

S. R. BRADLEY.  
PROCESS OF MANUFACTURING PULP PIPE.  
APPLICATION FILED JAN. 24, 1908.

966,729.

Patented Aug. 9, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

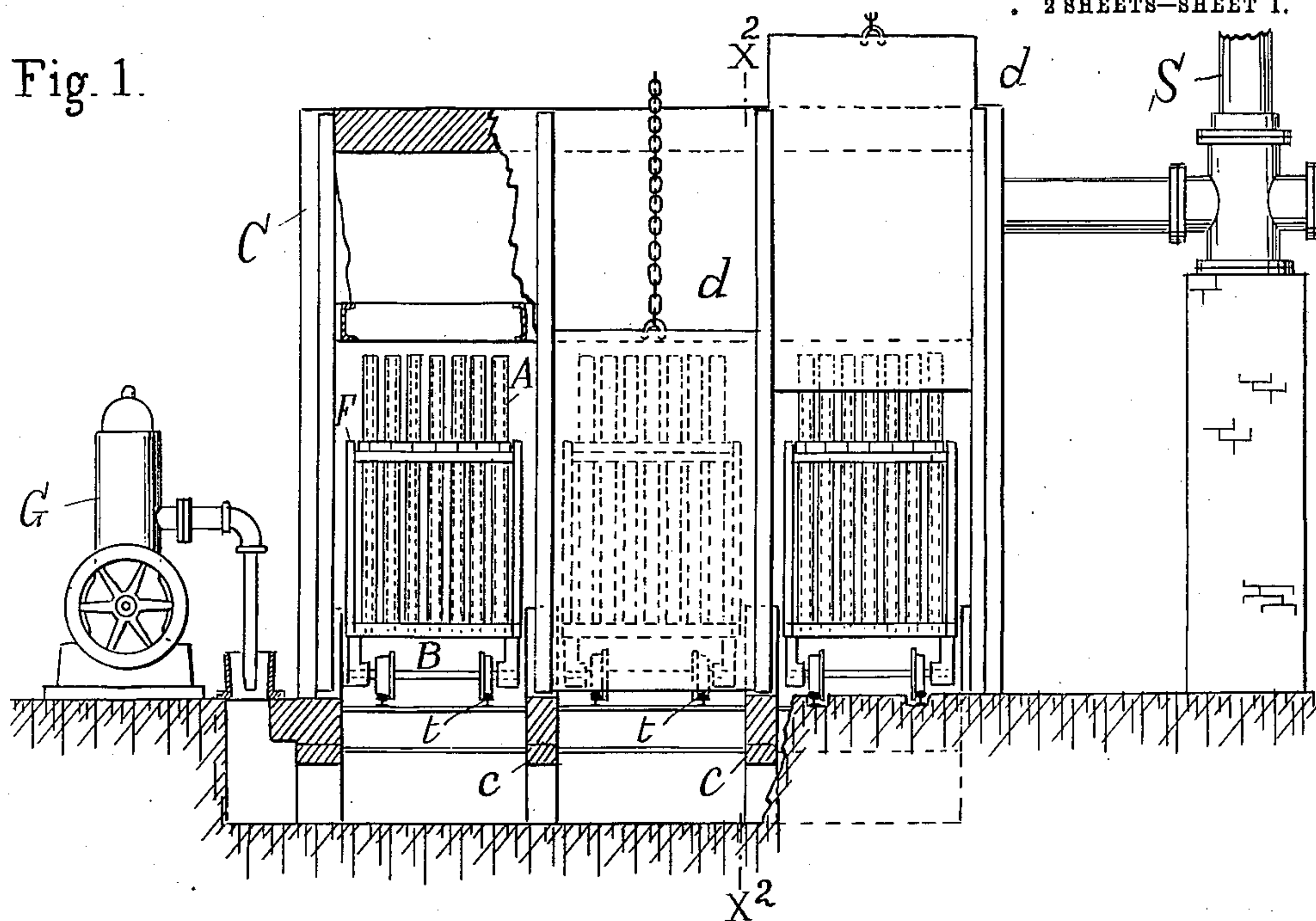
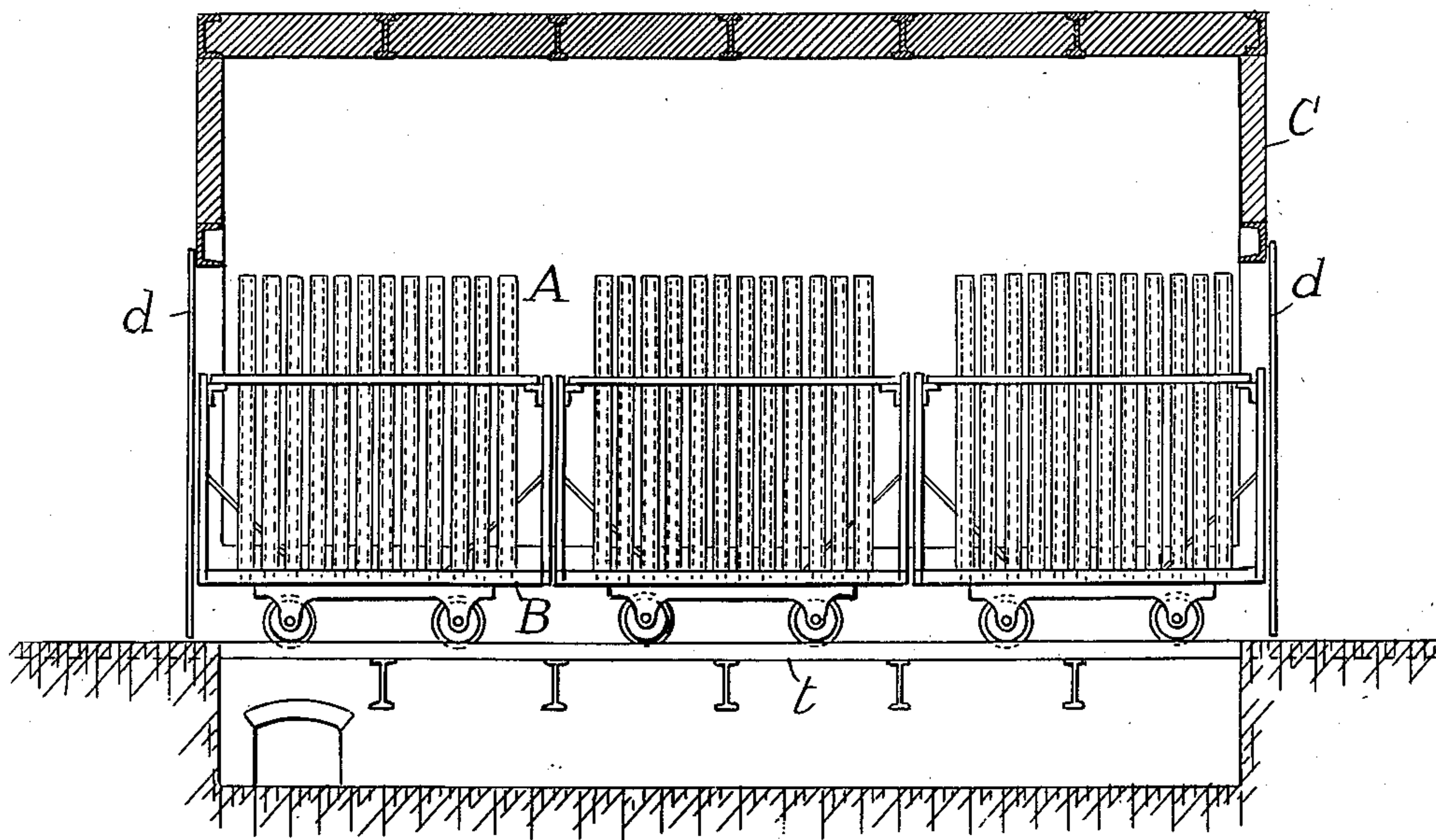


