

No. 659,437.

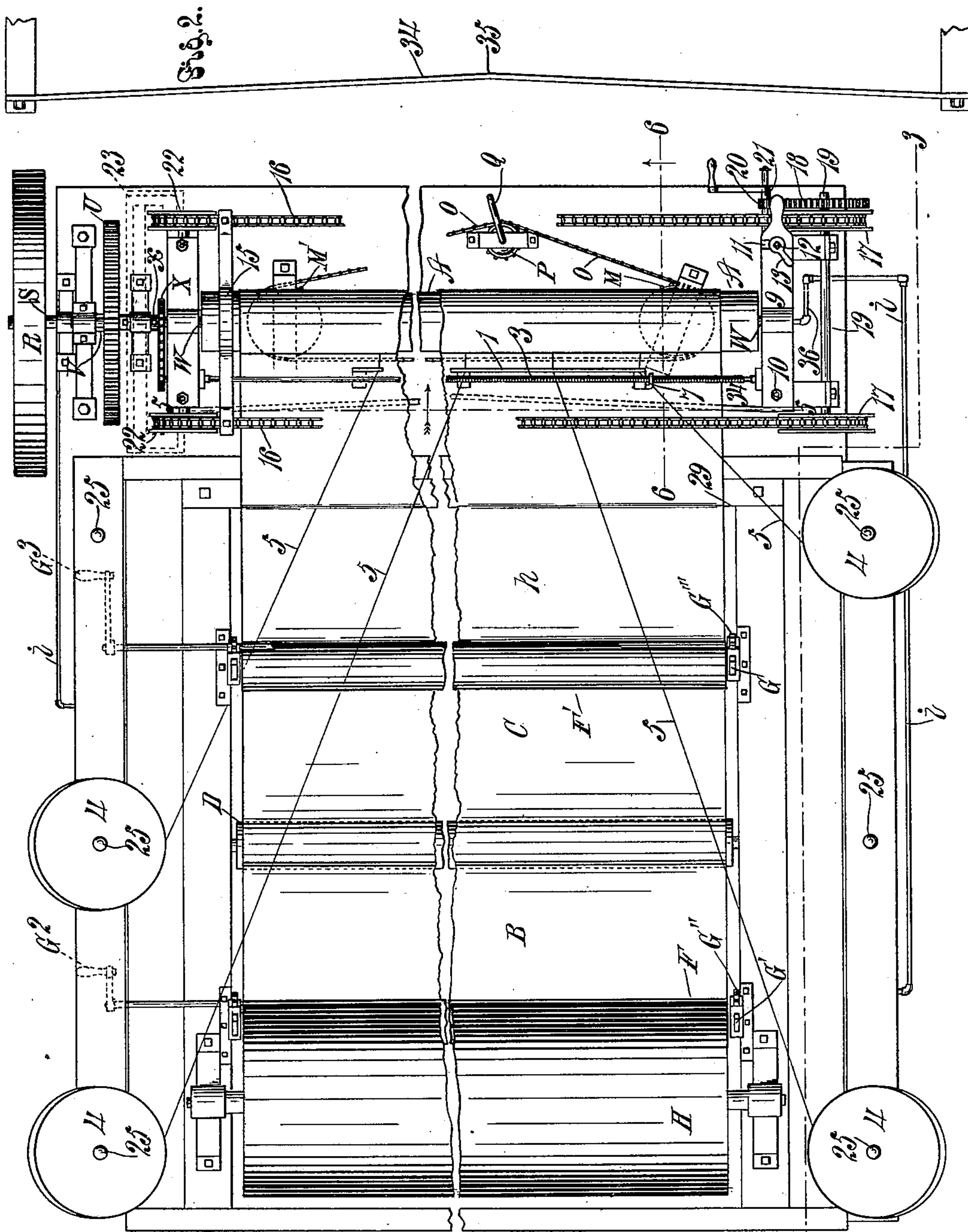
Patented Oct. 9, 1900.

A. S. DIXON.  
PIPE MAKING APPARATUS.

(Application filed Apr. 6, 1900.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses  
Secretaryman.  
J. Townsend.

Albert Stanley Dixon  
by Townsend Bros.  
his attys.

