

No. 627,258.

Patented June 20, 1899.

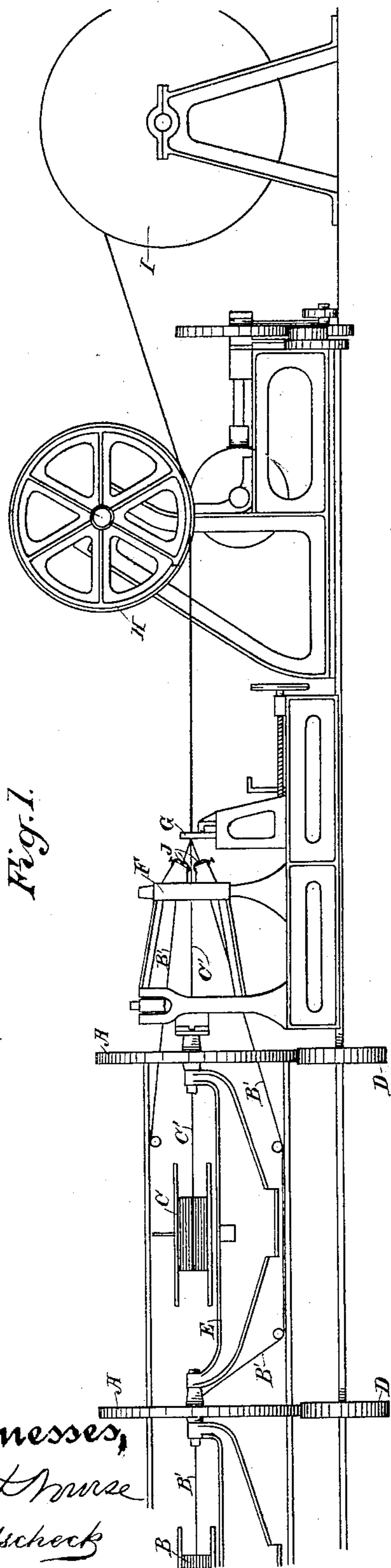
A. S. HALLIDIE.

MACHINE FOR MANUFACTURING ROPES OR CABLES.

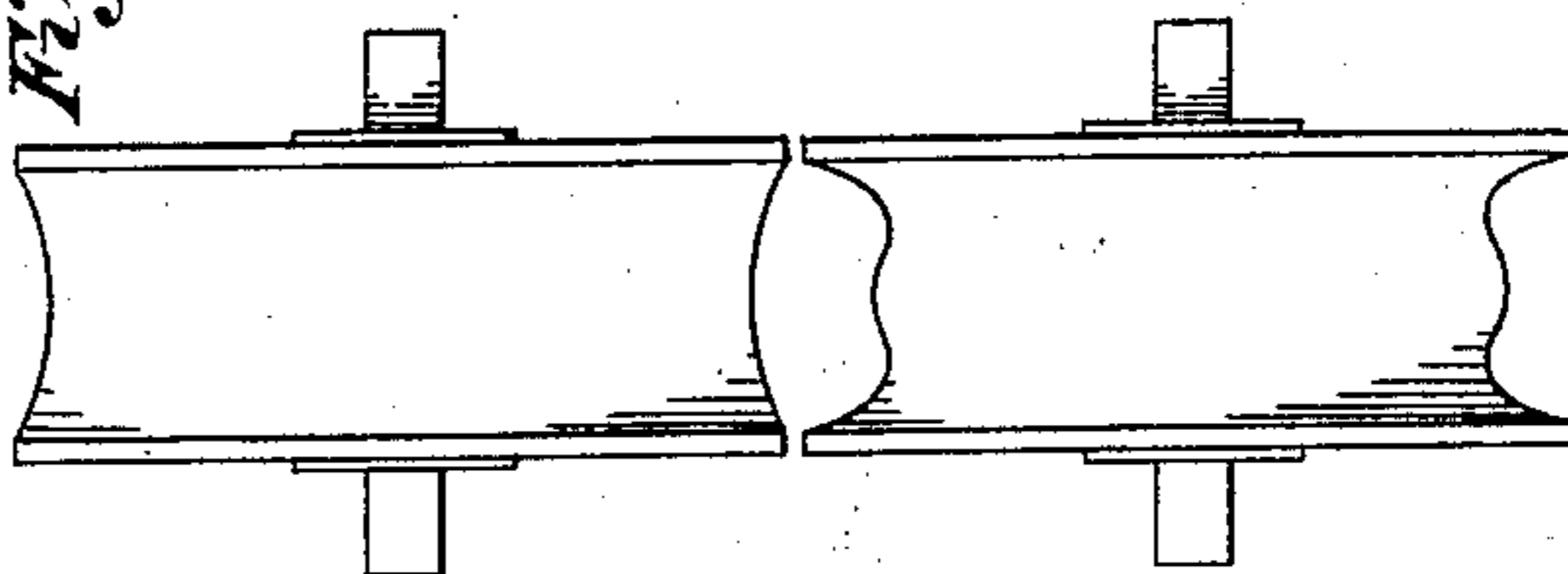
(Application filed June 8, 1898.)

(No Model.)

