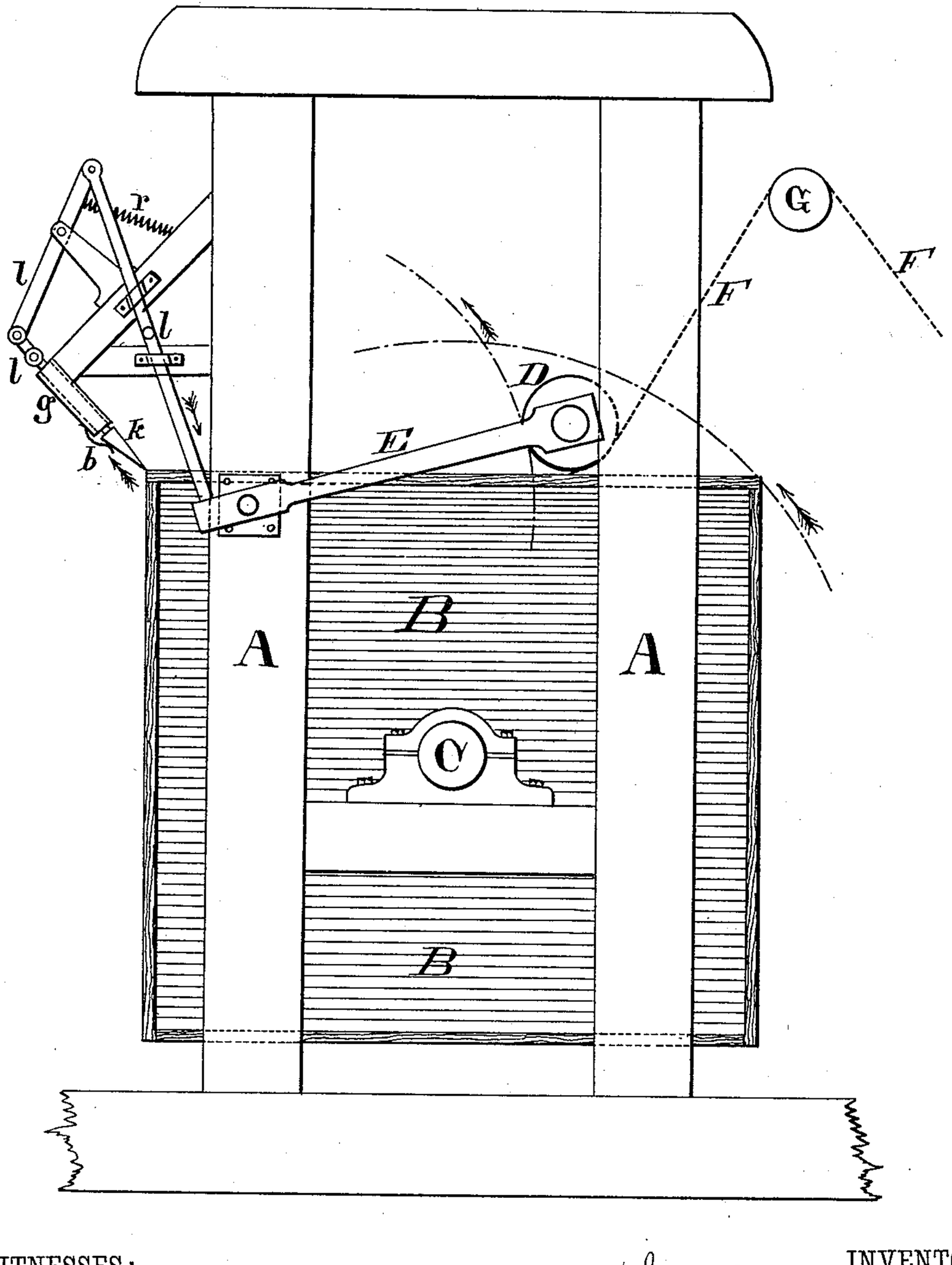
(No Model.) 2 Sheets—Sheet 1.

G. C. LAWRENCE.

MANUFACTURE OF VULCANIZED FIBER AND SIMILAR MATERIALS.

No. 336,330. Patented Feb. 16, 1886.

Fig. 1.



WITNESSES:
Gunvald Aas.
Franklyn S. Rouse

INVENTOR
George Clayton Lawrence
BY
Wyllys Bodgkin
ATTORNEY

(No Model.) 2 Sheets—Sheet 2.