**No. 659,437.**

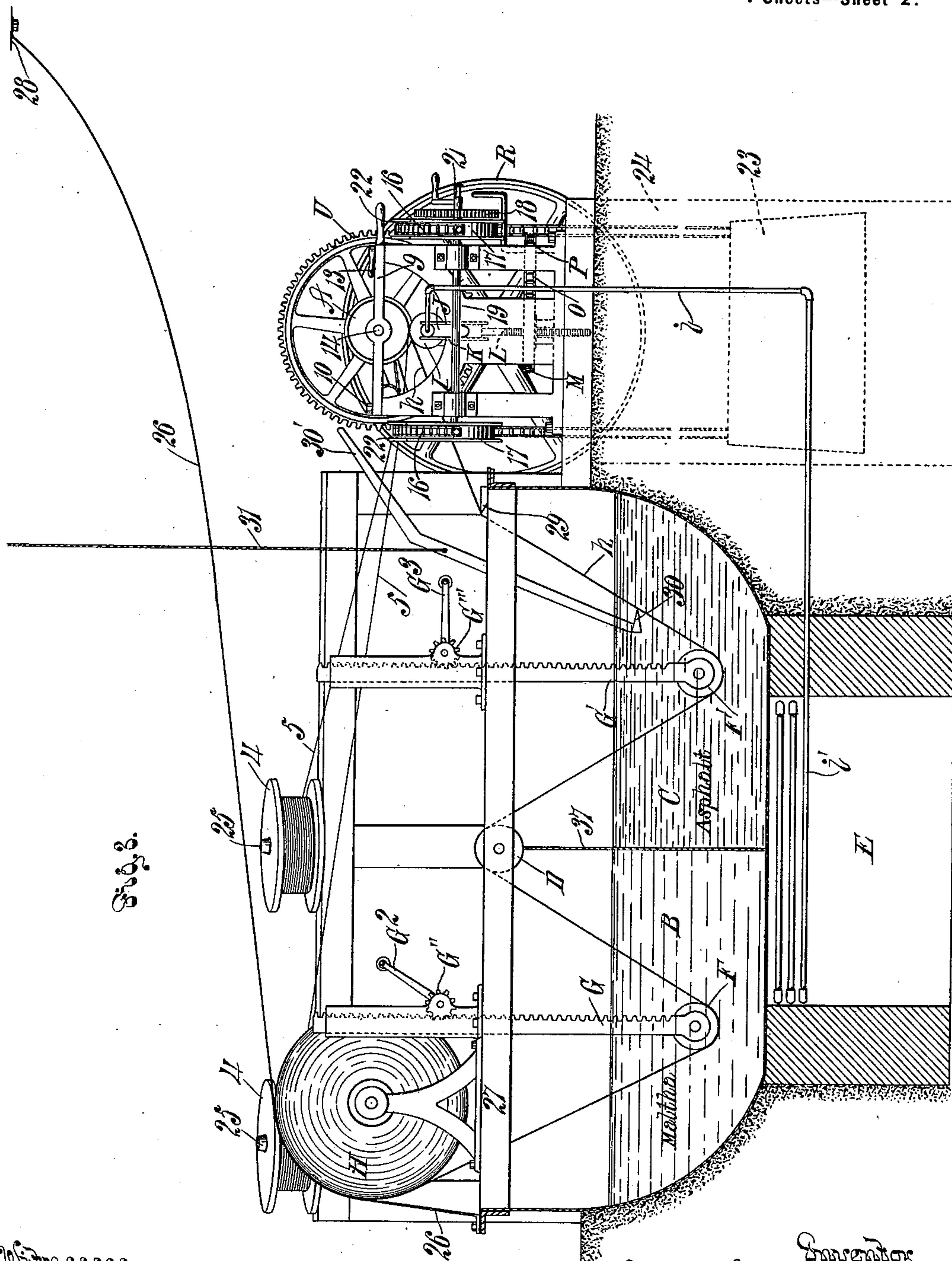
**Patented Oct. 9, 1900.**

**A. S. DIXON.**  
**PIPE MAKING APPARATUS.**

(Application filed Apr. 6, 1900.)

(No Model.)

**4 Sheets—Sheet 2.**



Witnesses  
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4 Sheets—Sheet 3.

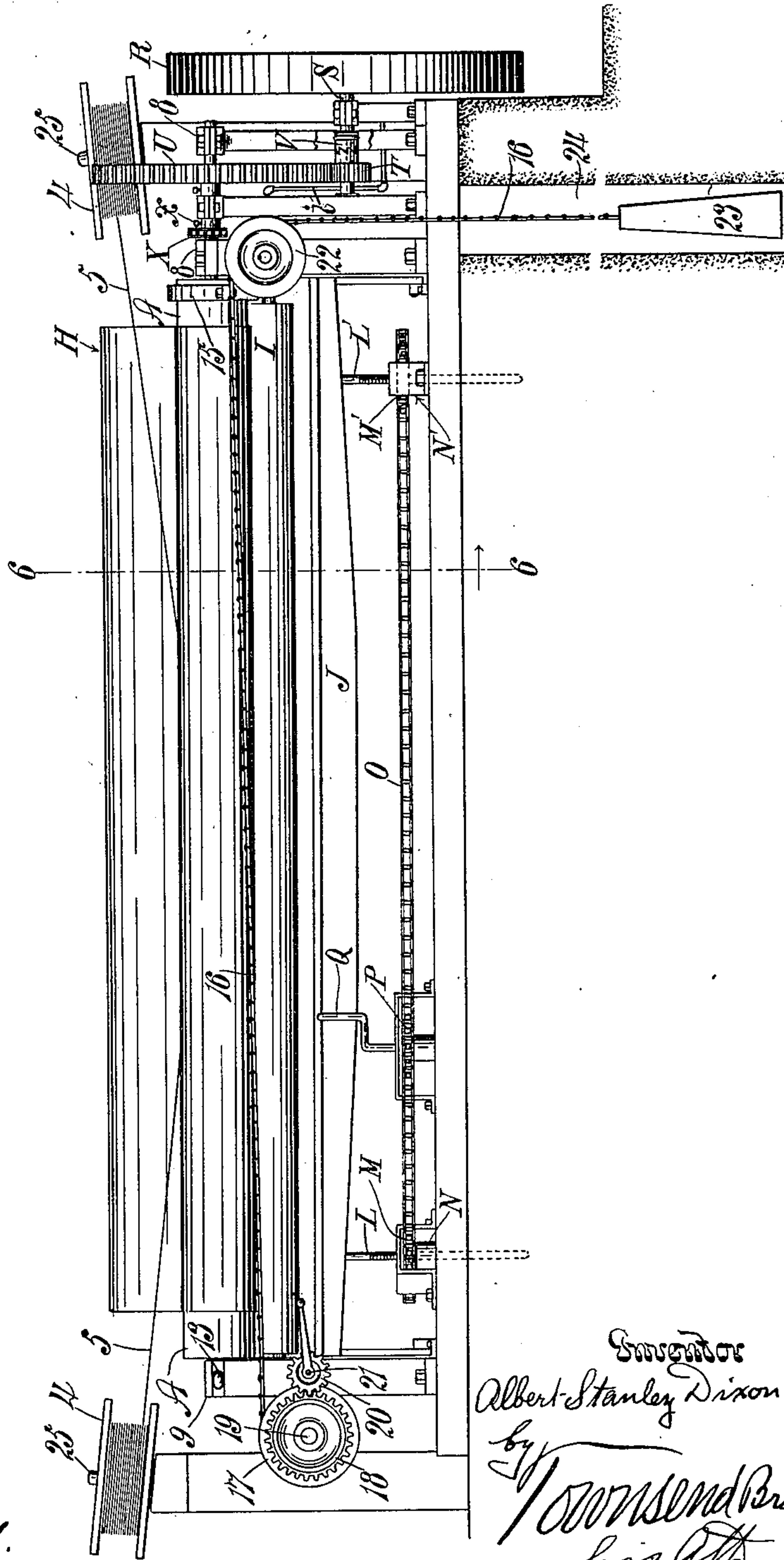


Fig. 3.

