(No Model.) 3 Sheets—Sheet 1.

J. MacFARLANE.

MACHINE FOR MAKING HOLLOW CYLINDERS OF STRIPS OF SHEET MATERIAL AND THE PROCESS THEREOF.

No. 483,742. Patented Oct. 4, 1892.

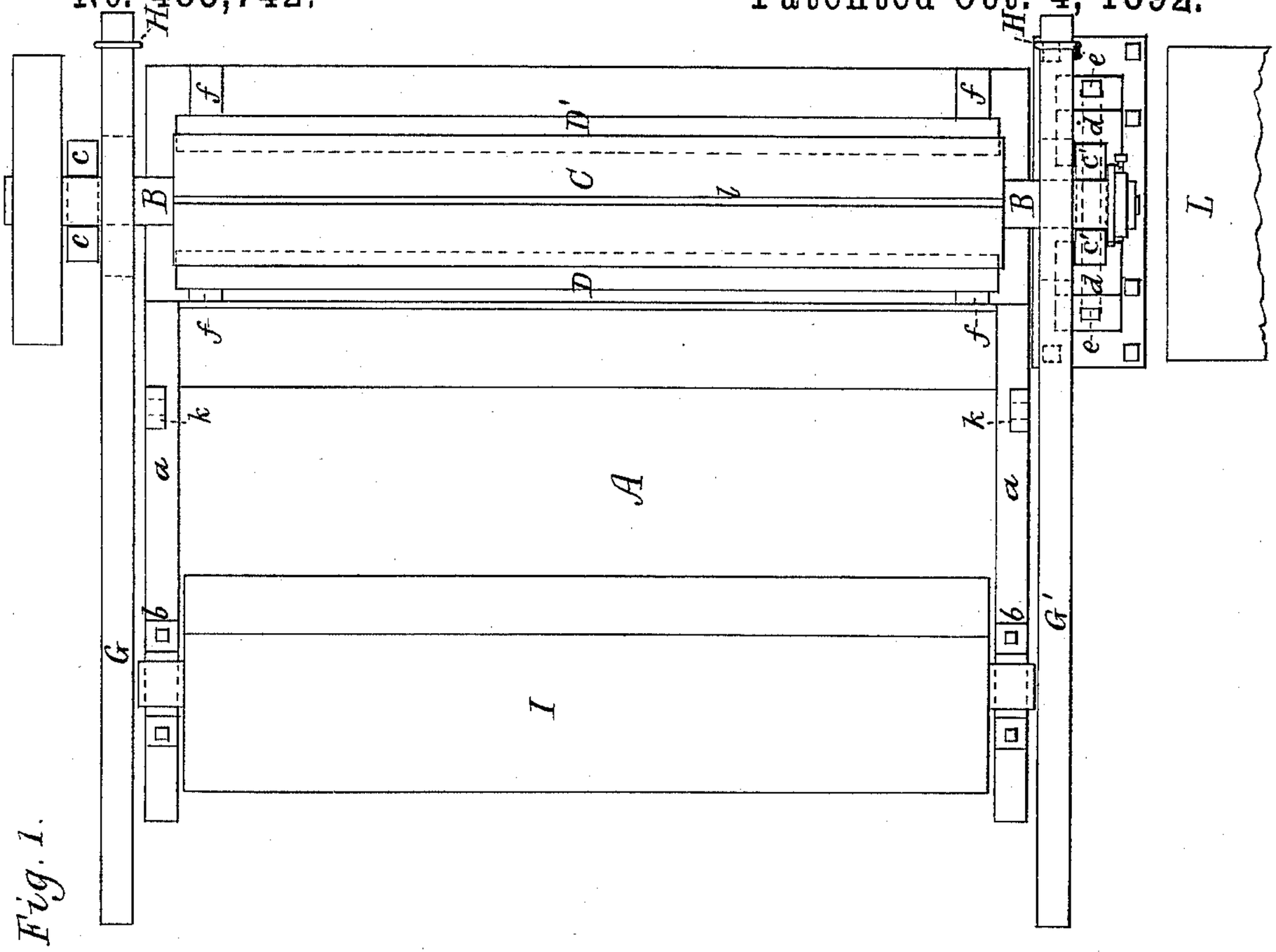
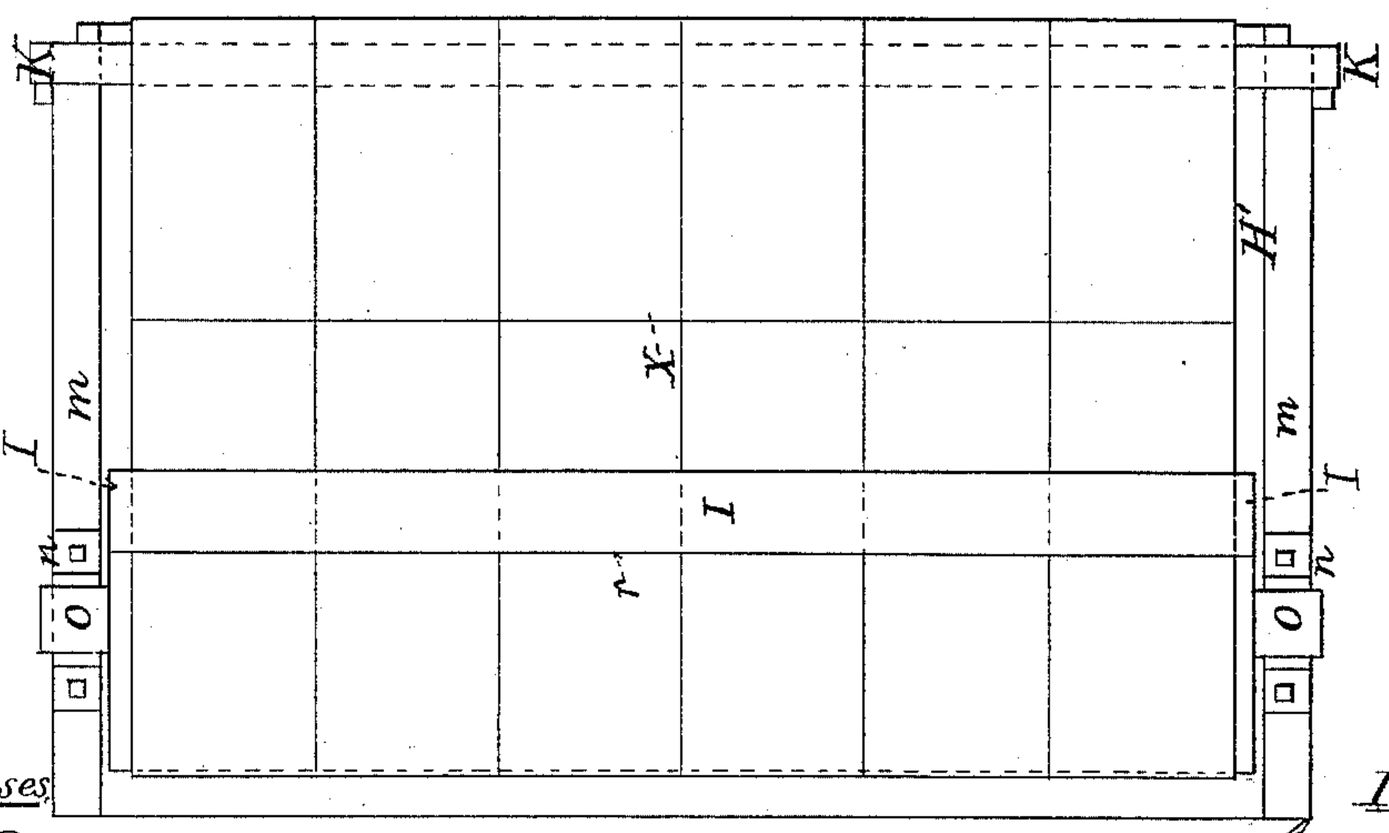