G. C. LAWRENCE.

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Fig. 2.

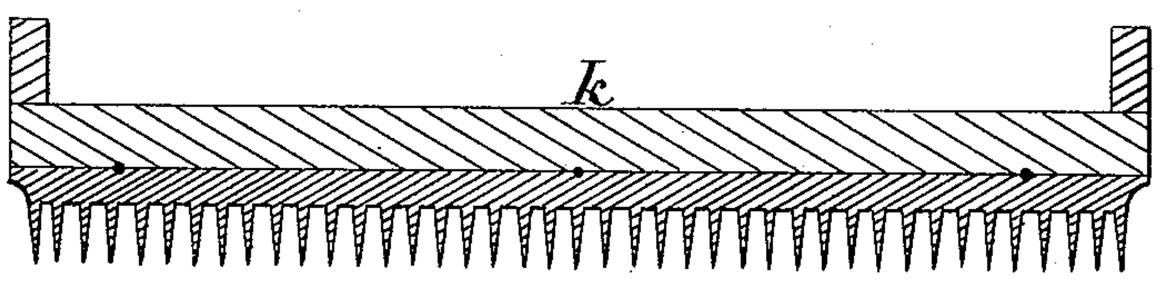


Fig. 3.

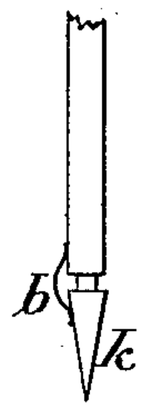
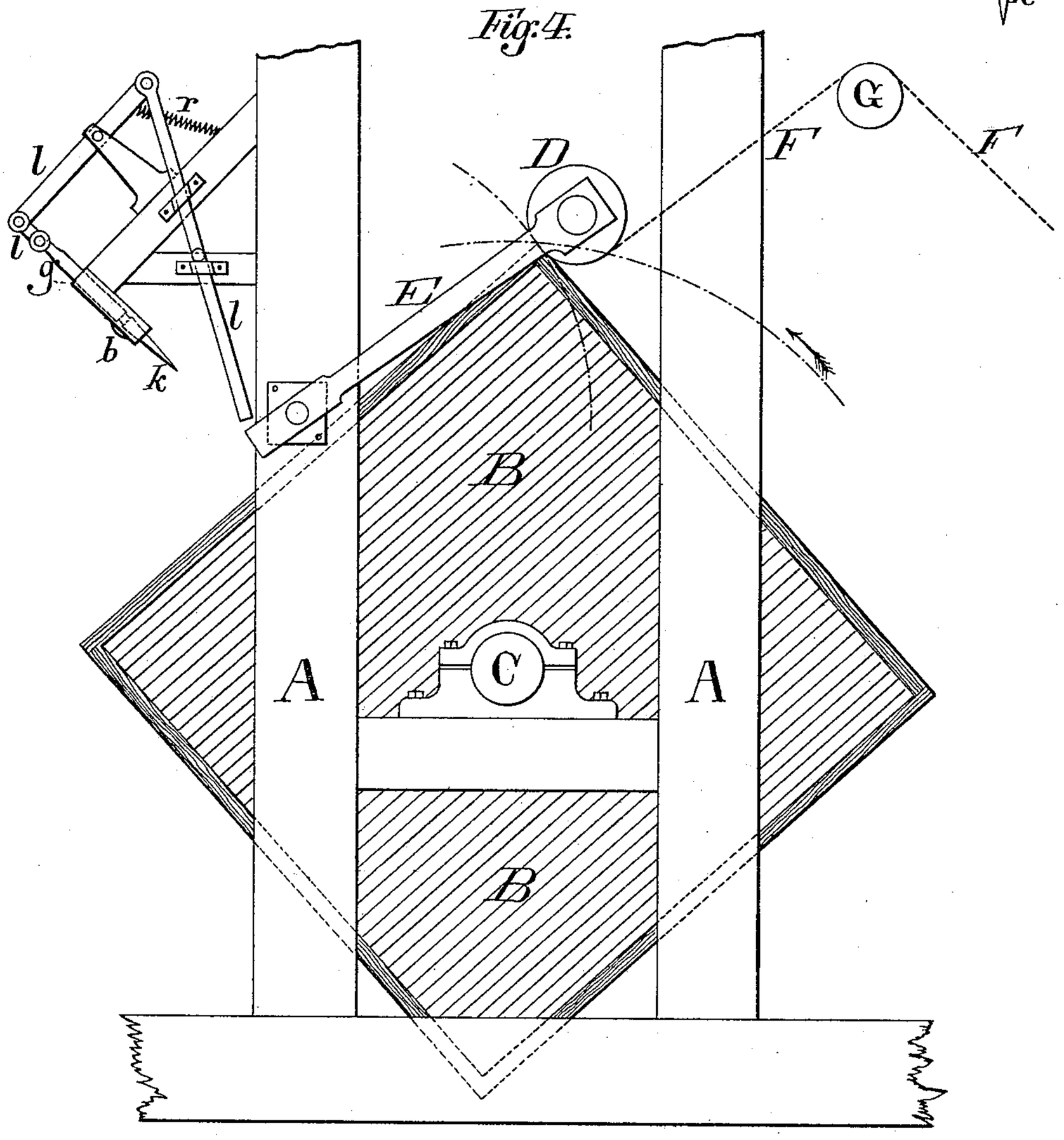