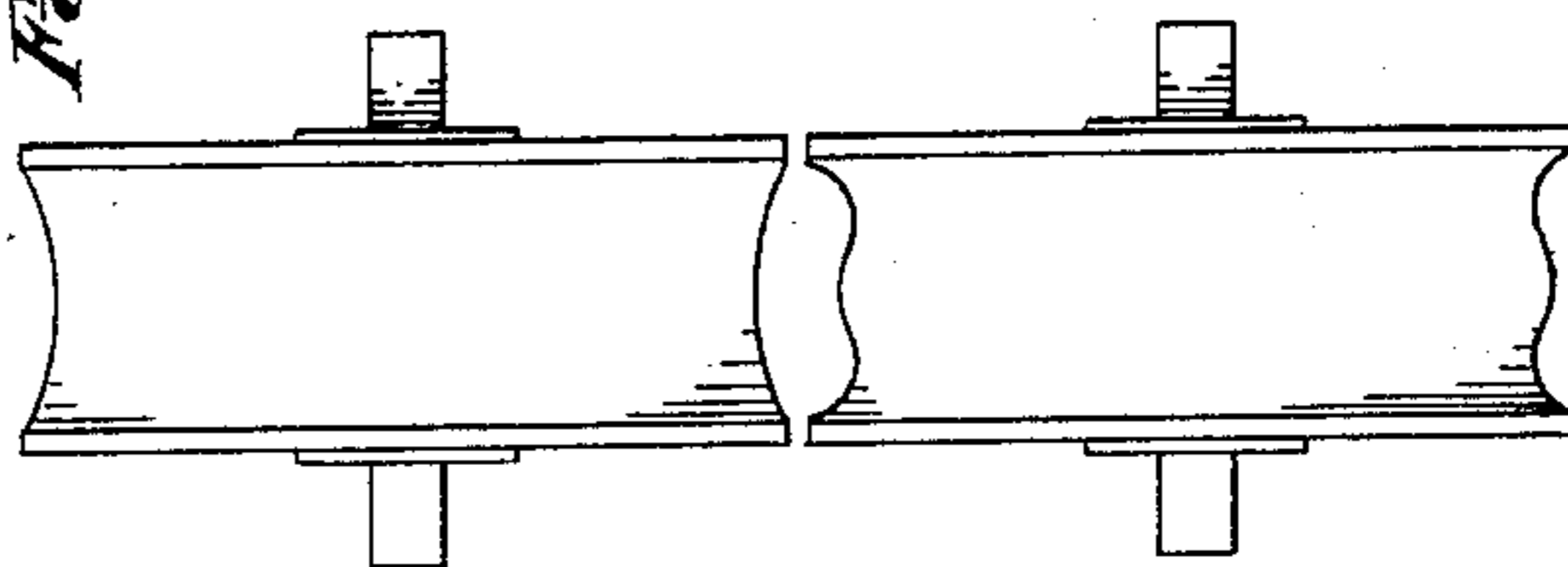
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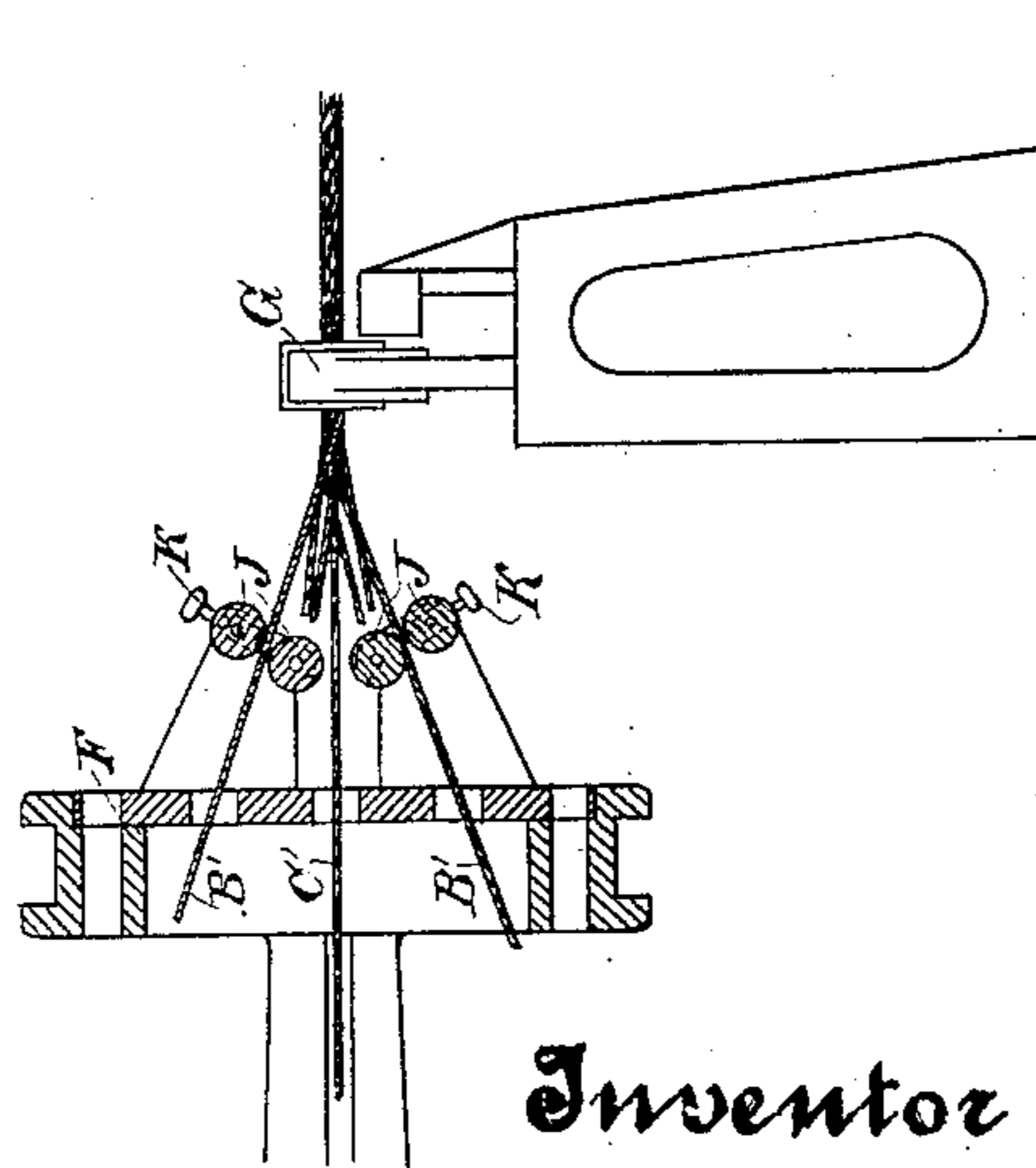
*Fig. 4.*