Fig. 1.



Witnesses,
W. E. Piper
A. F. Piper

Inventor.
James Mac Farlane
by S. N. Piper, atty.

(No Model.) 3 Sheets—Sheet 2.

J. MacFARLANE.

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No. 483,742. Patented Oct. 4, 1892.

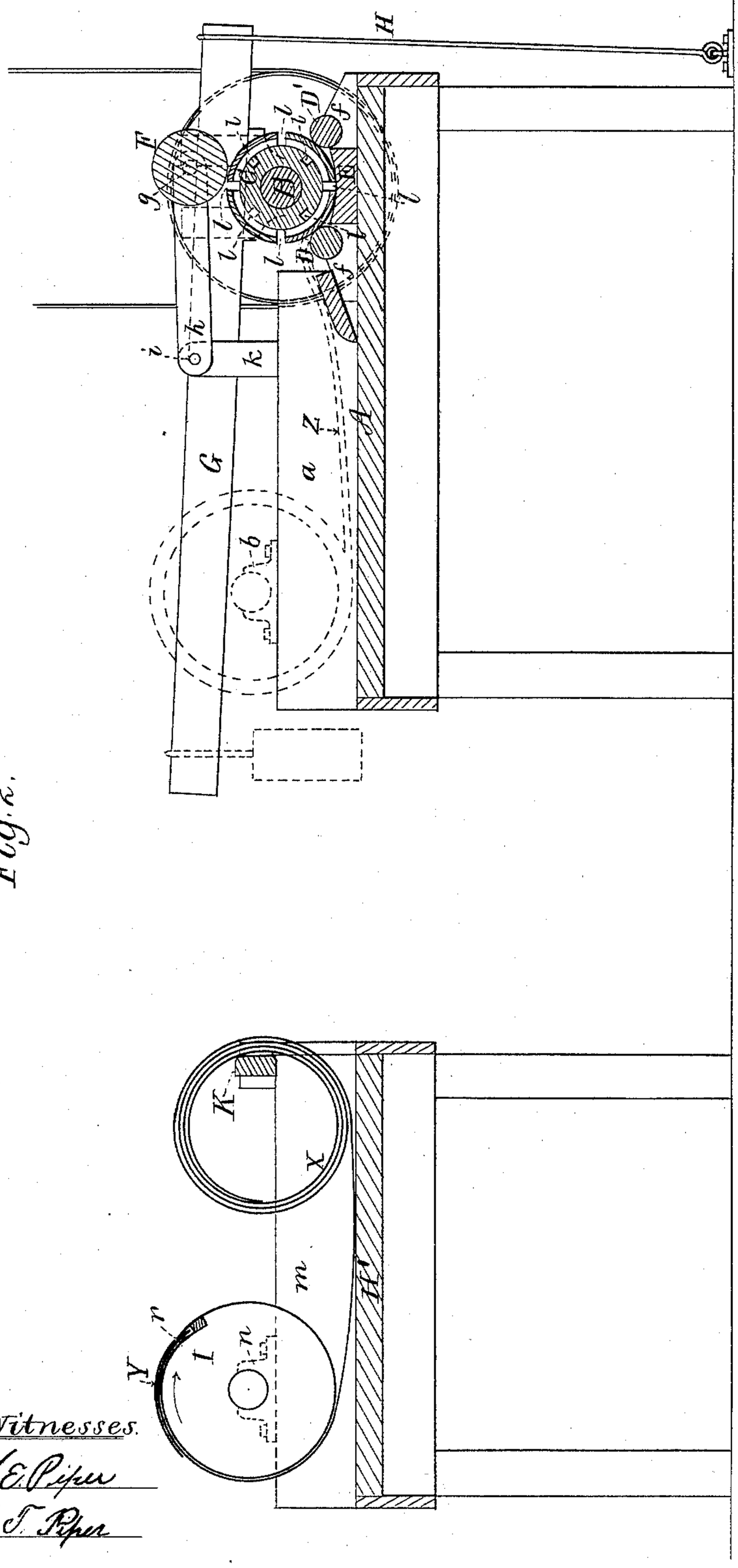

Fig. 2.