Fig. 2.



Witnesses:

*Samuel W. Balch*  
*Frank C. Cole*

Inventor,  
*Stephen R. Bradley*  
by *Thomas E. Enig, Jr.*  
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2 SHEETS—SHEET 2.

Fig. 3.

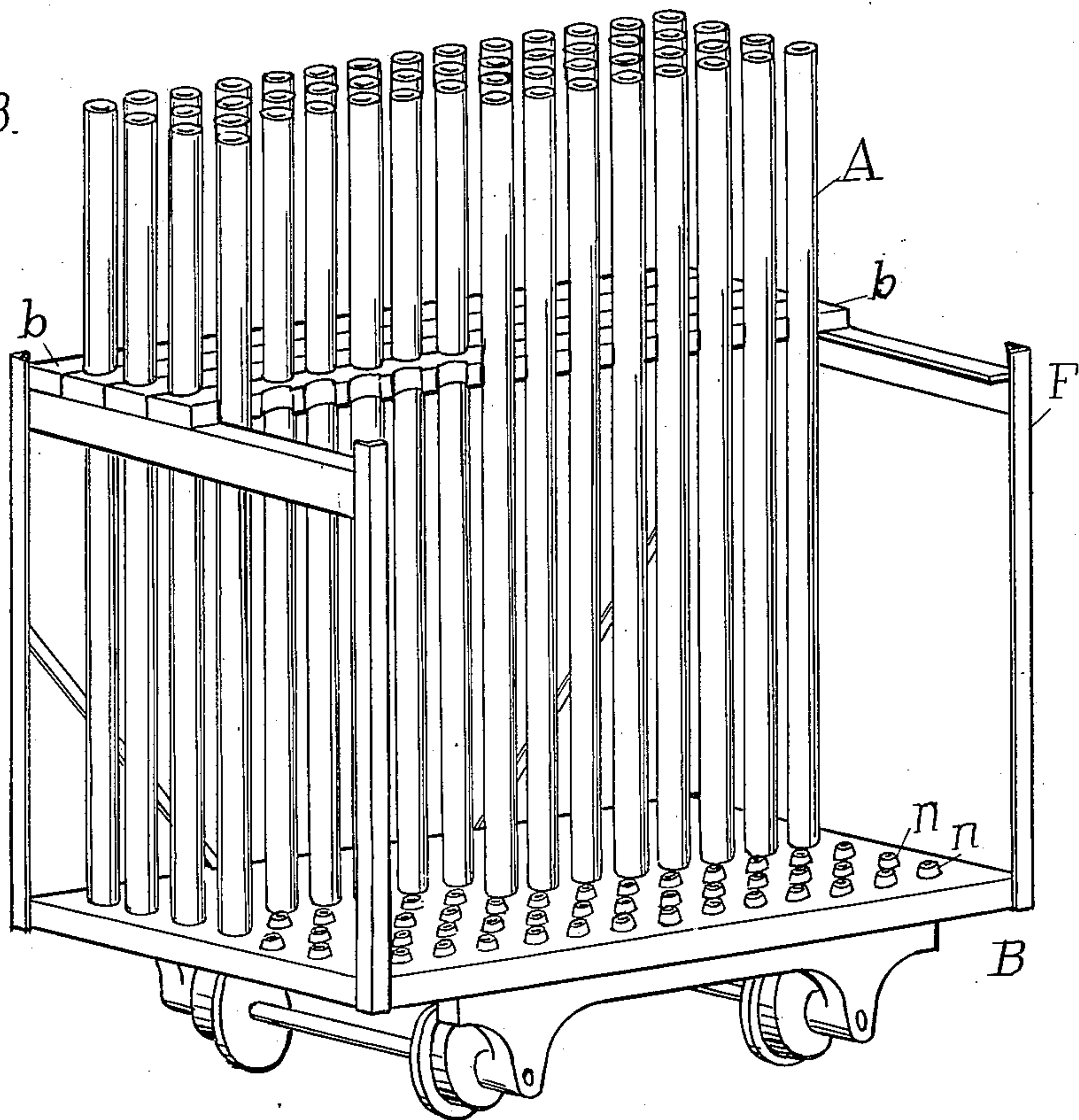


Fig. 5.

