

(No Model.)

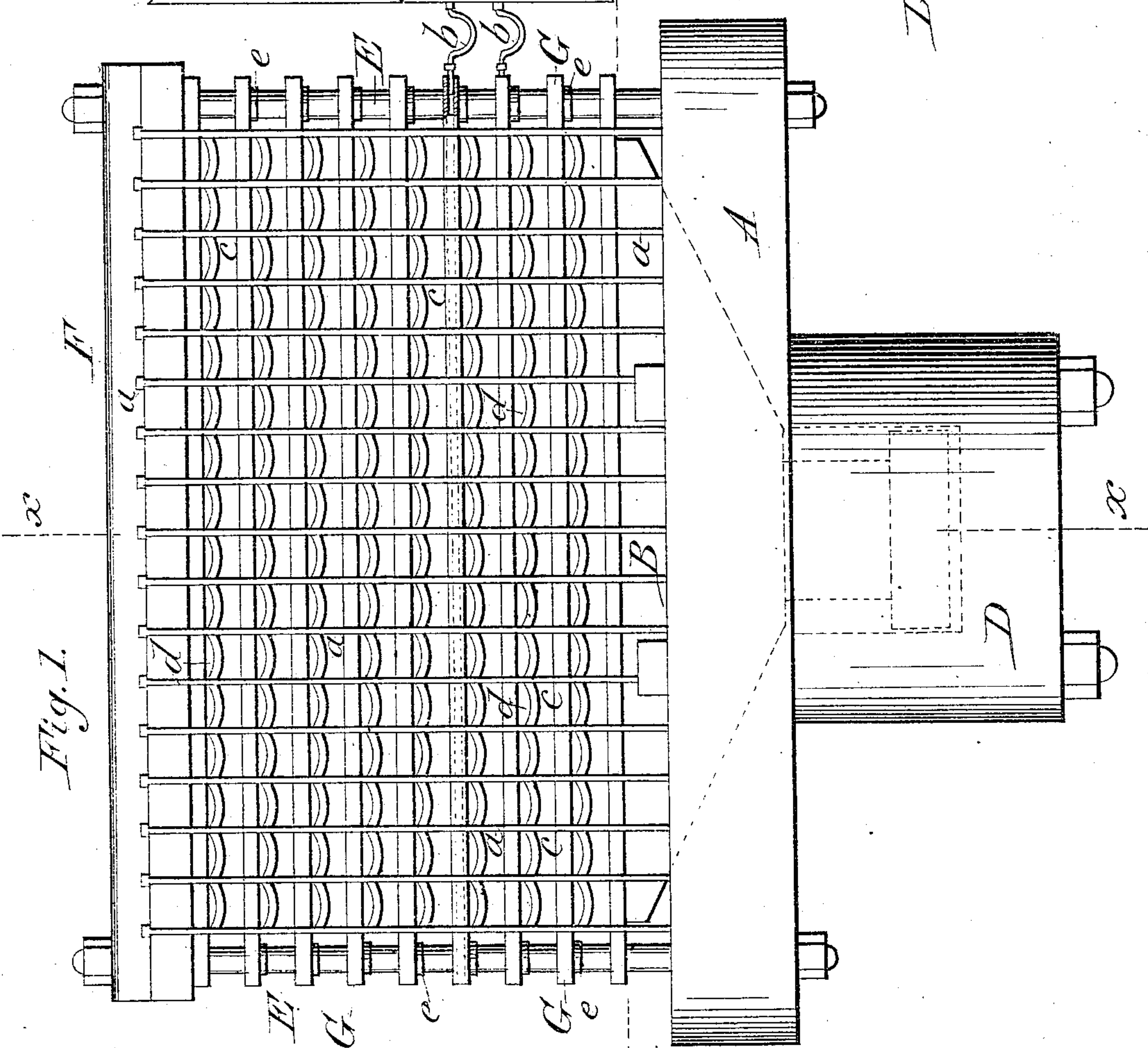