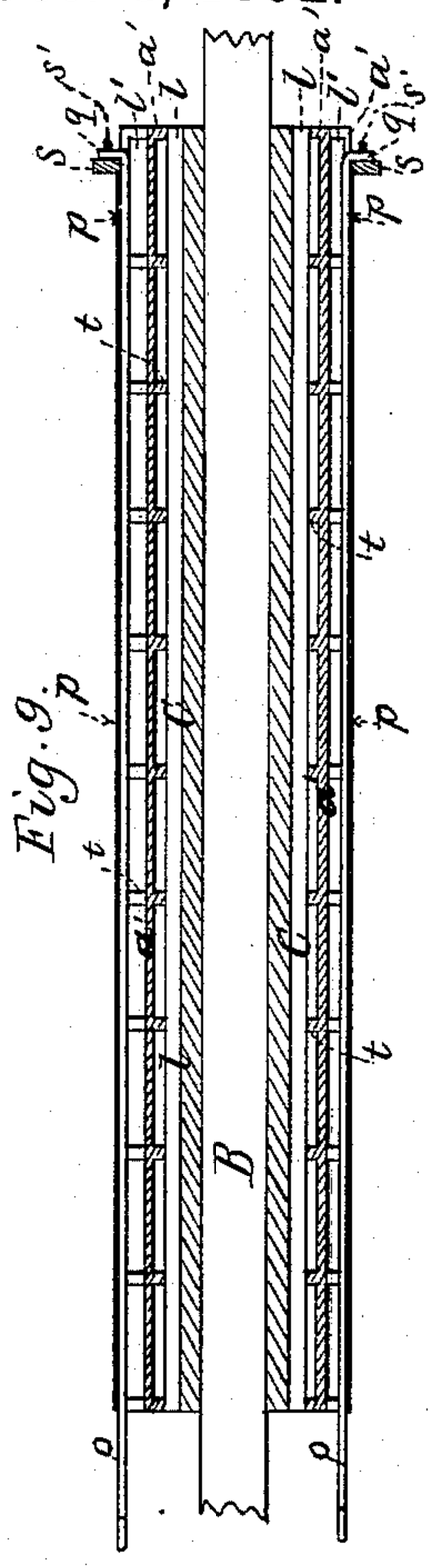

Fig. 9.

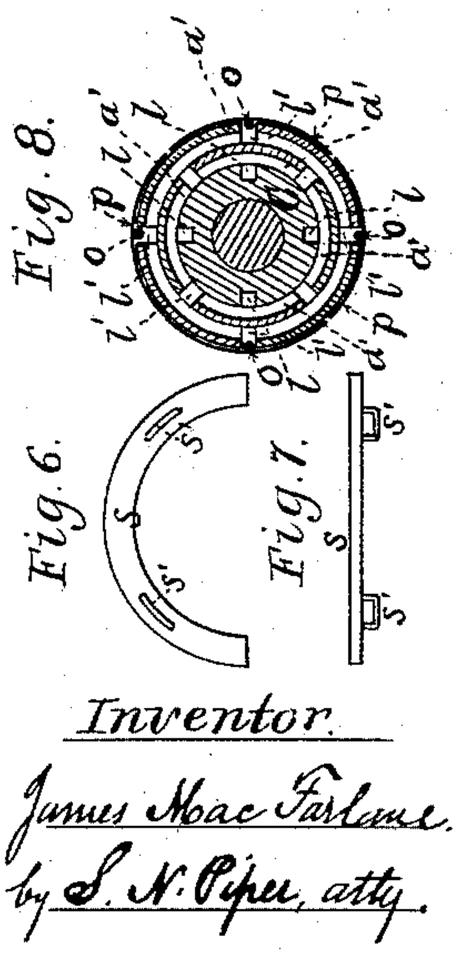

Fig. 8.

Fig. 6.

Fig. 7.

Witnesses.
W. E. Piper
A. T. Piper

Inventor.
James MacFarlane.
by S. N. Piper, atty.

(No Model.) 3 Sheets—Sheet 3.

J. MacFARLANE.

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Fig. 3.