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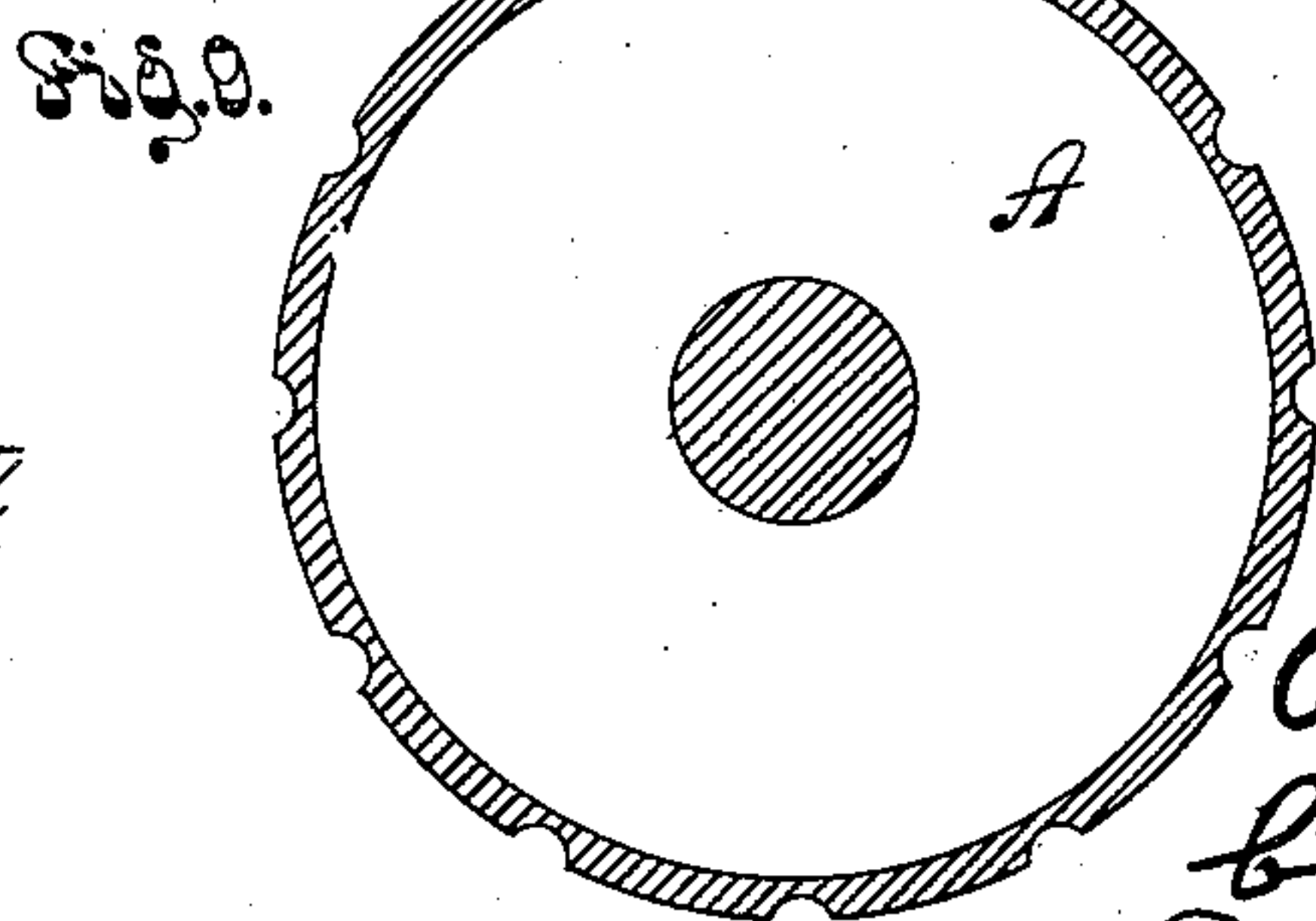
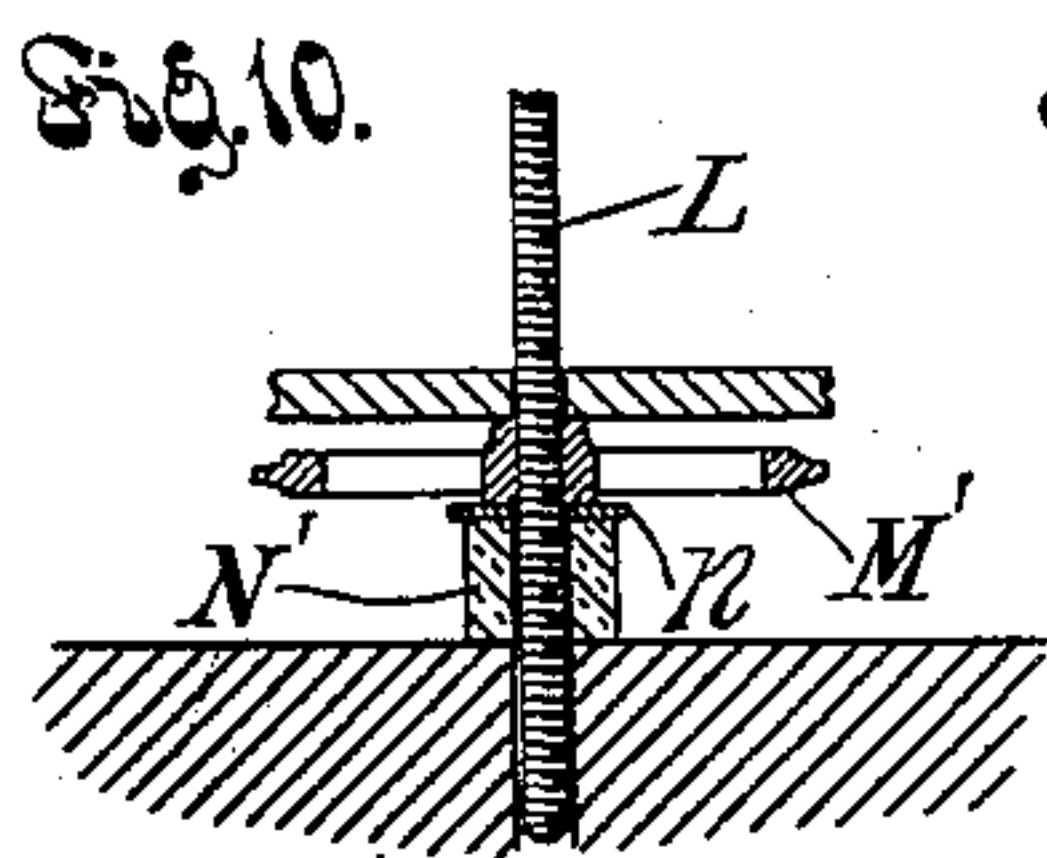