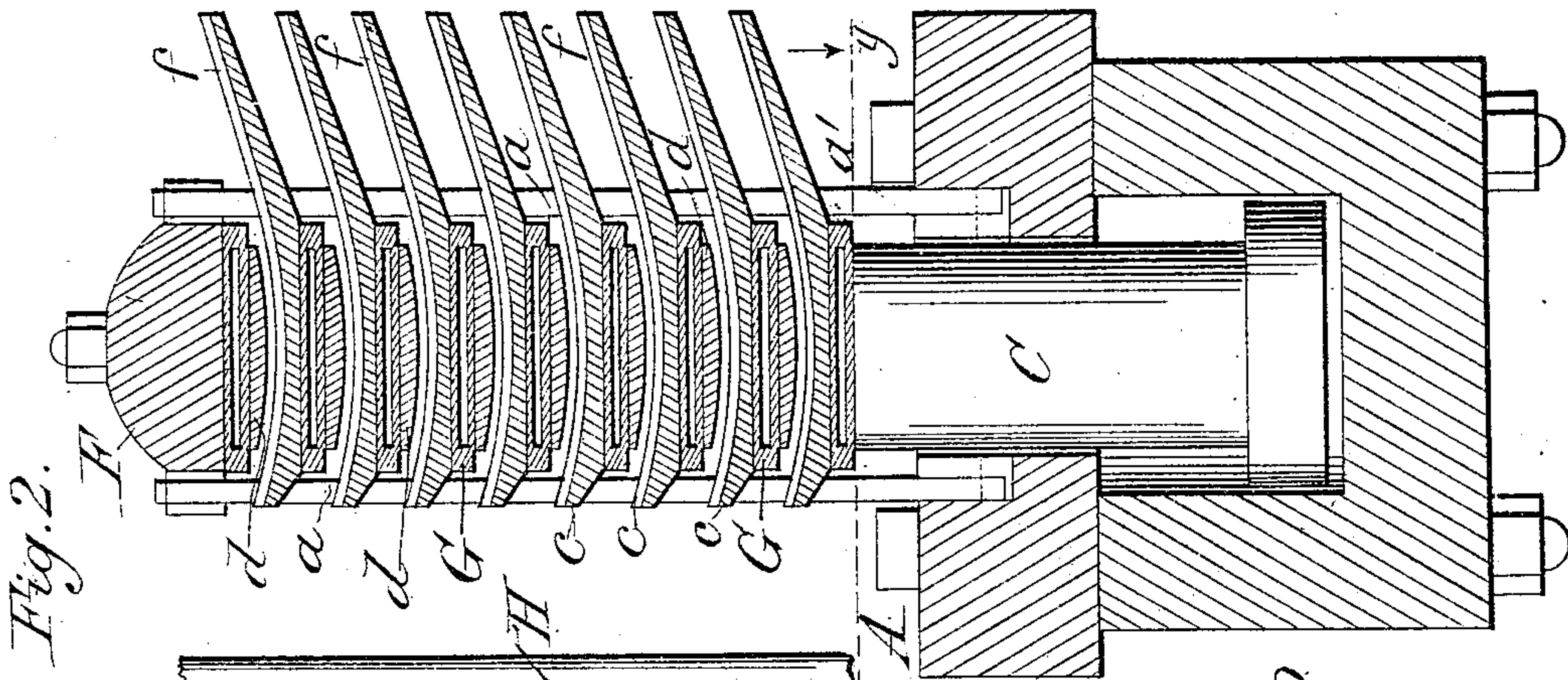
2 Sheets—Sheet 1.

