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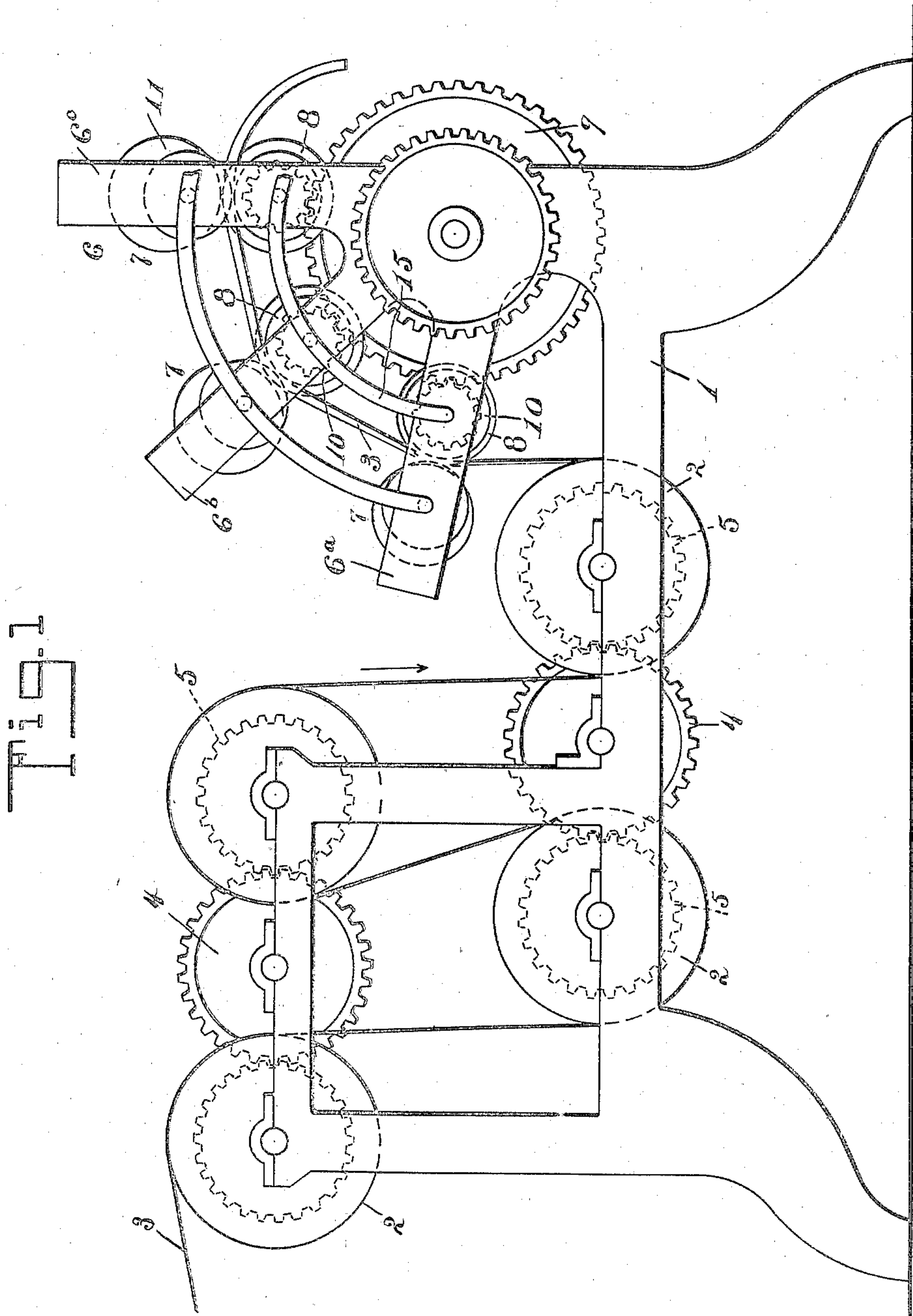
BARREL FORMING MACHINE.

APPLICATION FILED JULY 12, 1907.

947,629.

Patented Jan. 25, 1910.