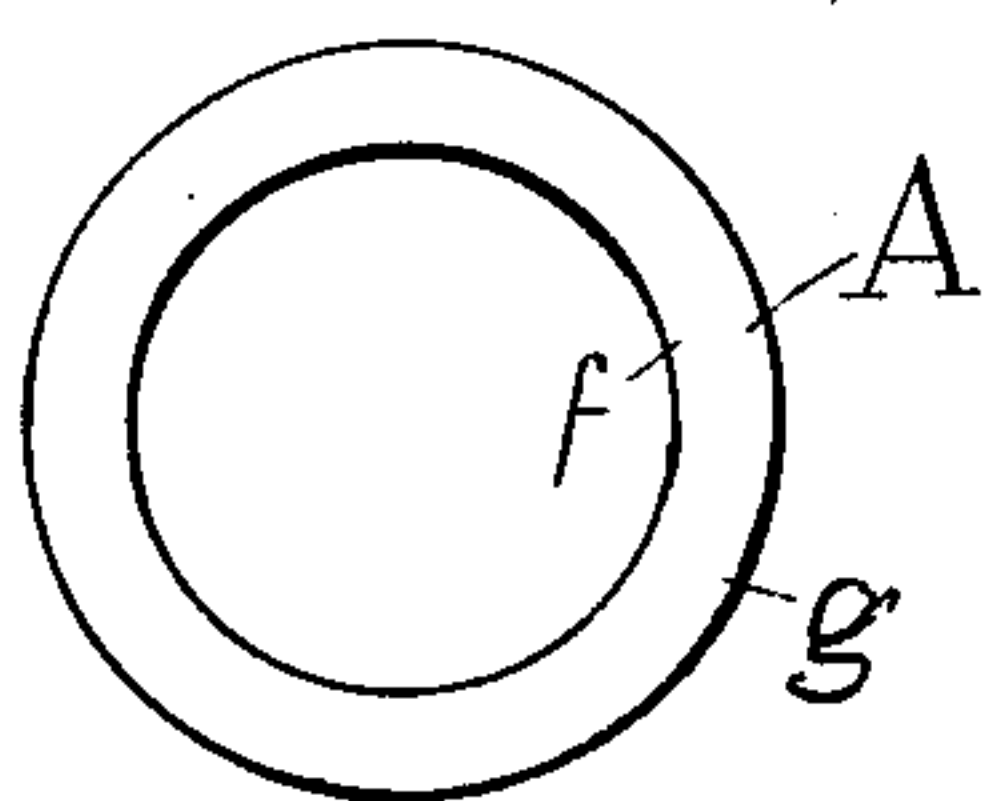


Fig. 6.