H. S. SMITH.

STAVE BENDING AND DRYING MACHINE.

No. 250,593.

Patented Dec. 6, 1881.



Attest:

J. H. Schott.
A. R. Brown.

Inventor:

Heman S. Smith.
per J. H. Parker

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2 Sheets—Sheet 2.

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Fig. 3.

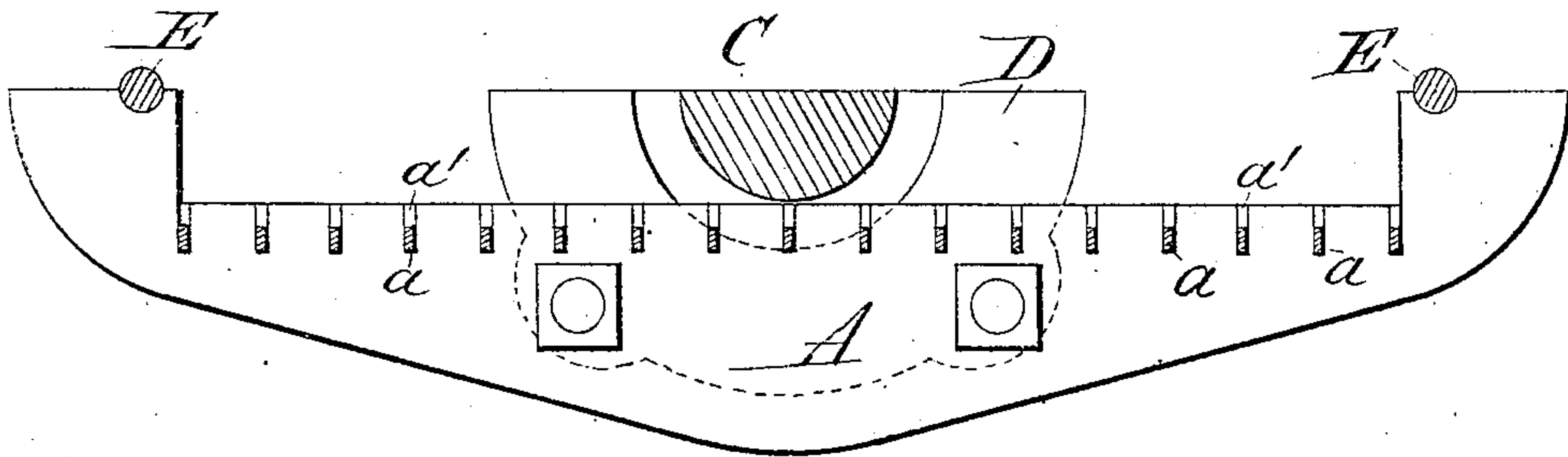


Fig. 4.