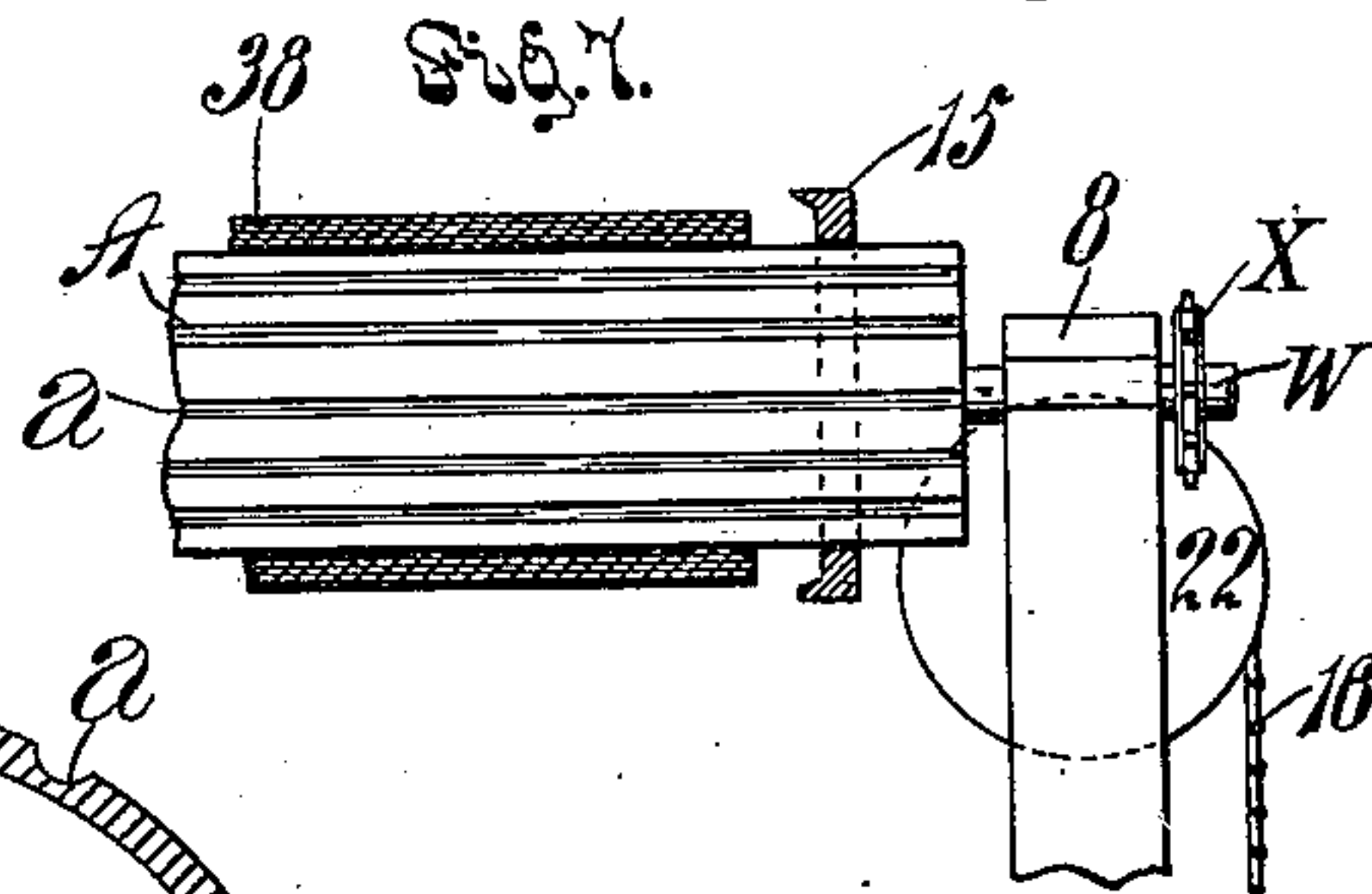
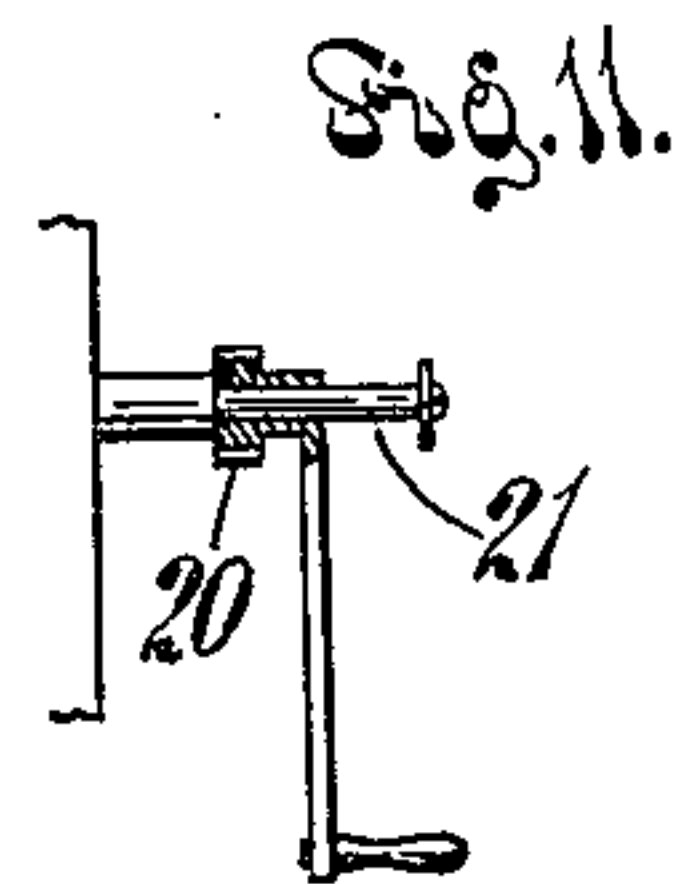
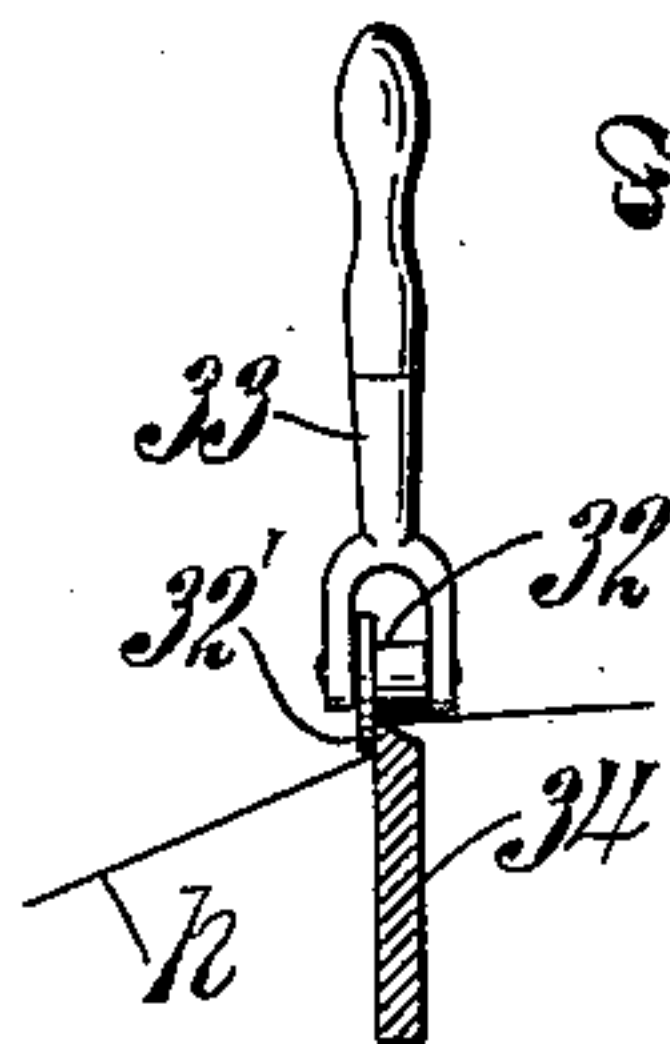