*Fig. 3.*



*Fig. 2.*



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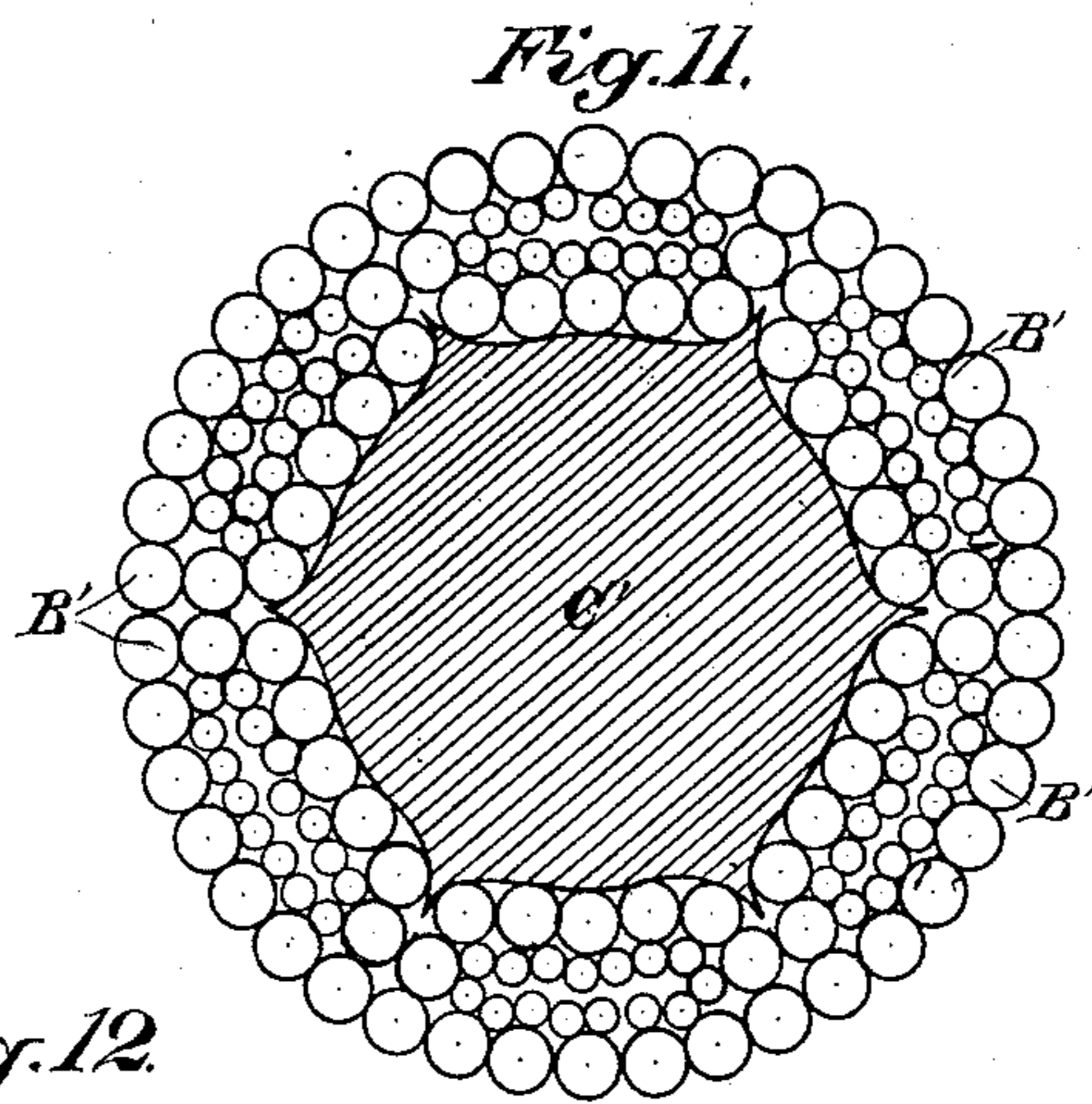