2 SHEETS—SHEET 1.



WITNESSES

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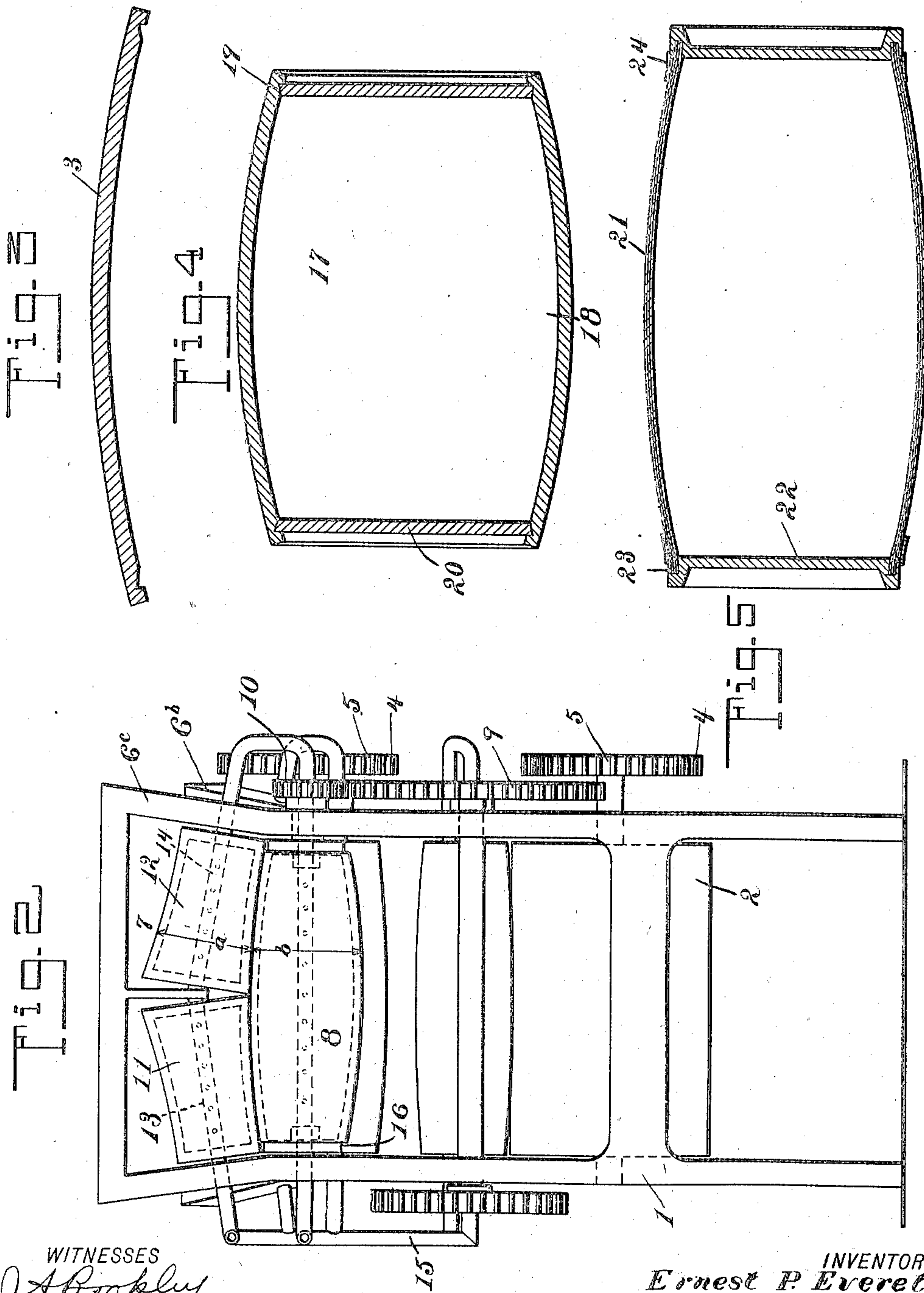
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UNITED STATES PATENT OFFICE.

ERNEST P. EVERETT AND GEORGE W. NORTON, OF NEW YORK, N. Y.

BARREL-FORMING MACHINE.

947,629.

Specification of Letters Patent.

Patented Jan. 25, 1910.

Application filed July 12, 1907. Serial No. 383,474.

To all whom it may concern:

Be it known that we, ERNEST P. EVERETT and GEORGE W. NORTON, both citizens of the United States, and residents of New York, Long Island City, Astoria, borough of Queens, in the county of Queens and State of New York, have invented a new and Improved Barrel-Forming Machine, of which the following is a full, clear, and exact description.

Our invention relates to the manufacture of barrels and especially to barrels such as are formed of bilged paper, pulp, or similar material. In treating the web or sheet of paper to form the bilge in the same, it is found in practice that it is impossible to form the bilge by passing the material between a concave roller and a convex roller of ordinary form for the reason that the material will become torn. This is partly due to the fact that the surfaces of the rollers move at different velocities.

The object of this invention is to produce a barrel forming machine having rollers of special form particularly adapting them for forming the bilge or curvature, and the rolls are constructed and arranged in such a way that the velocity of the faces of the rails on opposite sides of the web at any particular point is the same.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation showing diagrammatically the rolls by means of which the material is formed; Fig. 2 is a front elevation of the rolls shown in Fig. 1; Fig. 3 is a cross section showing the form of the web when treated with our rolls; Fig. 4 is a longitudinal central section through a barrel which may be formed with our machine; and Fig. 5 is a longitudinal section through a barrel of modified construction, but which is also made according to this process.