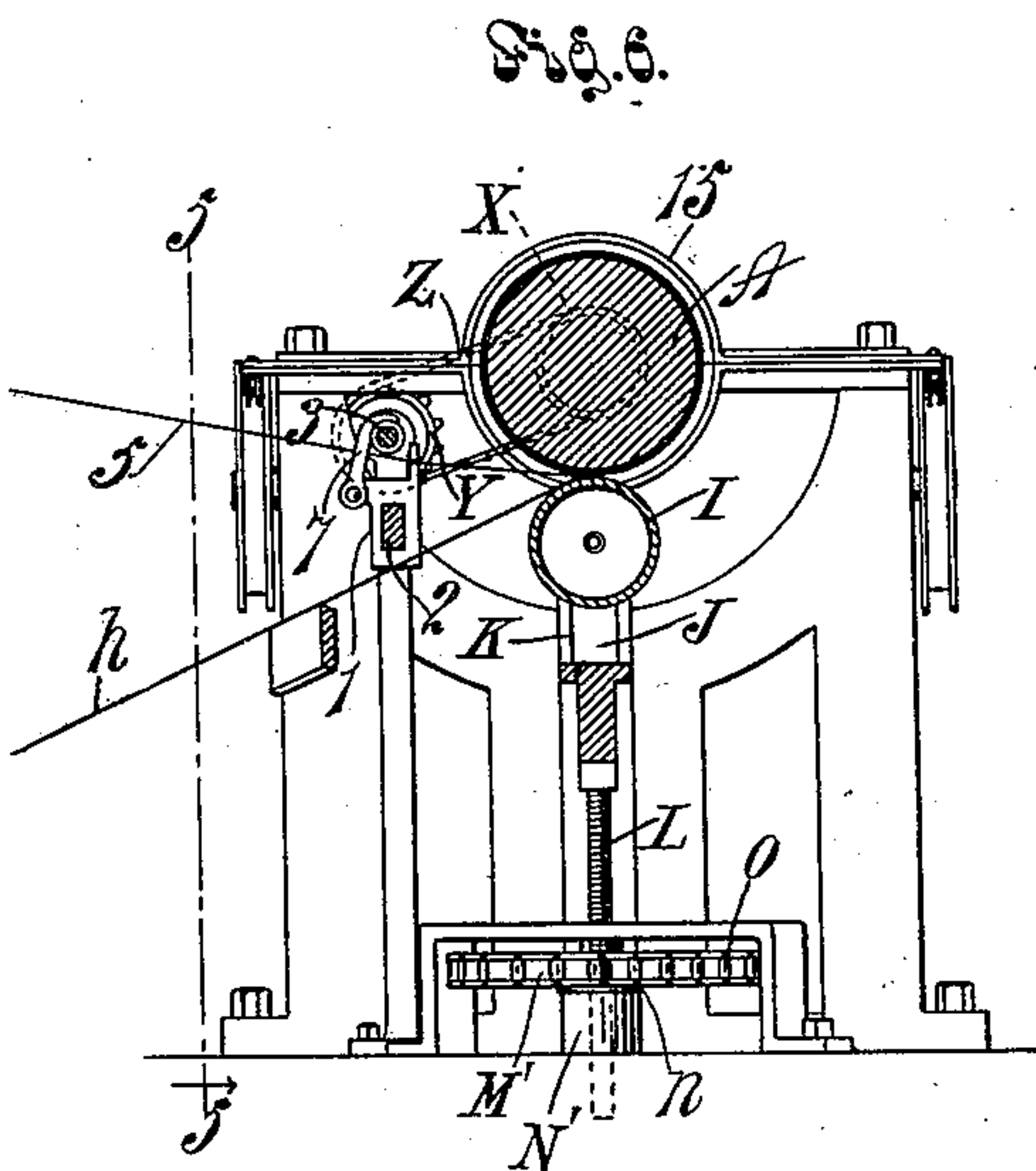
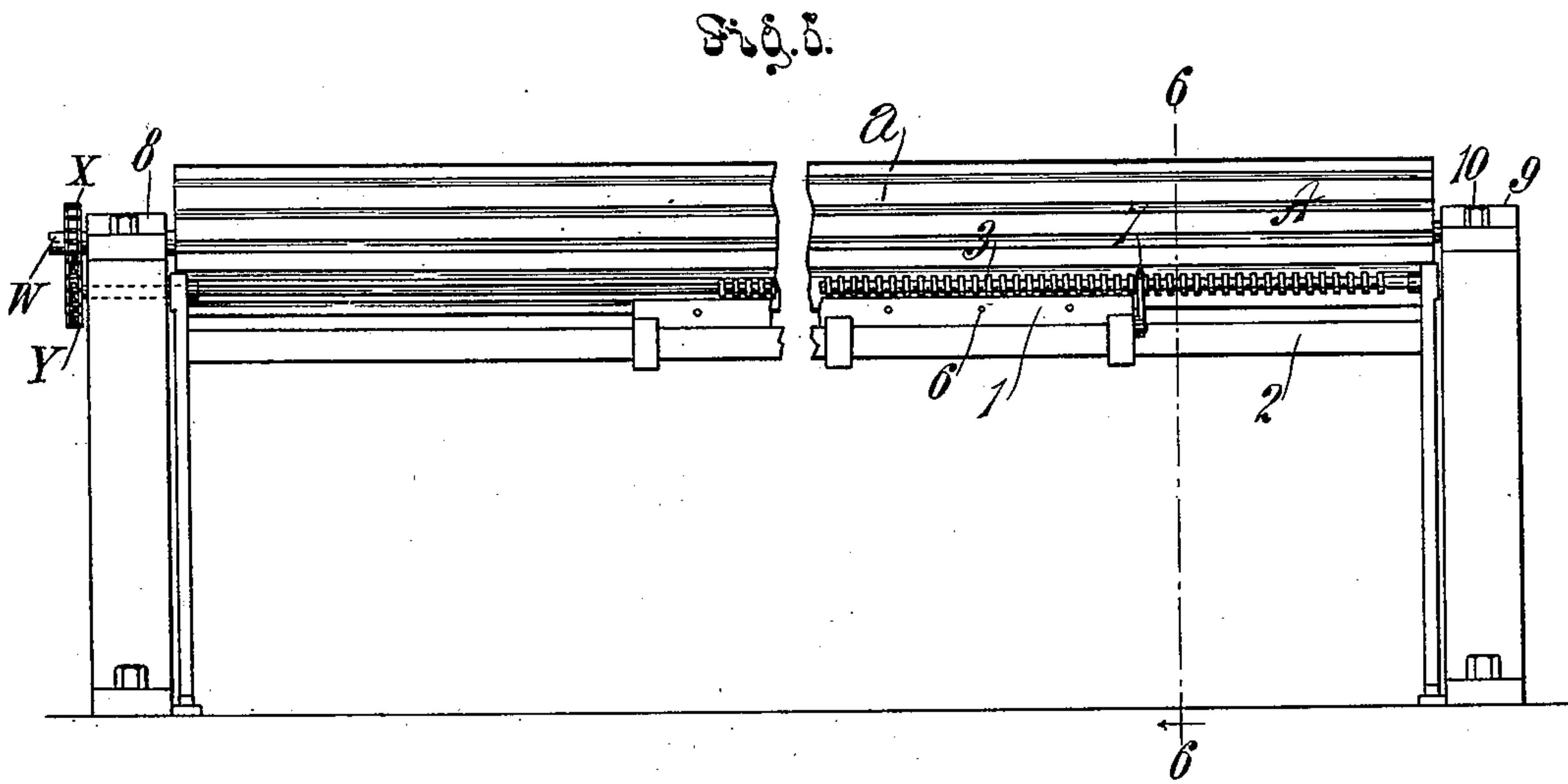
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4 Sheets—Sheet 4.