Fig. 4.



WITNESSES:
Gunvald Aas.
Franklyn S. Rouse.

George Lawrence INVENTOR

BY
Wyllys Hodges Lee
ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE CLAYTON LAWRENCE, OF BROOKLYN, NEW YORK.

MANUFACTURE OF VULCANIZED FIBER AND SIMILAR MATERIALS.

SPECIFICATION forming part of Letters Patent No. 336,330, dated February 16, 1886.

Application filed January 9, 1885. Serial No. 152,393. (No model.)

To all whom it may concern:

Be it known that I, GEORGE CLAYTON LAWRENCE, 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 the Manufacture of Vulcanized Fiber and Similar Materials, and in the Machinery Connected Therewith, of which the following is a specification, portions of which will be better understood by reference to the drawings, in which—

Figure 1 is an end elevation of a machine showing the general features of my improvement. Fig. 2 is a side view, and Fig. 3 an end view, of one of the details hereinafter described, and Fig. 4 is a view similar to Fig. 1, but showing the machine in a different position.

Similar letters refer to similar parts in the different figures.

My improvements relate to the manufacture of vulcanized fiber, gelatinized fiber, and other goods wherein a single web of thin cohesive material is converted into a thick sheet by reeling it upon itself, so that the successive convolutions of the web upon the reel unite to form a thick continuous or endless sheet of manufactured goods, which can afterward be cut open to form a flat sheet, and then cut into sizes to suit the demand; and my improvements are applicable to the manufacture of such goods whether the thin web is originally cohesive, or is rendered so by chemical treatment by the addition of some adhesive material or otherwise.

As all my improvements are applicable to the manufacture of the material known as "vulcanized" fiber I will describe the process used at present in such manufacture, and will then describe the changes I propose to introduce therein.

At present a thin web of paper is usually drawn through a bath of chloride of zinc in solution, then passed over a tension device, which regulates the drawing of the web upon the reel, then over a large heated cylinder and between it and a second cylinder, upon which it is then reeled until its successive convolutions form a continuous sheet of sufficient thickness. The web is then cut before it reaches the cylinders, which are, however, afterward allowed to revolve a considerable time for the purpose of completing the chemical action of the chloride and more thoroughly uniting the material, the weight of the upper cylinder, which is generally very heavy, pressing the material between itself and the reel, and, it is supposed, "kneading" the fibers together, so that they unite more firmly. The upper or kneading cylinder is also heated to increase the chemical activity of the chlorides. The goods are then cut from the cylinder and undergo other well-known treatment.

Others of my improvements relate, however, to any kind of multifold goods which are thus made by reeling. It will be seen that in any reel thus formed upon a round surface and afterward cut open and spread flat, the under side or that which was nearest the reel will be shorter than the upper side, and the sheet will have a tendency to buckle or warp. In vulcanized fiber and goods treated with chloride of zinc, sulphuric acid, sulphate of zinc, or any of their equivalents, not only is this tendency to warp increased by the astringent or contracting action of the chemicals, but particularly in sheets of great thickness other evils are introduced, some of which are well understood and others not. I propose to remedy this by multifolding the goods upon a flat instead of a round surface, and this I accomplish by substituting for the round or cylindrical reel a flat-sided one, consisting of a triangular, square, or many-sided prism, (or it might have only two sides.) Although the under side of the sheet will then still be the shortest, yet as all the inequalites produced will be at the angles, and not distributed through the sheets, the evils will be largely avoided, and as the sheets are punctured at these angles by certain mechanical devices, afterward described, the improvement is still further secured.