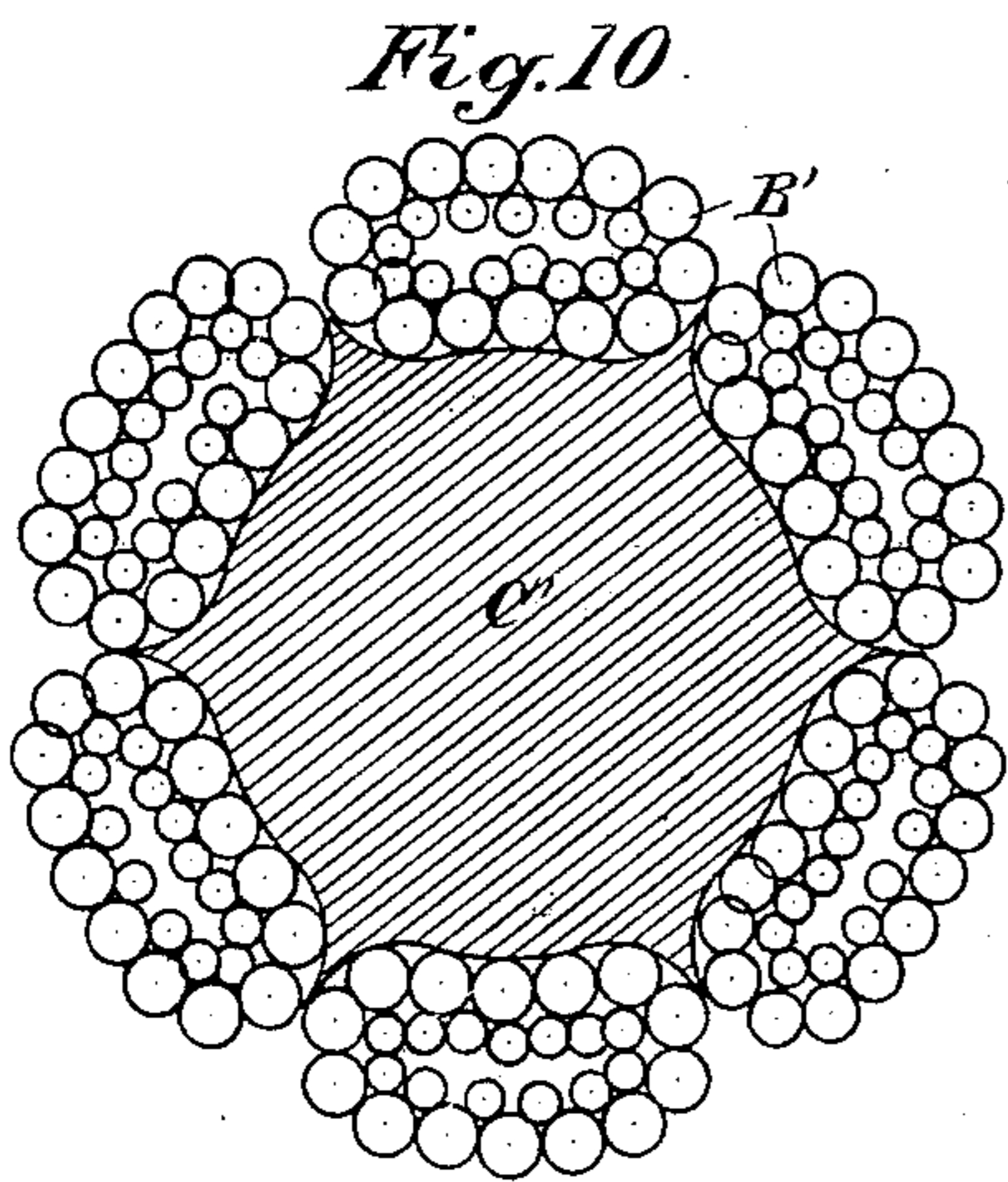
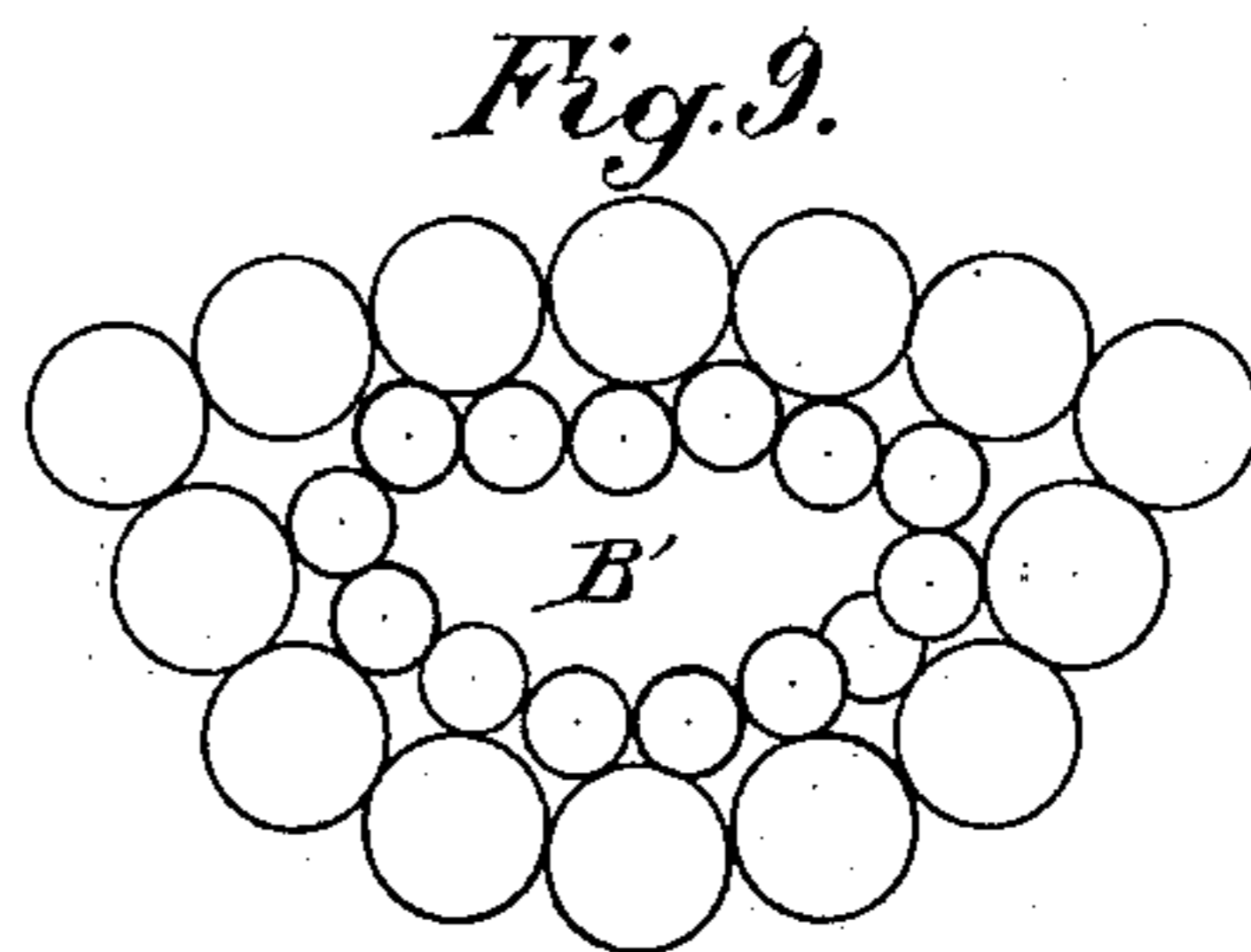
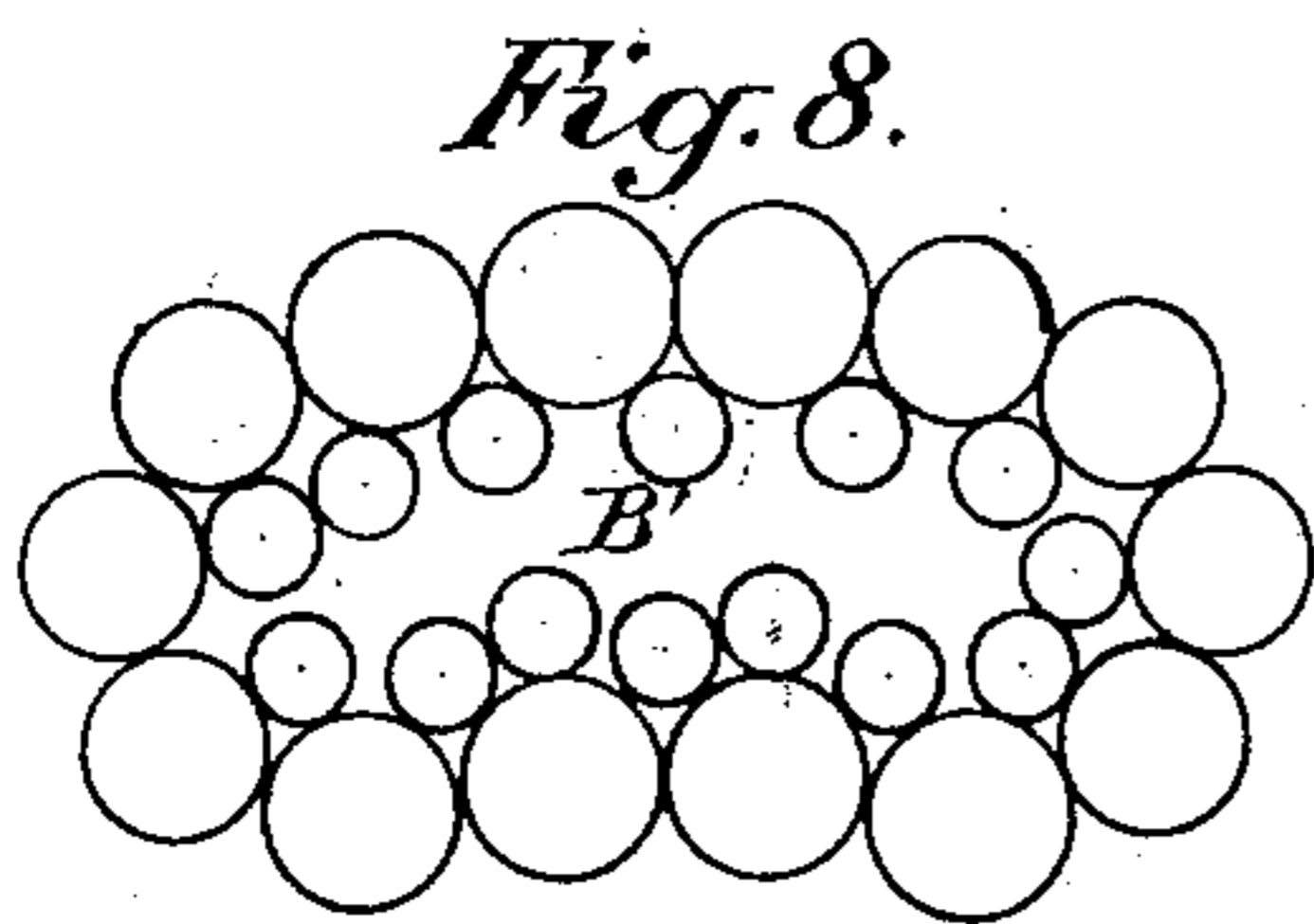