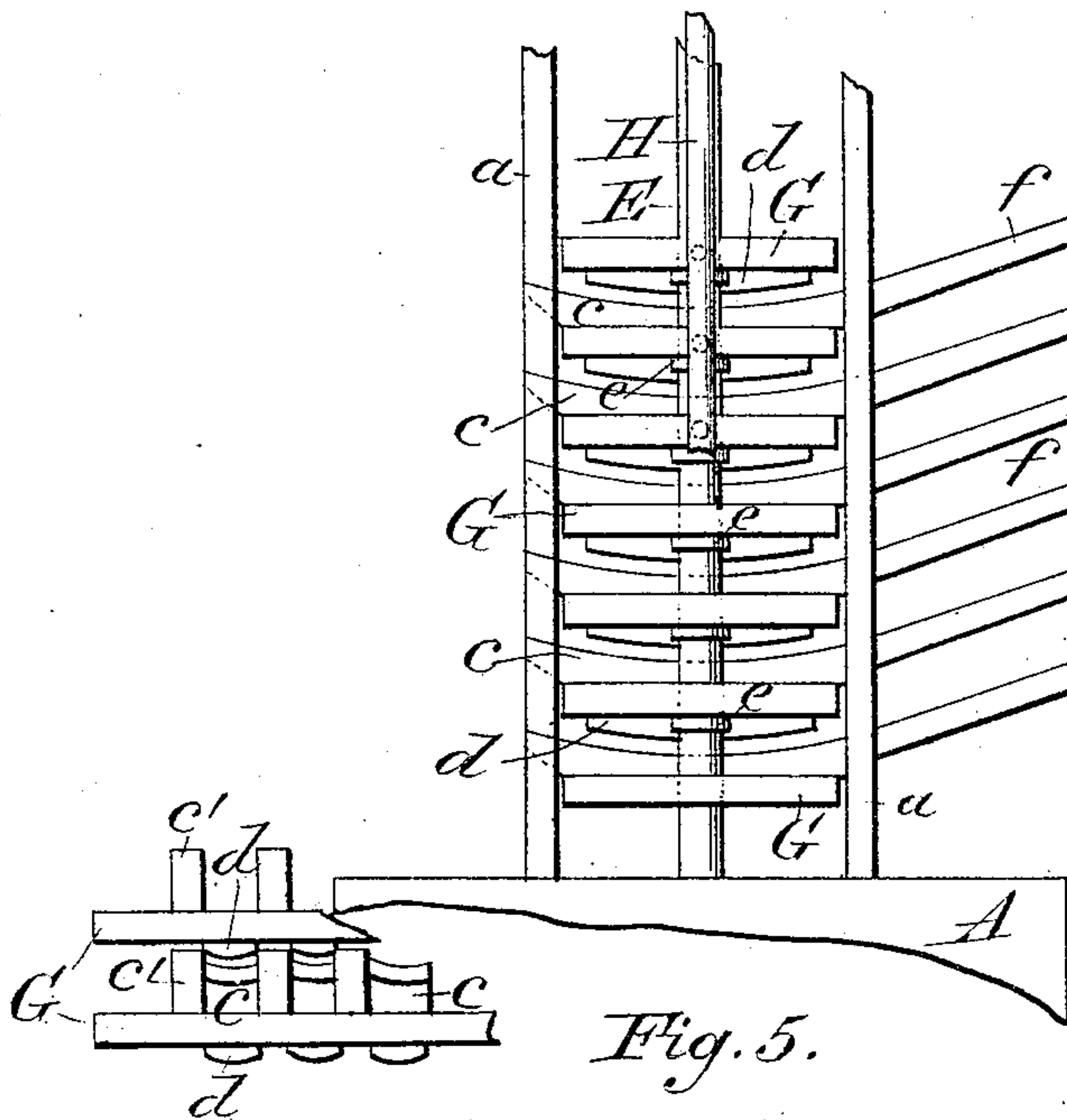


Fig. 5.

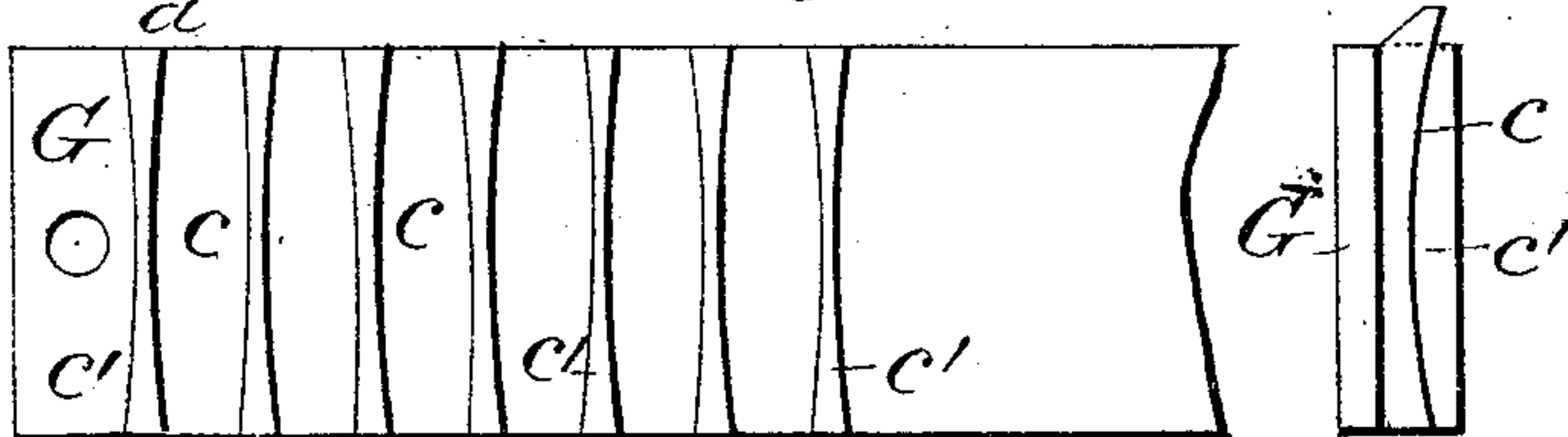


Fig. 6.