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# UNITED STATES PATENT OFFICE.

ALBERT S. DIXON, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO THE  
ASPHALT PAPER PIPE COMPANY, OF SAME PLACE.

## PIPE-MAKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 659,437, dated October 9, 1900.

Application filed April 6, 1900. Serial No. 11,881. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT STANLEY DIXON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Pipe-Making Apparatus, of which the following is a specification.

The object of this invention is to provide means for manufacturing asphalt-paper pipe of a superior character. Said pipe is to be made of paper saturated with a thin asphaltum and then coated with a thick asphaltum and then tightly wound under pressure upon a mandrel, with or without an interposed wrapping of one or more metallic strands.

The accompanying drawings illustrate my invention as in operation with four wrapping-wires.

Figure 1 is a plan view of my newly-invented pipe-making apparatus in operation, a fragment being broken away to narrow the view. Four spools of wrapping-wire are shown in place. The machine is adapted for the application of six wires or less. Fig. 2 is an unbroken plan of the bar over which the paper runs to the mandrel and upon which the paper is cut. Fragments of the supports for the bar are shown. Fig. 3 is an elevation on the irregular line 3 3, Fig. 1, showing the saturating and coating vats in section and the winding and compressing machinery in end elevation. Fig. 4 is a front elevation of the apparatus. Fig. 5 is a detail of the wire-carrier looking toward the front of the machine from line 5 5, Figs. 1 and 6. Fig. 6 is a section on line 6 6, Figs. 1, 4, and 5, looking in the direction of the arrow. A solid mandrel instead of a hollow one is shown in this view. Fig. 7 is a detail of a fragment of the preferred form of the pipe-forming mandrel with a sectioned fragment of manufactured pipe thereon and the pipe-removing collar shown in section. Fig. 8 is a view showing the paper-cutting knife in cross-section and the paper-cutting roller in position in the act of severing the sheet of paper. Fig. 9 is a cross-sectional detail of the preferred form of paper-winding and pipe-forming mandrel. Fig. 10 is a fragmental detail in vertical mid-section, showing the means

for adjusting the pipe-compressing roller. Fig. 11 is a fragmental detail view to show the detachable crank-shaft and pinion.

A indicates a power-driven mandrel. 55

B indicates a vat or receptacle for thin saturating material, such as maltha or thin asphaltum.

C indicates a vat or receptacle for a thick coating material, such as asphaltum, which is hard at the temperatures to which the pipe will ordinarily be subjected. 60

D indicates a sheet-supporting device between the receptacles B and C. Suitable means are provided, such as the furnace E, for heating the contents of the receptacles to keep the same sufficiently fluid for the work required. F F' indicate two sheet-depressing devices, one for each of said receptacles. G G' G'' G''' G<sup>2</sup> G<sup>3</sup> indicate means for raising and lowering said devices. 70

H indicates a roll of paper arranged to feed paper into the receptacle B.

I indicates a roller, being means for pressing the coated sheet forcibly against the mandrel A. 75

The machine is provided with means for feeding wire between the convolutions of the paper while the same is being wound upon the mandrel. 80

1 indicates a wrapping-wire carriage.

2 indicates a way or track for guiding the carriage parallel with the mandrel, and 3 indicates a screw parallel with the mandrel to move the carriage lengthwise of the mandrel. 85

4 indicates wire-holding spools, and 5 indicates wires led from the spools through wire-guides 6 in the carriage to be inserted between the mandrel and the roller. The screw 3 is located between the carriage 1 and the mandrel A. 90

7 indicates a dog pivoted on the carriage to be thrown into engagement with the screw for moving the carriage along. When the dog is to be used, it is thrown up into the space between the screw-threads, so that as the screw rotates it will move the carriage along the way or track 2. To return the carriage the dog will be thrown out of engagement with the screw and the carriage slid back by hand. 95 100

The compressing-roller I is mounted on a carrier J, which moves in ways K to carry the



compressing-roller I toward and from the mandrel A.

L L' indicate screws which carry the carrier. Means are provided for raising and lowering the screws uniformly to move the compressing-roller I toward and from the mandrel A and parallel thereto. For this purpose M M' indicate sprocket-wheels formed as thrust-nuts held by spring-supports N N', which are preferably made of india-rubber and are centrally perforated to allow the screws to play freely up and down there-through. The upper ends of said screws are fastened to the carrier J to prevent rotation of the screws.

O indicates a sprocket-chain led around the sprocket-peripheries of the sprocket-wheel nuts M M' and also around a power sprocket-wheel P, which is to be turned by suitable means, such as the crank Q, thus to rotate the nuts M M' to simultaneously raise and lower the screws L L' and the carrier J and compressing-roller I.

Any suitable means may be employed for driving the mandrel A. For this purpose R indicates a band-wheel mounted on a shaft S, connected through clutch mechanism V with a pinion T, meshing with a cog-wheel U, which is mounted on the shaft W of the mandrel A. In the form shown the shaft W of the mandrel A is provided with a sprocket-wheel X, and the screw 3 is provided with a sprocket-wheel Y.

Z indicates a sprocket-chain led around the sprocket-wheels X and Y to cause the carriage-driving screw 3 to rotate simultaneously with the mandrel A, so that the wires will be carried along the mandrel with definite relation to the rotations of the mandrel.

9 indicates a movable journal-box, which is pivoted to the main frame by a pivot 10 and is provided with a slot 11 to embrace a bolt 12, on which a spanner 13 screws to clamp the movable box 9 in position for sustaining the free end of the shaft W of the mandrel A.

15 indicates a collar around the mandrel and connected at its opposite sides with means by which the collar can be slid along the mandrel. Such means preferably comprise the flexible connections 16, which are carried around a drum 17 at the open end of the machine—that is to say, the end at which the mandrel is free. Suitable means are provided for rotating the drum.