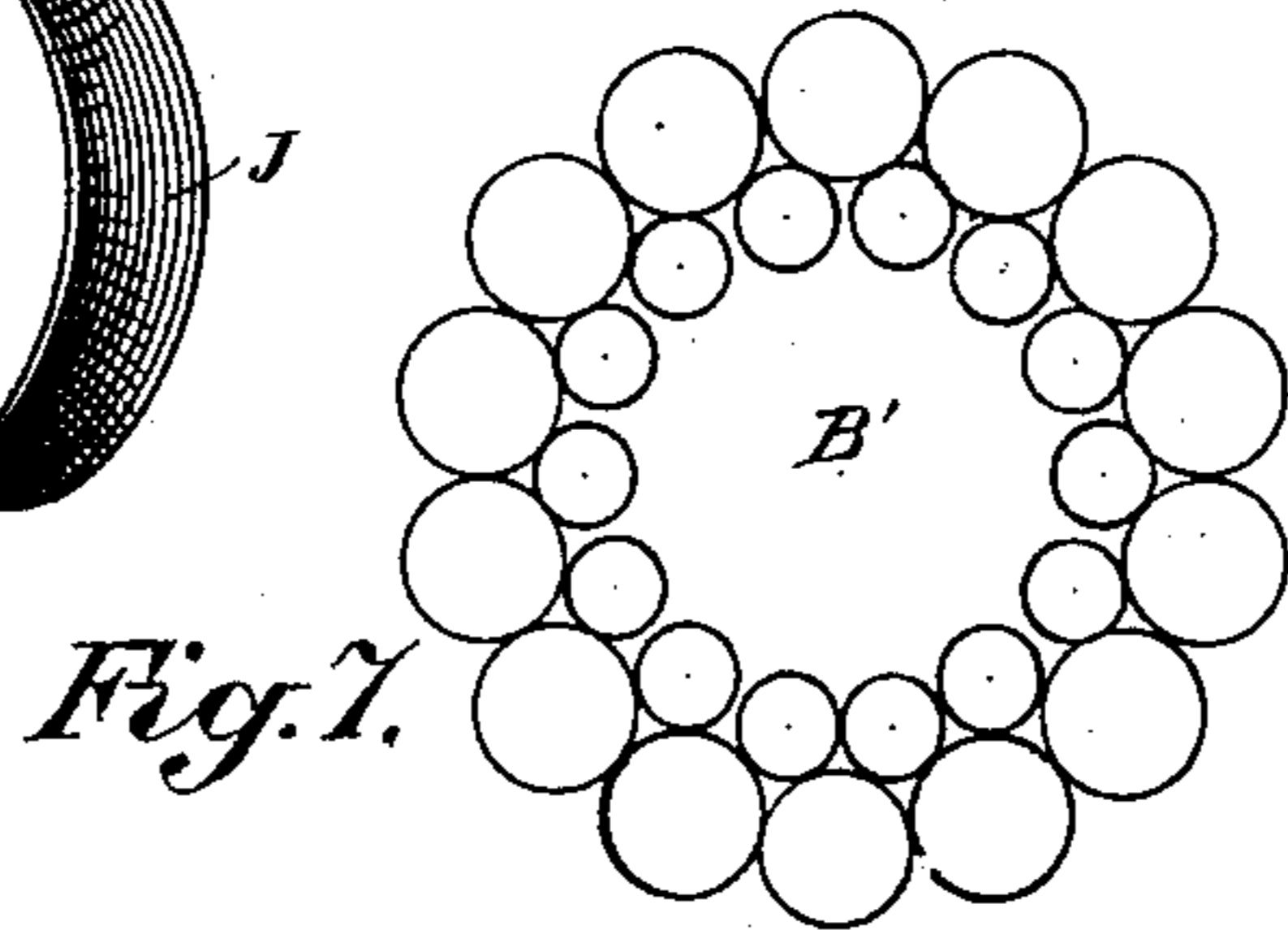
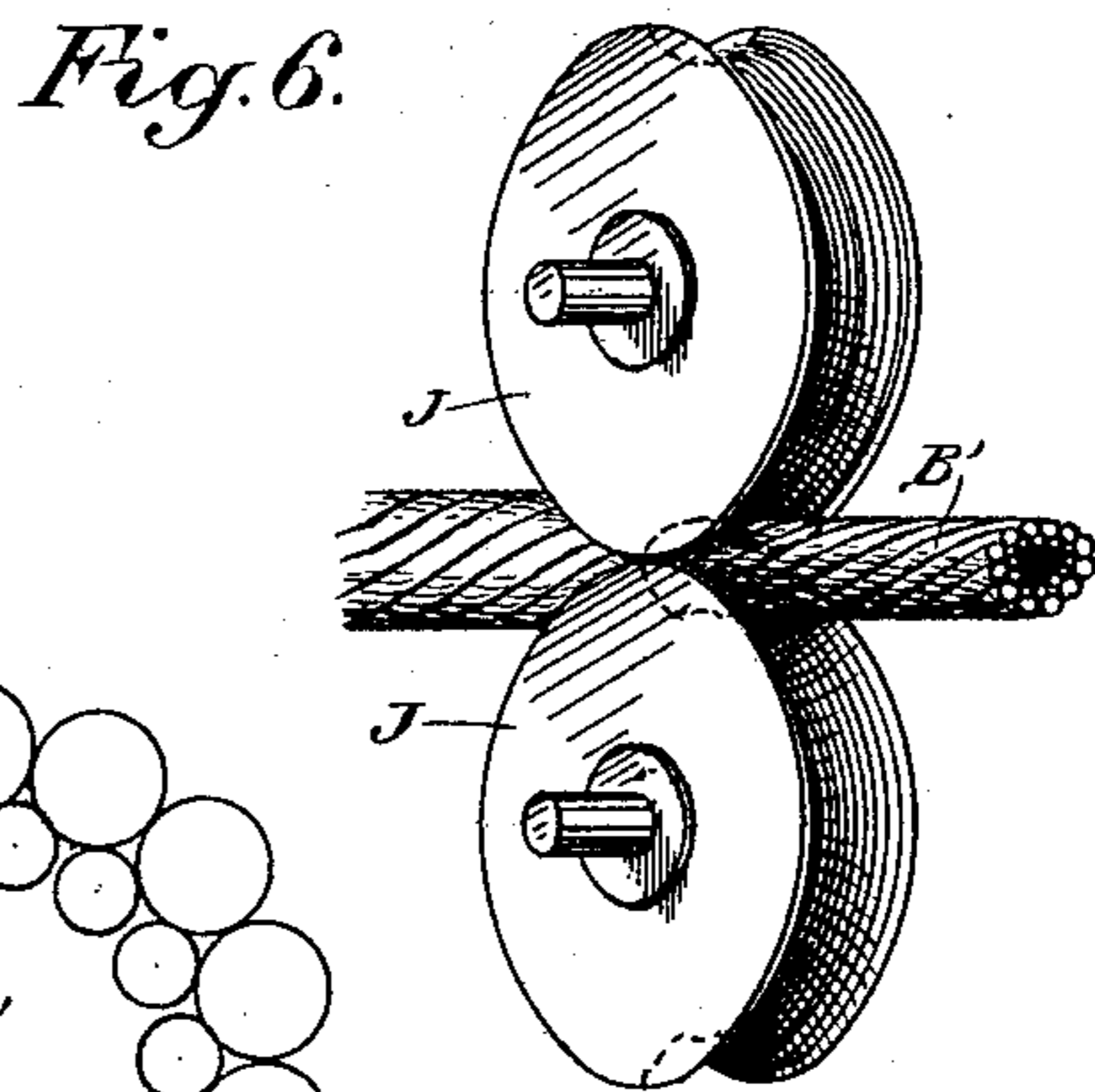