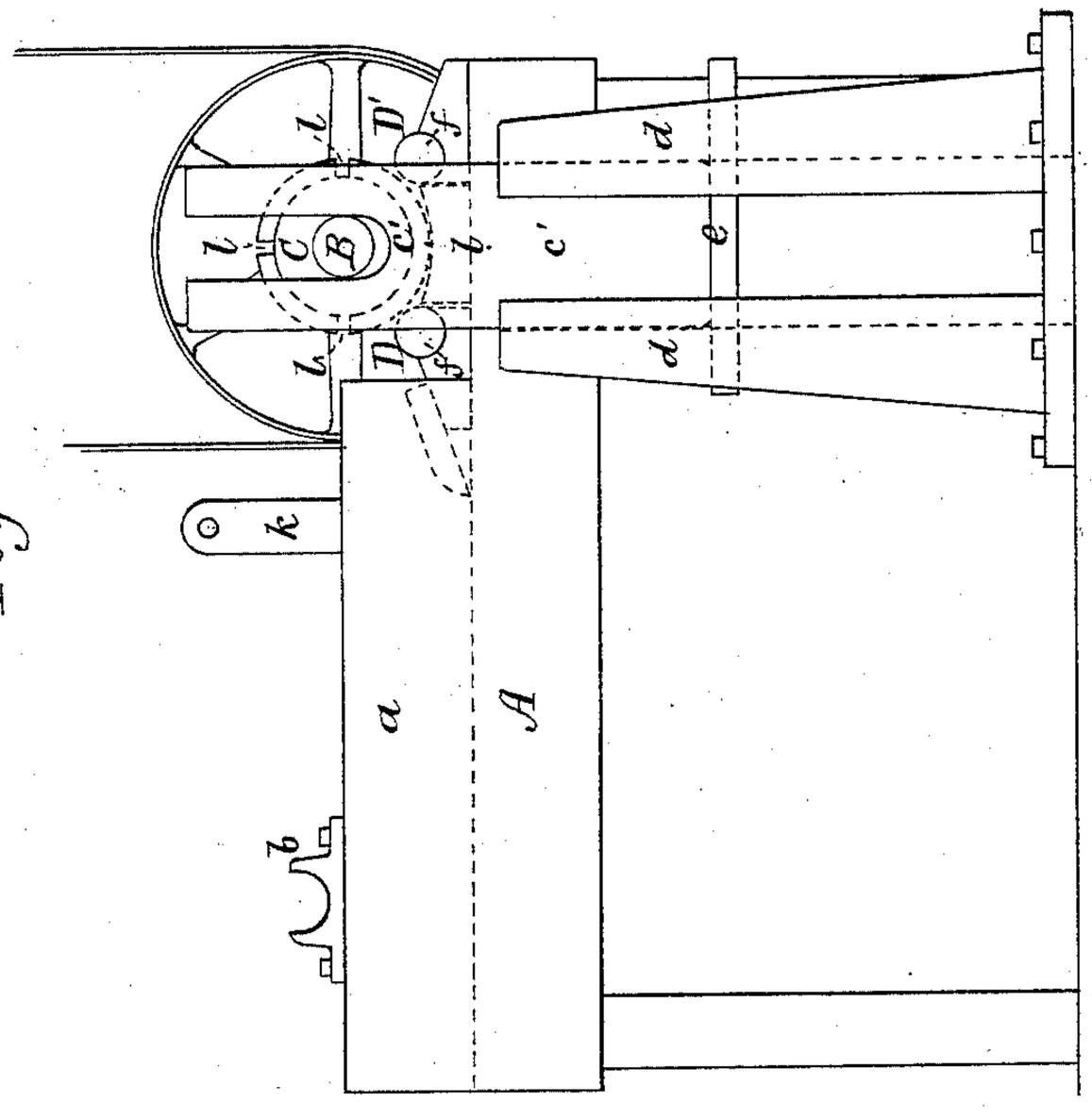

Fig. 4.

Fig. 5.

Witnesses.

W. E. Piper

A. F. Piper,

Inventor.

James Mac Farlane.

by S. N. Piper, atty

UNITED STATES PATENT OFFICE.

JAMES MACFARLANE, OF MALDEN, MASSACHUSETTS.

MACHINE FOR MAKING HOLLOW CYLINDERS OF STRIPS OF SHEET MATERIAL AND THE PROCESS THEREOF.

SPECIFICATION forming part of Letters Patent No. 483,742, dated October 4, 1892.

Application filed October 14, 1890. Renewed August 27, 1891. Again renewed March 7, 1892. Serial No. 424,092. (No model.)

To all whom it may concern:

Be it known that I, JAMES MACFARLANE, a citizen of the United States, residing at Malden, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Machines for Making Hollow Cylinders of Strips of Sheet Material and the Process Thereof; and I do 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 of reference marked thereon, which form a part of this specification.

Figure 1 represents a top view, Fig. 2 a transverse section, and Fig. 3 an end view, of a machine devised by me for producing a hollow cylinder of a series of strips of sheet material, as hereinafter explained. Such other figures as are necessary to a clear illustration of my invention will be hereinafter referred to.

The nature of my invention is defined in the claims hereinafter presented.