Before proceeding to a detailed description of the process and the steps by means of which it is practiced, it will facilitate the disclosure of the invention to state at the outset that, in the manufacture of paper or

pulp webs, great difficulty has been experienced in the operation of machinery for distending or bilging the web. Attempts to accomplish this end have generally resulted in tearing or rupturing the web at the point or line where the bilge is to be formed. In practicing the process, we employ rolls having a special form, which enable the middle portion of the web to be bilged or bellied without rupturing or tearing. The finished web of paper or pulp having a bilge as described, is admirably adapted for forming barrels because when formed into a roll, the bilge of the paper becomes the bilge of the barrel or cask.

Referring more particularly to the parts, and especially to Figs. 1 and 2, 1 represents a frame upon which a plurality of guide rolls 2 are provided, which receive the web 3 from the paper machine. These rolls 2 are adapted to be driven continuously in a forward direction by means of the gear wheels 4 which are continuously driven, and which mesh with gear wheels 5 carried by the shafts of the rolls 2. At the end opposite to the rolls 2, the frame 1 is formed with several arches or bows 6. In these arches the forming rolls 7 are supported. The arches are three in number, the one adjacent to the roll 2 being represented by the numeral 6^a, the next one by the numeral 6^b and the upper one by the numeral 6^c. The rolls 7 are arranged in sets carried respectively on the bows 6. The arrangement of each of these sets of rolls is indicated in Fig. 2. Each set comprises a main roll 8 which is mounted to rotate upon a horizontal axis as shown. In order to drive these rolls 8, we provide a master gear wheel 9 which meshes with pinions 10 carried by the shafts of the rollers, as indicated in Fig. 2. Cooperating with each of the main rolls 8, we provide presser rolls 11 and 12. The rolls 8 have bilged or convex faces and the rolls 11 and 12 have concave faces. The concave faces of the rolls 11 and 12 are held substantially against the faces of the rolls 8, as indicated in Fig. 2. In order to accomplish this, the rolls 11 and 12 are mounted upon inclined shafts 13 and 14, so that the lower adjacent edges of the rolls 11 and 12 come together as shown. The rolls 7 are arranged so that the rolls carried in the bows 6^a have the least curvature, while those carried in the bows 6^c have the greatest

curvature. The rolls carried in the intermediate bows 6^b have an intermediate degree of curvature.

The web of pulp or paper from the paper machine is advanced in its wet condition in the direction of the arrow, passing over the rolls 2 between the rolls 7, in the manner illustrated in Fig. 1. In this way the wet pulp as it passes over the rolls, is subjected to a stretching and pressing action. In order to prevent any tendency for the rolls to tear the pulp, we construct the rolls so that the peripheral speed of the presser rolls and the main rolls at any one point substantially is the same, as is illustrated in Fig. 2, where the diameters are indicated by the lines *a* and *b* running from a common point on the main roll and one of the presser rolls. We make the diameter *a* equal to the diameter *b*. If the diameters *a* and *b* were maintained exactly equal to each other at all points of the surface of the rolls, the meeting faces of the rolls would be straight lines and the rolls would be of conical form. The meeting line between the two cylinders would then bisect the angle between the axes of the convex cylinder and the corresponding convex cylinder. By varying the diameters *a* and *b* slightly from an exact equality we are enabled to give the cylinders a slightly curved meeting line which has the general direction of and substantially conforms in position to the straight line bisecting the angle between the axes of the cylinders. In this way it will be evident that there is substantially no sliding or friction between the web and either of the rolls. As a result of passing the web through the rolls, it becomes bilged so that its cross section will have the form represented in Fig. 3; that is, it is stretched, bulged or bilged toward its middle line.

In order to dry the pulp web as it is passing through the forming rolls, we provide steam pipe connections 15 which enable steam to be directed through the rolls in such a way that they are maintained highly heated.

The main rolls 8 are provided near their ends with grooves 16 which produce the croze of the barrel. In forming a barrel from the finished dried web, a sheet is cut in the web and is simply formed into a roll, the longitudinal meeting edges of the sheet out of which the barrel is formed, being simply lapped and riveted or butted together and riveted to a butt strip. In this way a barrel 17 may be formed, as indicated in Fig. 4. The inner side of the body 18 of the barrel will have a croze 19 which facilitates the fastening of the heads 20 in the barrel as shown.

Instead of making the barrel as illustrated in Fig. 4, we may form the body of the barrel by wrapping the bilged paper upon itself so that the barrel presents a plurality of layers 21 when viewed in section as in Fig. 5. In this form of the barrel, the heads 22 are formed with annular grooves 23 which receive the ends of the body, and these heads are held in position by hoops 24 which surround the ends of the barrel, as shown.

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

1. A paper-forming machine comprising a bilged roll and sectional presser rolls cooperating therewith, and having axes of rotation inclined with respect to the axis of said first roll.

2. A paper forming machine comprising a convex roller and sectional presser rollers of concave form rolling against the surface of said first roller and mounted on axes of rotation inclined with respect to the axis of rotation of said convex roller.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ERNEST P. EVERETT.
GEORGE W. NORTON.

Witnesses:

F. D. AMMEN,
JOHN P. DAVIS.