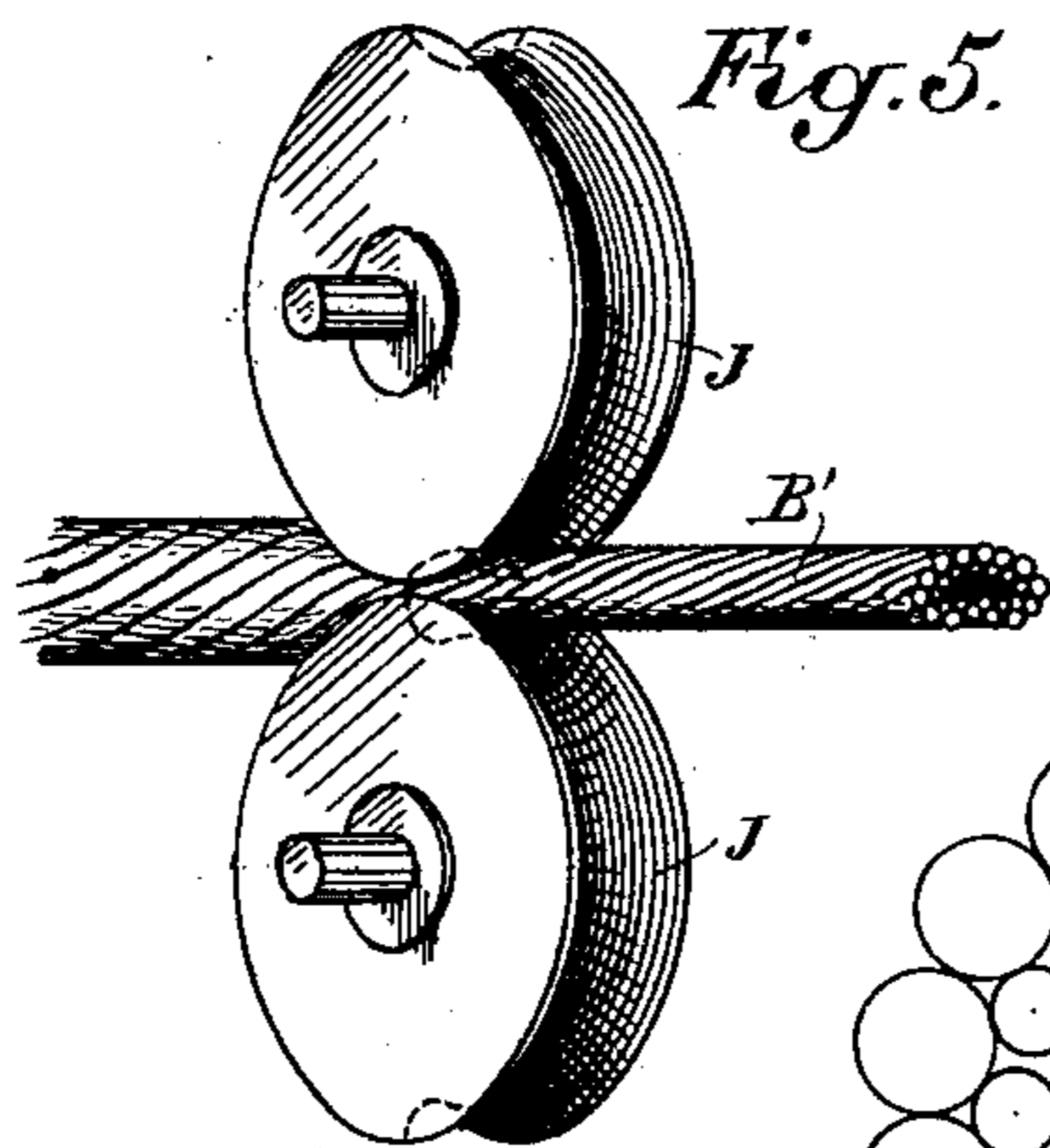
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(Application filed June 8, 1898.)