I now proceed to describe a machine embodying this improvement as shown in the drawings.

A A is a standard or frame.

B is a square-sided prism or reel, whose journals C have bearings carried by the frame, and through these journals the reel is moved by any suitable power. It is made of cast-iron properly placed and finished, or of other material suitable to the work to be done upon it.

D is an air-excluding roller of similar material and sufficiently heavy to exclude the air from between the folds of the goods. The roll D is journaled in the free end of two levers pivoted near their other ends to the standard A. Roll D is therefore free to rise and fall as the reel revolves, and care must be taken to pivot the arms E at such a point as to give roll E a path which will make its pressure on the reeled goods as nearly uniform as possible. This is a matter of mathematical calculation purely. Roll D can, however, move only in the arc of a circle, and it may therefore be desirable to dispense with the levers, and let the journals of the roll D move freely in slotted bearings. As any desired curve can be given to such slotted bearings, it is obvious any desired path can be given to the roll, and the most perfect uniformity of its action secured.

F is the web, which comes from a chemical bath or other source to the right, and passes over a roll, rod, or other device at the point G down between roll D and the reel, and is taken up and reeled on the latter.

It will be seen that if the web did not pass over roll G, but came from a much lower point directly onto the reel, the whole of one of the flat surfaces of the reel would strike the web at once, and before the roll D could act upon it and drive out the air. The object of the roll G is therefore to feed the web to the reel in such a direction that it shall first touch it under the roll D, and shall be brought gradually in contact with the reel, so that roll D can perform its full functions of squeezing out the air between the folds. Roll G must therefore be so located as to secure this object, and may be either a simple roller or a tension-regulator, or a "scraper" to remove the surplus chemicals from the web.

A further improvement I make by providing a device for puncturing the reeled sheet at the angles at every or at occasional revolution of the reel. This is done by a knife. (Shown in detail in Figs. 2 and 3.) Its position and operation in the machine are shown in Fig. 1, where it is indicated by the same letter, *h*. It is to be so supported as to move in guides *g*, supported by an arm of the standard, its motion being radial to the reel, and the knife itself parallel to the axis of the latter. It is actuated by a link motion consisting of levers *l l l*, which are so proportioned that lever E coming in contact with them will force the knife quickly forward precisely at the time the angle of the reel is opposite to it. As the lever E then reverses its movement, the spring *r* will withdraw the knife.

The knife might be moved forward by its own weight, and withdrawn by a cord passed over pulleys and moved by the rise and fall of the roll D, and it is apparent that the gearing for operating it might be varied to a great extent.

The edge of the knife I prefer to provide with teeth such as shown in Fig. 2, so that the goods will be simply punctured; but it might have a plain knife-edge, so as to make a clean cut.

In order that the knife may not tear the goods before it is withdrawn in the continuous motion of the reel, I give it a spring-connection with its supports, which is shown in Fig. 2, where *b* is a spring allowing the knife to yield in the direction of the motion of the reel.

Having thus described my invention, I further define and claim it as follows: It is obvious that the flat-sided reel is an improvement in sheet reeled goods of any character, whatever method may be adopted for uniting them into a solid sheet, and that the puncturing of the goods at intervals during the process of reeling does not depend, essentially, on the character of the mechanism which does the puncturing, and also that the parts of the machine might be so adjusted as to feed the web over and around the roller D in contact with it in the manner employed in the process now used. I add, also, that the drawings annexed to this specification are not made to a scale, and are not intended to represent the relative size and weights of the rollers, which must be proportioned to suit the judgment of the manufacturer in the different processes which may be employed.

I therefore claim as my invention—

1. In a machine for the manufacture of vulcanized fiber and similar goods, the combination of a flat-sided reel, adapted to the manifolding of the successive convolutions of the web, with a roller of sufficient weight to exclude the air from between the rolls, or of greater weight, substantially as described.

2. The knife or puncturing-instrument *k*, in combination with a flat-sided reel, B, substantially as described.

3. In combination with a flat sided reel, B, a feeding device, G, placed at such a position as to bring the web gradually in contact with the reel, substantially as and for the purpose described.

GEORGE CLAYTON LAWRENCE.

Witnesses:
E. J. MITCHELL,
H. S. MITCHELL.