Fig. 7.



Attest:

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A. R. Brown

Inventor:

Heenan S. Smith
per J. C. Parker

UNITED STATES PATENT OFFICE.

HEMAN S. SMITH, OF BROOKLYN, NEW YORK.

STAVE BENDING AND DRYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 250,593, dated December 6, 1881.

Application filed April 19, 1881. (No model.)

To all whom it may concern:

Be it known that I, HEMAN S. SMITH, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Machines for Drying and Forming Staves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to that class of machinery employed in preparing staves for the manufacture of various articles of coopers' ware, the object being to produce staves that shall be perfect in curvature, both diametrically and longitudinally, with the vessel of which each stave forms a part, from the ordinary flat and straight stave as it comes from the stave-cutting machine, without the intervention of dressing-machines, or other means of reducing the stave to the required shape by removing a portion of its substance, as is the usual practice of coopers at the present time.

It will be apparent that when the stave may be cut from the log no thicker than the finished article as ready for inserting into the vessel of which it is to form a part a great saving of material will be effected, as under the ordinary system of cutting the stave at least one-third thicker than the finished article, to allow for material to be cut away in order to give the desired curve to the stave, a great waste of material must necessarily follow, and even after the stave has been cut to a curve corresponding to an arc of the radius of the vessel it still remains a straight piece of wood and must be bent to the longitudinal curve of the barrel or other vessel by mechanical means. To avoid these difficulties I place the stave or blank as it comes from the cutting-machine between heated dies having a face curvature corresponding both longitudinally and diametrically with that of the vessel of which the stave is to form a part; then by the application of a powerful pressure the wood is made to take the desired form, which it retains without material alterations until it is placed in its

proper position in the vessel and secured in place by the hoops.

My invention consists in a stave-pressing machine so constructed as to be capable of permanently imparting the desired double curvature to a stave at one operation, as hereinafter more fully described.

In the accompanying drawings, Figure 1 is a side view of the stave-press. Fig. 2 is a vertical section on the line *xx* of Fig. 1. Fig. 3 is a sectional view of one-half the bed-plate, taken on the line *yy*. Fig. 4 is an end view of the press, showing the method of attaching the steam-pipes by which the dies are heated. Fig. 5 is a plan view of a die-plate. Fig. 6 is a perspective view of one of the staves or blanks as it comes from the cutting-machine, and Fig. 7 is a similar view of the stave after passing through the press.

In constructing this machine a heavy bed-plate, A, is formed with a rectangular recess through it for the reception of the press-platen B, to which is attached the piston C, working in the hydraulic-press cylinder D.

Connected with the bed A by the vertical guide-rods E and bars *a* is the cap F, of sufficient strength to withstand the great force of the press-piston, which in a large machine amounts to many tons. In resisting this force the cap is greatly assisted by the bars *a*, which are placed in a series at short distances apart along each of its sides. The ends of these bars being T-headed at both ends, their lower ends are embedded in slots *a'*, formed for their reception in the bed plate, and their upper ends enter corresponding receptacles in the cap F. A series of vertically-movable die-plates, G, are placed one above the other within the space or cage formed by the bars *a* over the press-platen, and are guided in their movements by the guide-rods E. As each die-plate has only a limited movement on these guide-rods, and as each one must occupy a certain position when the press is open, collars *e* are placed on the rods E in such places as are necessary to arrest the downward movement of each die-plate in its proper place. The die-plates are thus supported on the guide-rods E in such a manner as to have a free vertical movement in opening and closing the press. The die-plates G are made hollow, in order that steam, hot