(No Model.)

2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

ANDREW S. HALLIDIE, OF SAN FRANCISCO, CALIFORNIA.

## MACHINE FOR MANUFACTURING ROPES OR CABLES.

SPECIFICATION forming part of Letters Patent No. 627,258, dated June 20, 1899.

Application filed June 8, 1898. Serial No. 682,872. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW S. HALLIDIE, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in the Manufacture of Ropes or Cables; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an improvement in the manufacture of wire ropes and cables and a means for shaping the individual strands so as to present a larger surface to the parts with which they come in contact, such as the grooves or pulleys or wheels over which they may pass.

It consists, essentially, of an apparatus by which the strands of the ropes or cables are shaped, comprising pressure-rollers, so grooved or formed that when the individual strands pass between them while being twisted or laid up into ropes or cables the strands will be given the desired shape in close proximity to the point where they converge and are united to form a complete cable, and a drawing-off mechanism controlling the operation of the compressing-rollers.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is an ordinary type of horizontal wire-rope-making machine, showing the application of my invention. Fig. 2 is an enlarged view of the head-block, showing my invention. Figs. 3, 4, 5, and 6 are views of rollers by which the strand is shaped. Figs. 7 to 11, inclusive, are transverse sections showing various forms of completed rope or cable. Fig. 12 shows a spiral form of the compressed strand.

In the construction of wire ropes or cables a central core made of hemp or other suitable material is surrounded by strands, each of which comprises a core with wires laid around the core to form the strand, and these strands are approximately circular in outline, having, however, the interstices between each of the wires, which make a polygonal outline. When laid up into a rope, these circular strands have very considerable depressions between them, forming practically a polygon, so that when the rope is in use the bearing at any one time comes largely upon one or more of

the exterior wires of a single strand at the point of bearing.

The objects of my invention are to so shape these strands as to present a larger bearing-surface and to reduce the space between the strands, so that the circumference of the entire rope or cable will be more nearly circular and more even and symmetrical in shape.

In making my improved wire rope I prefer to employ an elastic core or filling for the strand, so that when the circular shape of the strand is changed to the shape desired the core or filling will adjust itself to the change in form and reduction in area. Around this core are a number of wires. In the drawings I have shown fourteen wires, and these are surrounded by other wires, which complete the strand.