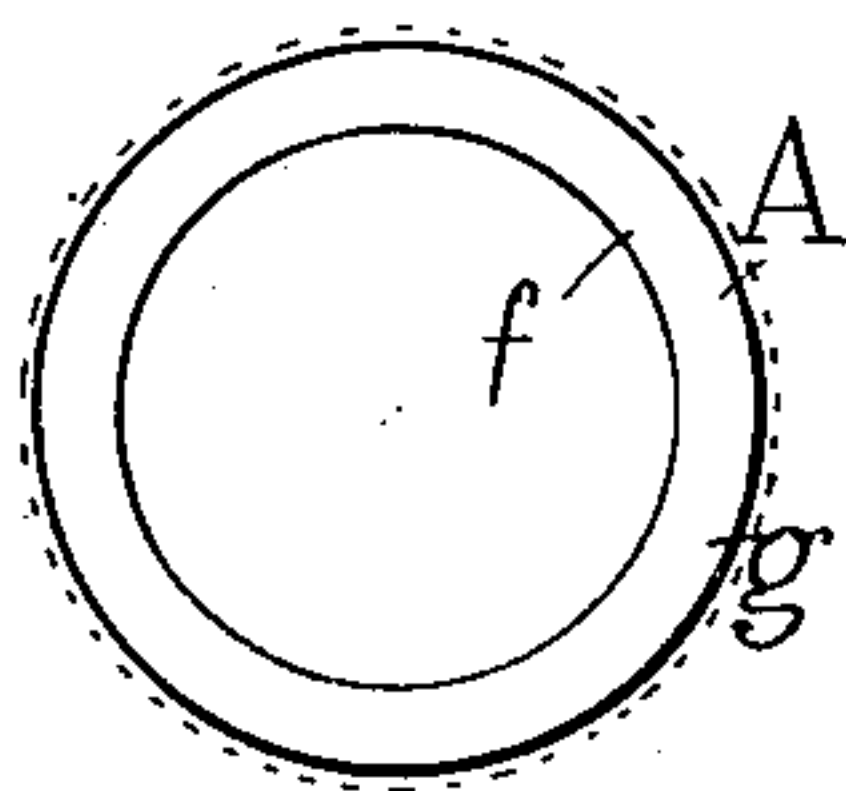
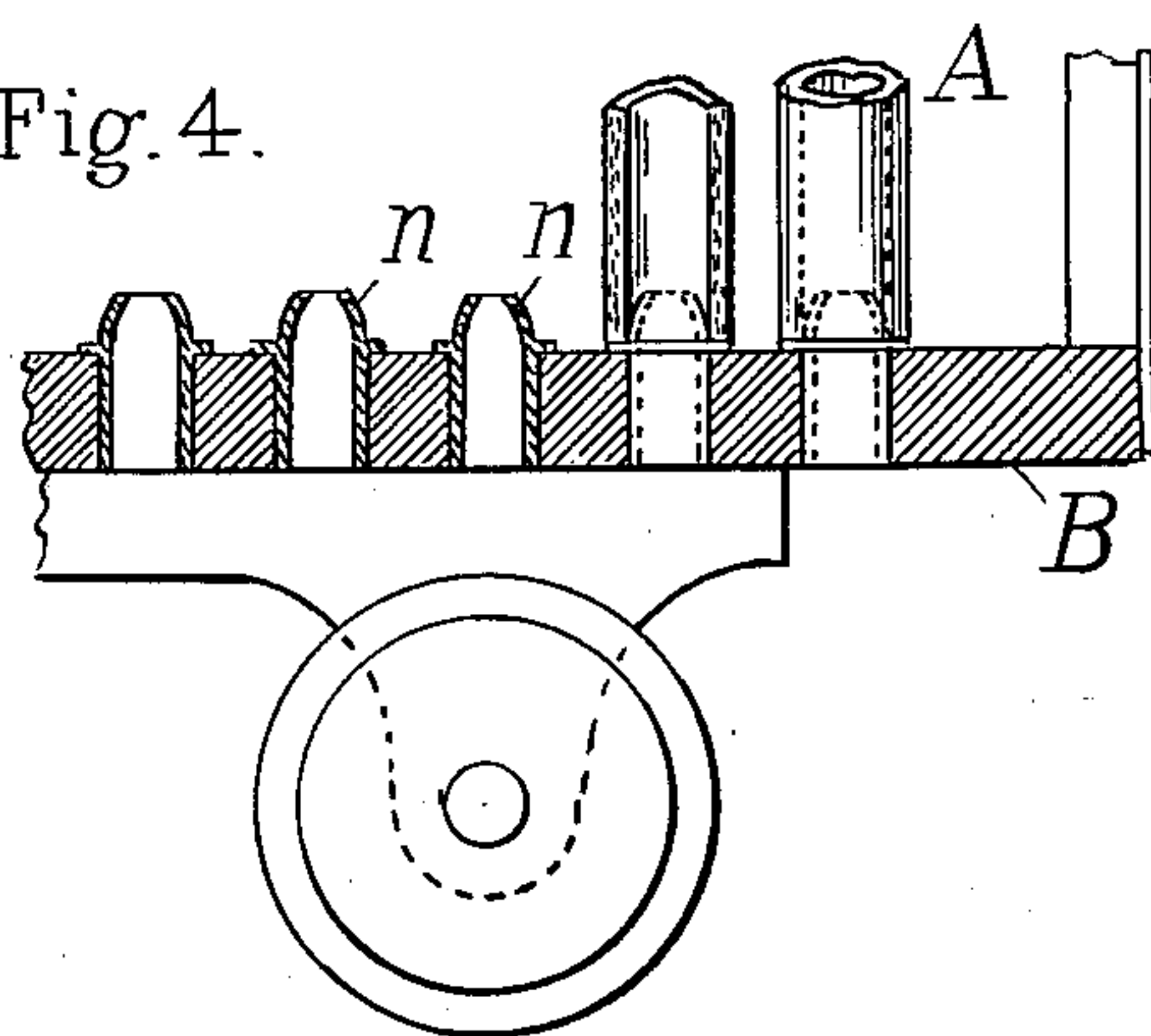


Fig. 4.



Witnesses:  
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Frank C. Cole.

Inventor,  
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# UNITED STATES PATENT OFFICE.

STEPHEN R. BRADLEY, OF SOUTH NYACK, NEW YORK, ASSIGNOR TO THE FIBRE CONDUIT COMPANY, OF ORANGEBURG, NEW YORK, A CORPORATION OF NEW YORK.

## PROCESS OF MANUFACTURING PULP PIPE.

966,729.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Application filed January 24, 1908. Serial No. 412,440.

*To all whom it may concern:*

Be it known that I, STEPHEN R. BRADLEY, a citizen of the United States of America, and a resident of South Nyack, county of Rockland, and State of New York, have invented certain new and useful Improvements in Processes of Manufacture of Pulp Pipe, of which the following is a specification.

The object of this invention is to produce pipe of fibrous material which is regular in form, particularly in its interior bore, and the walls of which are compact, free from cleavage planes or tendency to split, and are firmly matted or felted together so that the inner and outer surfaces of the walls are tied together and the walls possess tensile strength longitudinally and circumferentially.

To this end, the invention relates to a process of drying pipe formed from pulp, particularly wood pulp, which is formed into pipe while saturated with a considerable quantity of water.