water, or other heating-fluid may be introduced to heat the dies which are attached to them. This heating-fluid may be introduced in different ways; but I prefer to do it by means of an apparatus (shown in Figs. 1 and 4) in which the stand-pipe H receives the heating-fluid, and from this stand-pipe it is conveyed to the several die-plates through the flexible pipes *b*. By this arrangement the flow of the heating-fluid through the die-plates will be uninterrupted, no matter what their position within the press may be. It is sometimes advisable to have a similar system of pipes at each end of the press, so that a steady circulation through the die-plates may be maintained. Upon these die-plates are placed the forming-dies *c*, while attached to their under sides are the reverse dies *d*. These dies have their adjoining or corresponding surfaces made to the exact shape of the proposed stave, so that when the latter is pressed between them it is forced to take the curvature in all directions needed to make it fit its place in the barrel or other vessel of which it is to form a part.

Between the dies *c*, and extending across the die-plates *G*, are secured stops *c'*, which are slightly thicker than the dies, and by coming in contact with the plate above distribute the pressure equally throughout the machine, so that the upper layers of staves will be compressed equally with those resting between the lower dies. Attached to the bars *a* on one side of the machine, and coincident in position with the dies *c* when the press is open, are curved tables *f*, which serve as guides for the reception and introduction of the staves to their places within the press. These tables may be attached directly to the dies *c*, if desired.

The operation of these devices is very simple. The die-plates and dies being dropped to their lowest positions, so as to open the press, and the whole being heated to the proper point, the stave-blanks, as they come from the cutting-machine, are immediately introduced to their proper places upon all the dies *c*, either by hand or by a mechanically-operating apparatus that will force them all into place at one operation. The stave-blanks being in place, water is forced into the press-cylinder, and the platen, with the several die-plates, the dies, and staves, are raised until the whole is forced solidly against the under surface of the cap *F*, the pressure being maintained until the staves are dry, when they will be found to have assumed permanently the shape of the dies. When the pressure is relaxed, so as to allow the platen and die-plates to fall and open the press, another supply of stave-blanks is introduced, which force the compressed staves before them

and take their places upon and between the dies, the finished staves dropping from the press on the side opposite to that where they entered. The stave thus formed, when a proper blank is used, requires no further manipulation or dressing, and possesses the necessary longitudinal and diametrical curvature to enable it to assume and fit perfectly in its proper place in the vessel for which it is intended.

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

1. The method of compressing and drying staves at one operation, which consists in subjecting the stave-blank to pressure in contact with heated dies applied to both surfaces thereof, said dies being provided with the necessary longitudinal and transverse curves at their ends and center corresponding with those to be imparted to the stave, whereby said stave is permanently curved, to adapt it to fit its place in a barrel or other article of coopers' ware, substantially as described.

2. In a machine for compressing staves, the combination of a recessed bed-plate, vertical side bars secured thereto and supporting a cap-plate, vertical guide-rods, and die-plates moving vertically upon said rods and provided with suitable dies having stops *c'* alternating therewith, substantially as set forth.

3. In a machine for compressing staves, a hollow die-plate provided upon its upper and lower surfaces with dies of suitable curvature, and adapted to be heated by introducing steam or hot water within the hollow portion of the same, substantially as described.

4. In a machine for compressing staves, the combination, with the bed-plate *A*, cylinder *D*, side bars, *a*, cap-plate *F*, tables *f*, and guide-rods *E*, having collars *e*, of the piston *C*, platen *B*, and hollow die-plates *G*, having dies *c d* and stops *c'*, said hollow die-plates being supplied with a heating medium and adapted to move vertically upon the guide-rods for the purpose of compressing the staves, substantially as shown and described.

5. In a machine for compressing staves, the combination, with the hollow die-plate *G*, having dies *c d*, of the stand-pipe *H* and flexible pipes or connections *b*, whereby steam or hot water may be conveyed to the interior of said die-plates, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

HEMAN S. SMITH.

Witnesses:

F. H. SCHOTT,
CHARLES P. WEBSTER.