In the ordinary type of wire-rope-making machine, A is the revolving frame.

B are the spools, containing strands B'.

C is a spool containing the core C'; D, the supporting-rollers; E, the yokes within which the frame A revolves.

F is the head-block or frame, where the strands converge to be twisted or laid into a rope.

G is the die-block, through which the strands pass to complete the rope or cable.

H is the draw-off mechanism, and I the spool for coiling up the finished rope.

In my invention I attach to the head-block F, at a point between it and the block G, the rollers J J, which are mounted in pairs so arranged that each of the strands B' will pass between a pair of the rollers, being pulled through by means of the drawing-off mechanism H while the machine is revolving and laying up the strands into a rope. There are as many pairs of the rollers J J as there are strands in the rope, and the journal-boxes of the rollers are provided with compressing-screws K to adjust them to any required depth. These rollers are formed with grooves in the faces of such shape as to give the required shape to the strands as they pass between them. In some cases the strands may be made triangular in form or with the outer surface convex and the inner partially concave, or the strands may be elongated into the form of an ellipse in which one of the long sides,

forming the exterior of the strands, will be convex, and the other, the interior one, will be concave. Any of these forms, several of which are here illustrated, are produced by the shape of the grooves formed in the pulleys J J, between which the individual strands pass and by which they are compressed into the desired form before entering the die-block, where they are laid up in the rope. The strands, after passing between these rollers and having assumed the desired shape by reason of the pressure of the rollers upon them are laid or twisted around the core or heart, and thus formed into a rope or cable. The strands being thus compressed are also given a spiral form, and when laid up and the rope completed the outer surface of the rope presents a comparatively smooth surface with no deep interstices between the strands; but the strands lie very closely together and present a regular arch or curve about the center of the rope or cable as a radius, which insures an even bearing of a great number of the wires upon the pulley over which the rope is passing.

In the process of laying the strands into a rope or cable and during the compressing of the individual strands the compressing-rollers, which compress during the operation of the drawing-off mechanism only, make one or more revolutions around the strands for every turn or lay in the rope, forming a spiral in the strand having a pitch equal to the lay of the rope, and thus the strands lie in place in the rope without any tendency to unlay or untwist, and always presenting their broader faces on the outer side of the rope.

In a rope-making machine in which the bobbin-frames containing the strands are fixed to and turn with the machine the rollers will compress the strands in a line parallel with the axis of the strand.

While I have described the foregoing mechanism as particularly applied to wire-rope-making machines, it is obvious that it can be applied under similar conditions to machines making rope from manila, hemp, or other fiber, and it will also be understood that dies might be substituted for the rollers by which the strands are shaped with similar result.

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

1. In a machine for making ropes or cables, mechanism by which the strands are laid up around a central core to form a complete rope or cable, a drawing-off mechanism, and compressing-rolls adapted to compress individual strands before they are laid up said rolls being free to move under the strain or tension imparted by the drawing-off mechanism whereby the rolls only operate during the operation of the said mechanism.

2. In a machine for making ropes or cables, the combination of means whereby the strands are laid up around a central core, devices for

compressing individual strands before they are laid up, and a drawing-off mechanism the operation of which controls the compressing devices whereby the latter only operate during the movement of the drawing-off mechanism.

3. In a machine for making ropes or cables, mechanism by which strands are laid up around a central core to form a complete rope or cable, and compressing mechanism by which said strands are individually flattened or shaped in spiral lines before being laid into the rope and without being themselves twisted, said spiral formation of the strands coinciding with the lay or twist of the rope, and a drawing-off mechanism controlling the operation of the compressing mechanism whereby the latter only operates during the operation of the former.

4. In the manufacture of ropes or cables, a machine by which the strands are laid up around a core, in combination with compressing-rollers attached to the laying-head of the machine between it and the die-block so that the strands pass between the compressing-rollers before reaching the die-block, and a drawing-off mechanism controlling the operation of the compressing-rollers.

5. In a machine for making ropes or cables, a laying-head through which the strands are passed, a die-block to which the strands are converged and wherein they are laid up around a central core to form a complete cable, compressing-rollers carried by the revolving laying-head and arranged in pairs between it and the die-block, whereby the strands are passed between said rollers and compressed during the process of laying the strands up, and a drawing-off mechanism controlling the operation of the compressing-rollers whereby the rotation of the rolls is dependent upon the operation of the drawing-off mechanism.

6. In a machine for making ropes or cables, a laying-head through which the strands are passed, rollers arranged in pairs and carried by the laying-head, said rollers having grooves or channels made in their faces and adjusting-screws for the journal-bearings whereby the strands converging from the head to the die-block are passed between the pairs of rollers and given a corresponding shape, and the degree of compression regulated, and a drawing-off mechanism for operating the rollers whereby the rotation of said rollers is dependent upon the operation of the drawing-off mechanism.

7. In a machine by which the strands of a rope or cable are laid up around a core, a die-block, a laying-head through which the strands pass, and from which they converge to the die-block, compressing and shaping devices carried by the laying-head, and through which the strands pass on their way to the die-block, whereby a spiral form is given to the strands corresponding with their position in the rope,

and a drawing-off mechanism controlling the operation of the compressing and shaping devices.

5 8. In a machine for making ropes or cables, a die-block through which the strands pass, a laying-head by which the strands are directed in their passage to the die-block, grooved or  
channeled shaping devices fixed to and rev-  
10 oluble with the laying-head, whereby the strands passing through said devices are shaped and given a spiral form correspond-

ing with the lay of the rope, and a drawing-off mechanism controlling the operation of the shaping devices whereby the latter only re-  
volve during the operation of the former. 15

In witness whereof I have hereunto set my hand.

ANDREW S. HALLIDIE.

Witnesses:

S. H. NOURSE,

J. B. LEE.