The initial forming of pipe, to which this invention is particularly applicable, is set forth in United States Letters Patent No. 799,028, granted Sept. 12, 1905, to Stephen R. Bradley, Jr. In brief, the method of the patent involves the formation of a web of wet pulp and winding it on a forming roll until the required body has been built up. Then the pipe of wet pulp so formed is stripped from the forming roll. This present invention, however, is not limited to pipe initially formed in the above manner.

The pipe is formed by subjecting the interior to the drying action of heated gases, whereby the water is removed more rapidly at first from the fibers at and near the interior surface and these fibers are first felted and set so that subsequent drying or shrinking of the exterior layers of the pipe will tend to compact the whole, and radial flow of water will tend to felt together these several layers. The pulp pipe as initially formed may be about seventy-five per cent. water, and in this condition the pipe can, by careful handling, be stood on end in suitable racks for subsequent drying. The apparatus which I have devised for this drying in accordance with my invention is set forth in the accompanying two sheets of drawings in which—

Figure 1 is a front elevation of a drying chamber, partly broken away, wherein the

invention is practiced. Fig. 2 is a vertical section through the drying chamber on the line  $x^2-x^2$  of Fig. 1. Fig. 3 is a perspective view of one of the drying cars wherein the pulp pipes are supported. Fig. 4 is an enlarged vertical section through a portion of the base of a car. Fig. 5 is an end view of a pulp pipe as initially formed. Fig. 6 is an end view of the pipe when dried in accordance with this invention.

The pulp pipes A A are set vertically in drying cars, each of which comprises a platform or floor B with perforations there-through. Tubular nipples  $n n$  project from the perforations and are adapted to receive the lower ends of the pulp pipes. A framework F projects above the car floor and serves to steady or support the pipes at suitable points near their upper ends through notched bars or separators  $b b$  which are laid into the car alternately with each row of pipes.

An oven C is formed to receive as many cars as may be required. Doors  $d d$  are provided on opposite sides of the oven and parallel tracks are laid through the oven. The cars and oven walls are so adjusted to each other that when the oven is filled with cars the car floors will meet and substantially bridge the space between the doors on opposite sides of the oven. It is ordinarily not convenient to place the parallel tracks sufficiently near to each other so that the platforms of cars on adjoining tracks will also come close together, since some framework is desirable between doors. This space between cars is therefore conveniently bridged by transverse walls  $s s$  which extend up as high as the car platform. The platforms, therefore, when the oven is filled, together form horizontal diaphragms, which divide the oven into upper and lower sections, the communication between the two sections being in large measure confined to that afforded through the perforations and the interiors of the pipes which are supported over the perforations, while circulation over the exterior surfaces of the pipes is obstructed.

The hot exhaust gases from an explosive engine G are found to be particularly suitable for effecting the drying. These gases may be mixed with air to such extent as may be necessary to reduce the temperature and afford a greater volume in the mixed air and gas to absorb and carry off the moisture.



The hot gas and air are preferably introduced into the lower of the sections into which the oven is divided by the diaphragm of car platforms, and the upper of the sections is connected with a stack S. Which section receives and which discharges the gases is, in some respects, immaterial to the invention. The arrangement shown, however, has advantages, since gravity causes a considerable transfer of moisture to the lower ends of the pipes and this requires the more rapid drying action of the entering gases.

The abstraction of moisture from the interior surfaces of the pipes causes a flow of water or capillary movement transversely in the walls, leaving at the inner surface. This, to a certain extent, appears to draw the fibers of one layer into the next, thereby felting the several layers together. The portion of the fibers *f* at and adjoining the interior face lose their moisture and with a slight enlargement of the interior bore, become set while the moisture in the outer portion of the fibers, including more than half the thickness of wall *g* from the outer face

toward the inner face of the pipe, keeps these fibers in a somewhat plastic state, so that this portion will be drawn in on the inner portion, and the outer face of the pipe will contract from the position indicated by the encircling dotted line in Fig. 6 to the position shown in full line, on the drying of the outer portion, thereby shrinking onto the inner portion and forming a compact and firm pipe wall.

What I claim as new and desire to secure by Letters Patent of the United States is—

The process of felting the fibers of pulp pipe which consists in subjecting the interior of the pipe to drying action by gases unsaturated with moisture passed there-through, while circulation of such gases over the exterior surface of the pipe is obstructed, substantially as described.

Signed by me at Orangeburg, N. Y., this 15th day of January, 1908.

STEPHEN R. BRADLEY.

Witnesses:

JNO. M. GESNER,  
H. C. FENTON.