18 indicates a cog-wheel on a shaft 19 of the drum.

20 indicates a pinion on the crank-shaft 21 and meshing with the cog-wheel 18 to drive the same with considerable power, so that by rotating the crank the flexible connections 16 will be drawn toward the free end of the machine, thus sliding the collar along the mandrel.

22 indicates pulleys at the supported end of the mandrel, over which pulleys the flexible connections 16 are led to be operated by a weight 23 in a pit 24 below the machine,

thus to give sufficient play to the collar, so that when the drum 17 is released the weight 23, acting upon the flexible connections, will unwind the same from the drum and will return the collar 15 to its normal position at the supported end of the mandrel. For convenience of operation the crank-shaft 21 and pinion 20 are arranged to slide with relation to their bearings 24, thus to be thrown into and out of mesh with the cog-wheel 18.

25 indicates the pins, upon which the spools of wire 4 are mounted.

26 indicates a flexible brake which is in the form of a band applied to the surface of the paper-roll H and fastened at one end to the frame 27 of the receptacle or vat B and fastened at its other end to the ceiling 28 or to any other suitable support.

29 indicates a scraper at the edge of the coating vat or receptacle C and over which the sheet of paper *h* will be drawn in the process of manufacturing pipe, thus to remove the coating material from the under side of the sheet.

30 indicates a scraper pivotally supported by a flexible connection 31 and provided with a handle 30' and arranged to normally hang in the hot coating material in vat C, thus to constantly keep the scraper 30 heated to the temperature or the coating material in the vat. The purpose of this scraper is to remove the coating material from the first lap of the paper which is to be applied to the mandrel, so that as small amount as possible of the coating material will come into contact with the mandrel. The purpose of keeping this scraper 30 hot is to keep it free from congealed asphalt, which would give it a rough surface and would thus prevent the desired removal of the material.

The mandrel A may be of any desired form, but preferably is provided with longitudinal grooves *a*, as shown in Figs. 7 and 9. The ribbed surface formed by reason of these grooves assists in preventing the mandrel from slipping with relation to the tube of paper wound thereon; but the grooves facilitate the removal of the manufactured tube from the mandrel, because they reduce the frictional surface of the mandrel.

32 indicates a cutting-tool formed in a flanged roller and provided with a handle 33.

34 indicates a knife mounted between the vat and the mandrel and roller and bent toward the mandrel and roller to form a very blunt point 35 at its mid-length. The upper edge of the knife is sharp, as indicated in the sectional view in Fig. 8, and when the sheet of paper *h* rests upon the edge of the knife the same can be severed by rolling the roller 32 across the paper above the edge of the knife 34. The flange 32' will press the paper down in front of the face of the knife and will thus effect the cutting of said sheet. When the sheet is thus cut, the end thereof which is unsevered from the strip in the vat will be bluntly pointed.



It is necessary for the most satisfactory work that the roller I shall be kept at a considerable temperature, so that such portion of the coating as may not be removed by the scraper 29 will not adhere to such roller.

For the purpose of keeping the roller I constantly hot said roller is made hollow and is connected through pipe *i* with the heating-coil *i'* in the furnace E. This pipe is jointed at each end, as indicated at 36, to admit of the adjustment of the heating-roller.

In practical operation the workman will first turn the cranks  $G^2 G^3$ , thus operating the pinions  $G'' G'''$  to respectively raise the rack-bars  $G G'$ , with which the pinions  $G'' G'''$  engage, and thus to raise the rollers  $F F'$  above the level of the supporting-roller D at the partition 37 between the receptacles B C. Then, the roll of paper H being in place, the strip of paper *h* will be unwound therefrom and will be brought beneath the rollers  $F F'$  and over the supporting-roller D and will be carried forward to the pipe-forming portion of the machine. Then the cranks  $G^2 G^3$  will be turned to throw the rack-bars  $G G'$  down, thus to press the paper down below the level of the maltha and asphaltum in the vats. Then when the paper has become properly treated the free end of the paper strip will be drawn up and inserted into the space between the mandrel and the roller. Power being applied to drive the mandrel, the paper will be drawn around the mandrel and inserted in between the mandrel and paper, so that the rotation of the mandrel will wind the paper on the mandrel. The roller-adjusting crank Q will be turned to bring the compressing-roller I firmly up against the under side of the paper beneath the mandrel to firmly compress the material while the pipe is being formed. As the thickness of the pipe increases the india-rubber springs  $N N'$  will yield somewhat, thus accommodating any irregularities of the material on the mandrel; but as the thickness of the pipe increases the crank Q will be turned in a reverse direction to lower the carrier and the compressing-roller sufficiently to allow the work to proceed. When the pipe has been formed of nearly the required thickness, the cutting-roller 32 will be run along upon the paper above the edge of the knife 34, as indicated in Fig. 8, thus to sever the paper and leave a blunt point on the end of the strip remaining connected with the paper-roll, and the mandrel is allowed to make a further rotation, thus to more firmly compress the sheet and to seal the severed end of the paper on the outside of the tube, a sufficient amount of the coating asphaltum being squeezed out from between the convolutions of the paper to perfect the outside of the pipe. Then the clutch V will be thrown out of gear, and the spanner 13 will be turned to release the movable journal-bar 9, which will then be swung upon its pivot away from the free end of the mandrel-shaft W. Then the pinion 20 will

be brought into mesh with the cog-wheel 18 of the drum 17, and the pinion 20 will be turned by means of its crank, thus rotating the drum and winding up the flexible connection 16 and drawing the collar 15 along the mandrel to force the completed pipe 38 off of the mandrel A. The collar 15 is preferably cupped and provided with an inwardly-beveled rim upon that side which is presented toward the end of the manufactured pipe, so that the collar will bind the end of the pipe and prevent it from spreading under the pressure of the collar. The sprocket-wheel X forms a thrust-collar on the mandrel-shaft W to hold the shaft from being drawn endwise by the operation of the collar 15. *x* indicates a set-screw for fixing the sprocket-wheel X firmly upon the shaft W to resist the thrust while the manufactured pipe is being removed. When the pipe has been removed, the movable bearing is swung back and secured in place by the spanner, and the end of the paper is again inserted and the operation described is repeated. At an appropriate time just before the completion of the pipe the workmen will use the scraper to remove the coating from the upper surface of the paper sheet *h* at the portion which will come into contact with the mandrel in starting to form the pipe.

The medium which passes through the pipe *i* for heating the roller I is preferably water. I have used hot air effectively; but water is the best.

*n* indicates metal washers on top of the rubber bearings  $N N'$ , respectively, to receive the wear of the sprocket-nuts  $M M'$ .

During the operation the tension of the paper will be adjusted as desired by means of the brake-band 26.

The workmen before applying the paper to the mandrel will first thoroughly lubricate the mandrel with a suitable lubricant, which will prevent the paper from adhering to the mandrel.

