and smoothness are imparted to the metal.

55 The successive stages through which the metal passes in its conversion from the disk or flat form to that of the cylindrical or tubular form of the caliber and thickness desired may be considerably varied; but I have in the accompanying drawings illustrated a series of operations and a form of mandrel and die to be employed therein, by which the conversion from the flat form to the form of a cylinder ready for cold-drawing may be effected.

60 Figure 1 is a diagram illustrating the changes of profile form through which the disk of metal passes while in process of conversion by folding in the hot state into a cylinder, the said views representing axial sections. Figs. 2 and 3 are sectional views of a plunger and die of a kind which may be used in effecting the conversion.

70 Similar letters of reference indicate corresponding parts in the several figures.

75 The heat to which the copper or alloy is subjected for the operations of folding illustrated in Fig. 1 should be about that of a cherry-red.

80 The first operation to bring the disk A to the form B may be performed in an ordinary flanging-machine, and the following operations of conversion into cylinders C D E of successively greater length and less caliber may be performed by means of a series of cylindrical mandrels, F, or plungers and dies G, of corresponding diminishing caliber, a proper proportion being observed between the external caliber of each plunger or mandrel and that of its corresponding die to preserve between all the corresponding plungers or mandrels and dies a uniform width of space, so that the metal in the successive operations may be simply folded or turned in over the mandrel or plunger without being reduced, or materially reduced, in thickness.

85 The method of successively reducing the cylinders or cylindrical cups by folding or

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turning in the metal is illustrated in Figs. 2 and 3, the former of which figures represents the cylinder C as placed upon the die G ready for action of the plunger F, which forces it through the said die and brings it to a smaller and increased length, as illustrated by D in Fig. 3.

In the above-mentioned figure sliding strippers H H are shown attached to the bottom or back of the die G, for the purpose of stripping the cylinder D from the plunger F when the latter is drawn back. These strippers have slots *a* provided in them for the reception of screws *b*, which pass through the said slots and screw into the die, and so attach the said strippers in a manner to permit them to move toward and from the center of the die. Springs *c*, bearing against stops or abutments *d* on the bottom of the die, press against the strippers to force them toward the center of the die. When the plunger forces the cylinder into the die, the cylinder presses them, when the springs force the strippers over the upper edge of the cylinder, as shown in Fig. 3, so that when the plunger is drawn back the cylinder will be detained by the strippers and caused to be stripped from the plunger. The cylinders or cylindrical cups B C D will generally be heated between every two successive operations, though if separate machines are used for the successive operations it might be possible to pass the cylinder through two dies of successively smaller size at one heat. When the cylinder has been thus folded or turned in and shaped to bring it as nearly as desirable to the caliber required, it may be cleaned by suitable means to remove the scale, and is then subjected as many times as desirable to a drawing action between

monly used, and in the manner commonly practiced in cold-drawing metal tubes and cylinders, for the purpose of reducing its thickness and also reducing its caliber, if desired, to give it the thickness and caliber required, and also to give it those desirable qualities of density, homogeneity, hardness, tenacity, and smoothness peculiar to cold-drawn cylinders and tubes of copper and its alloys.

The cold-drawing operations may be much facilitated by applying to the cylinders before the drawing a coating of tin or stanniferous alloy, which acts as a sort of lubricant to reduce the friction between the copper and the mandrel or triblet and the die.

If tubes are to be formed, the closed end left in the cylinder in forming from a flat piece may be cut off at any suitable stage of the manufacture after the termination of the hot-folding operations.

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

The improvement in the art of manufacturing seamless cylinders of copper and its alloys by first subjecting the metal in a hot state to a series of folding operations, whereby its form is changed from the flat to the cylindrical and from that of a shorter cylinder of larger caliber to that of a longer cylinder of smaller caliber, and afterward subjecting it in a cold state to the drawing operations, by which the cylinders are brought to the desired thickness and caliber, condensed, hardened, and finished, substantially as herein set forth.

WM. HENRY BROWN.

Witnesses:

MINERT LINDEMAN,
FREDK. HAYNES.