In the drawings, A denotes a long bench or table, extending above the top surface of which are supports *a a*, provided with shaft-bearings *b b*. Arranged above the table near to one side of it and projecting beyond it at each end is a shaft B, supported in furcated bearings *c c'* to admit of variation in altitude of said shaft, as will be hereinafter explained. The shaft B is the mandrel-shaft, which receives motion by belt-power and sustains the mandrel C, applied to and fixed to it, so as to turn with said shaft. The bearing *c'* of the mandrel-shaft is sustained in grooved standards *d d*, the lower end of said bearing resting on a bar *e*, supported in holes (not shown) in said standards, and by withdrawing said bar *e* the bearing *c'* can be lowered, so as to be out of the way, when it is desired to apply the mandrel to or remove it from the shaft B or while removing a cylinder from the mandrel. The mandrel bears at its periphery and throughout its length on friction-rolls D D', supported in bearings *f f*, and it also bears or nearly touches a bed E, arranged below it and between the said friction-rolls. A press-roll F, maintained in position above the mandrel by having its journals *g* arranged in arms *h*, pivoted at *i* to standards *k*, erected on the supports *a*, also bears on the periphery of the mandrel. (See Fig. 2.) Levers G G', arranged to bear on the mandrel-shaft near its ends, have their shorter arms connected by links H to the surface on which the bench is supported or to said bench, as may be preferred. By applying weights to the longer arms of said lever great pressure can be produced on the mandrel during the winding of a series of strips thereon.

The mandrel is provided throughout its length with grooves *l*, as represented, the purpose of which is to receive rods *o*, secured to sheet-metal shields *p*, each of which covers a quarter of the periphery of the mandrel transversely of it and throughout its length.

H' represents a table or bench arranged at a convenient distance from the bench A, said table H' being provided at its ends with supports or uprights *m*, which sustain bearings *n* for the journals of a cylinder I. (See Figs. 1 and 2.) A bar K is also sustained on the uprights *m*, the office of which is hereinafter explained. Arranged in prolongation of the axis of the mandrel is a table L, the length of which is not less than that of the mandrel, an end of said table being represented in Fig. 1.

In preparing for the formation of a cylinder by the mechanism hereinbefore explained I first take a series of thin strips of wood or other suitable fibrous sheet material of the proper dimensions and immerse them in a bath of liquid asphaltum, and after they have remained therein long enough to become thoroughly saturated they are removed from the bath and allowed to dry. For convenience in handling and supporting some of said strips—viz., those that are to be wound around the cylinder I are usually coiled before being subjected to the asphaltum bath; but such is not necessary. Next a series of said strips, when coiled, as shown at X, are placed edge to edge on the bar K of the bench H and their outer ends carried under the cylinder I and brought up over the same and entered into a groove *r* therein. Next a strip Y is laid on and across the series of strips X and is tacked to each one. Next the cylinder I is turned to bring the strips X into position to receive an-