When it is desired to strengthen the pipe by means of wire, the wires 5 from the spools 4 will be brought forward through the carriage 1, and when one or more layers of paper have been wrapped upon the mandrel the wires will be inserted at their appropriate places between the paper sheet and the paper that is wrapped upon the mandrel, and the further rotation of the mandrel and the movement of the carriage by means of the screw 3 will carry the wires alongside the mandrel, so that as the wrapping of the paper continues the wires will become wrapped in a spiral between the paper layers. Before the pipe is fully completed the wires will be cut and the coated paper allowed to lap beyond the ends of the wires thus cut, and preferably one or more wrappings of paper will be applied after the wires have been cut, so that the wires are completely embedded in the pipe and are not subject to action from external forces. When the collar is brought forward to force the pipe off of the mandrel,



the beveled socket receives the end of the pipe, and the pressure which is applied is thus made to compress the end of the pipe toward the mandrel, and all spreading of the pipe under the pressure of the collar is avoided. When the pipe has been slid along the mandrel, which is smooth from end to end, although provided with longitudinal grooves, it can be readily removed from the mandrel, and owing to the beveled form of the socket in the cup it is readily withdrawn from such socket, and the end of the pipe will be practically smooth and slightly tapered.

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

1. A pipe-making apparatus comprising a power-driven mandrel; a receptacle for a thin saturating material; a receptacle for a thick coating material; a sheet-supporting device between the receptacles; means for heating the contents of the receptacles; two sheet-depressing devices, one for each of said receptacles; means for raising and lowering said devices, respectively; a paper-roll to feed a sheet of paper into one of the receptacles; means for holding the coated sheet forcibly against the mandrel; and means for feeding wire between the convolutions of the paper while the same is being wound upon the mandrel.

2. A pipe-making apparatus comprising a power-driven mandrel; a receptacle for thin saturating material; a receptacle for thick coating material; a sheet-supporting device between the receptacles; means for heating the contents of the receptacles; two sheet-depressing devices, one for each of said receptacles; means for raising and lowering said devices, respectively; means for feeding a sheet of paper through the receptacles to the mandrel; and means for holding the coated sheet forcibly against the mandrel.

3. In a pipe-making apparatus, the combination of a power-driven mandrel; means for supplying to said mandrel a sheet having coating material thereon; means for pressing the coated sheet against the mandrel; and means for feeding wire into the convolutions of the sheet as the same is wound upon the mandrel.

4. In a pipe-making apparatus, the combination of a mandrel; a roller parallel therewith to compress the pipe material when wound upon the mandrel; a wrapping-wire carriage; a way for guiding the carriage parallel with the mandrel; and a screw parallel with the mandrel to move the carriage lengthwise of the mandrel.

5. In a pipe-making apparatus, the combination of a mandrel; a roller parallel therewith; a wrapping-wire carriage; a way for the carriage parallel with the mandrel; wire-holding spools with wires led from the spools through wire-guides in the carriage to insert the wires between the mandrel and roller; a screw located between the carriage and the

mandrel; and a dog on the carriage to engage the screw.

6. In a pipe-making apparatus, the combination of a mandrel; means for rotating the mandrel; a compressing-roller parallel with the mandrel; a screw parallel with the mandrel; means for connecting the screw with the mandrel to cause the screw to rotate relative to the mandrel; and a wrapping-wire carriage driven by the screw to feed the wrapping-wires between the mandrel and the roller.

7. A pipe-making apparatus, comprising a mandrel; means for supporting the mandrel at one end; movable means for supporting the mandrel at the other end; a compressing-roller parallel with the mandrel; means for moving the roller toward and from the mandrel; means for rotating the mandrel; and means for feeding a coated sheet between the mandrel and the roller.

8. A pipe-making apparatus, comprising a mandrel; means for supporting the mandrel at one end; movable means for supporting the mandrel at the other end; a compressing-roller parallel with the mandrel; means for rotating the mandrel; means for feeding a coated sheet between the mandrel and the roller; means for moving the compressing-roller toward and from the mandrel; a collar around the mandrel; and means for sliding the collar to and fro along the mandrel.

9. In a pipe-making machine, the combination of a mandrel supported at one end and free at the other end; a collar to slide along the mandrel; a drum at the free end of the mandrel; flexible connections connecting the collar with the drum; and means for returning the collar to the supported end of the mandrel.

10. In a pipe-making machine, the combination of a mandrel supported at one end, and upon which the pipe is formed; a collar to slide along the mandrel to engage the end of the manufactured pipe when the same is upon the mandrel; a drum mounted at the free end of the mandrel; pulleys at the supported end of the mandrel; flexible connections connected with the drum and with the collar and passing over the pulleys; means for rotating the drum; and a weight for operating the flexible connection to return the collar to its normal position.

11. In a pipe-making apparatus, the combination with a pipe-forming mandrel; of a collar around the mandrel and provided with a beveled socket to fit upon the end of the manufactured pipe; and means for sliding the collar along the mandrel.

12. In a pipe-making machine, the combination with a mandrel upon which the pipe material is to be wound; a roller mounted in vertical ways beneath the mandrel; screws at opposite ends of said roller to raise and lower the roller; and means for simultaneously rotating the screws to simultaneously move the opposite ends of the roller toward the mandrel, and vice versa.



13. In a pipe-making machine, the combination with a pipe-forming mandrel; of a compressing-roller mounted in ways beneath the mandrel; screws at the ends of the roller for  
5 moving the roller up and down in said ways; sprocket-nuts for supporting and raising and lowering the screws; a chain-driving sprocket-wheel provided with means for rotating the same; and a sprocket-chain led around the  
10 sprocket-nuts and around the sprocket-chain-driving sprocket-wheel.

14. The combination of a pipe-forming mandrel; means for rotating the same; a roller parallel with the mandrel; screws for  
15 moving the roller toward and from the mandrel; nuts screwed on the screws for moving the screws endwise; means for rotating the nuts; and springs for receiving the thrust of the nuts.

20 15. In a pipe-making machine, a pipe-forming mandrel the face of which is smooth from end to end and is provided with longitudinal

grooves whereby the pipe-forming material will be prevented from rotating with relation to the pipe-forming mandrel, and the pipe-  
25 forming material will be permitted to slide freely lengthwise of the mandrel for the purpose of removal therefrom.

16. In a pipe-making machine, the combination of a pipe-forming mandrel; a compress-  
30 ing-roller parallel therewith; and a V-shaped knife extending substantially parallel with the mandrel to form a rest for the sheet material fed to the mandrel and to enable the sheet to be cut to a pointed form substan-  
35 tially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, California, this 31st day of March, 1900.

ALBERT S. DIXON.

Witnesses:

JAMES R. TOWNSEND,  
JULIA TOWNSEND.