other strip Y, which is laid edge to edge with the strip Y before mentioned and tacked to each strip X, as before. This operation is continued until a compound strip Z of the required length is formed, wound on the cylinder I, and consisting of the series of strips X and Y, secured to each other, the grain of the series Y crossing that of the series X at right angles, or thereabout. Fig. 4 represents a top view of said compound strip, and Fig. 5 a section of the same. This part of the operation being completed, the cylinder I, with the said strips upon it, is removed from its bearings *n* and immersed in a bath of hot water to soften the strips and render them pliable. Next said cylinder I is placed with its journals in the bearings *b* of the bench A and the outer end of the strip Z is entered between the mandrel and the inner friction-roll D, as shown in Fig. 2. The mandrel before the winding of the said strip thereon is first covered by strips or shields *p* of sheet metal, which in length are each equal, or thereabout, to that of said mandrel, and transversely each shield covers a quarter of the periphery of the mandrel, and said shields are each secured to rods *o*, the latter laid in the grooves *l* of the mandrel. The ends *q* of said rods *o* farthest from the table L are bent at right angles, or about so, to the rest of the rods, and said bent ends *q* are arranged to bear against the outer faces of half-rings S, the inner peripheries of which correspond, or about so, to the circumference of the mandrel. Fig. 6 is a side view, and Fig. 7 an edge view, of one of said half-rings. Fig. 8 is a transverse section, and Fig. 9 a longitudinal section, of the mandrel, showing the shields, rods, and half-rings applied thereto. The mandrel having been prepared to receive the compound strip Z, as explained, is put in revolution and the said strip wound thereon, it passing between the mandrel and the friction-roll D, bed E, roll D′, and press-roll F, as indicated in Fig. 2, and after said strip has been wound once around the mandrel the exterior of said wound portion and the inner surface of said strip are coated with waterproof cement, and as said strip continues to wind thereon the mandrel will rise in its forked bearings. When the winding of the strip is completed, the outer edge or end of it is properly secured to the cylinder, the lever G′ is elevated high enough to allow of the passage of the cylinder under it, and the furcated bearing *c′* is lowered in its standards. Power is then applied to the ends of the rods *o* and the half-rings S drawn against the adjacent end of the cylinder and the cylinder drawn from the mandrel onto the tables L. The rods and shields are next removed from the cylinder and applied to the mandrel, as hereinbefore explained, which is now ready to receive another compound strip. This completes the forming of a cylinder of a series of strips in accordance with my improvement. Next said cylinder is coated both inside and outside with a mixture of waterproof cement, pulverized mica, and asbestus, which will render said cylinder both water and fire proof. Furthermore, cylinders of different diameters may be produced in said machine by varying the size of the mandrel, as follows: The smallest mandrel is made cylindrical and tubular, is slid on and secured to the shaft B, and is provided with the exterior longitudinal grooves *l*, as represented in the drawings; but the sizes larger are produced by securing lags *a′* to the exterior of the mandrel for the next size and next securing other lags to the first series of lags for the next larger size, and so on, as shown in Fig. 8, which is a transverse section of an enlarged mandrel. The lags for each size are four in number, each made in cross-section enough less than a quarter-circle to form between each two adjacent lags when secured in position a space *l′* sufficient to receive the rods *o*. The lags are each provided at short intervals throughout their length with transverse ribs *t* to strengthen the same and prevent them from warping. Furthermore, each half-ring S on its outer face is provided with a loop S′ to receive the turned-up end of the rod *o* to connect the two.

What I claim is—

1. A machine, substantially as described, for winding a strip composed of a series of strips of fibrous sheet material to form a hollow cylinder, said machine consisting of a bench or table, a mandrel-shaft, a grooved cylindrical mandrel applied to the latter, shields and rods applied to the mandrel and grooves, friction-rolls D D′, a concave bed between them, a pressure-roll, and levers G G′, adapted to force the strip while winding on the mandrel into contact with the friction-rolls and bed, all arranged to operate essentially as represented and explained.

2. A machine for winding a strip composed of a series of strips of fibrous sheet material to form a hollow cylinder, said machine consisting of a bench or table, a mandrel-shaft, a grooved cylindrical mandrel supported on and fixed to said shaft, the friction-rollers D D′, a concave bed between said rollers, a pressure-roll F, levers G G′, adapted to force the mandrel toward the friction-rollers and bed, and a cylinder for supporting the compound strip while being wound on the mandrel, essentially as set forth and represented.

3. In a machine for winding a strip composed of a series of strips of fibrous sheet material, a cylindrical mandrel having its periphery grooved longitudinally, a shaft upon which the same is mounted, the curved shields around the periphery of the mandrel, rods fitted in the grooves of the mandrel, and the half-rings connected with the rods, resting against the end of the cylinder to remove the cylinder from the mandrel, substantially as herein described.

4. A mandrel consisting of a grooved and cylindrical body and one or more series of lags, the first series being secured to the man-

drel and each succeeding series to that series on which it is placed and fixed, the outer curved surface of said lags in cross-section being somewhat less than a quarter of a circle, in combination with rods extending longitudinally through the body, substantially as and for the purpose explained.

5. The process of preparing and arranging a strip composed of a series of strips of any fibrous sheet material to form a hollow cylinder, substantially as described, consisting in first subjecting each strip of the series to a bath of liquid asphaltum, next drying the same, next arranging a sufficient number of said strips edge to edge until their combined width shall be equal to the required length of the cylinder, next applying and securing to said series another series of strips arranged edge to edge, the grain of the one series crossing that of the other series, next subjecting the compound strip to a bath of hot water to render it pliable, next winding said compound strip on a mandrel, waterproof cement being applied to those parts of the surface of said strip that come in contact while winding, next drawing said cylinder off the mandrel when wound, as explained, and coating the said cylinder inside and outside with waterproof cement, pulverized mica, and asbestus, essentially as set forth.

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

JAMES MACFARLANE.

Witnesses:
S. N. PIPER,
E. DILLINGHAM.