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PATENTED NOV. 22, 1904.

J. A. McCONNELL.

APPARATUS FOR MAKING NON-CONDUCTING COVERINGS.

APPLICATION FILED FEB. 23, 1904.

NO MODEL.

3 SHEETS—SHEET 1.

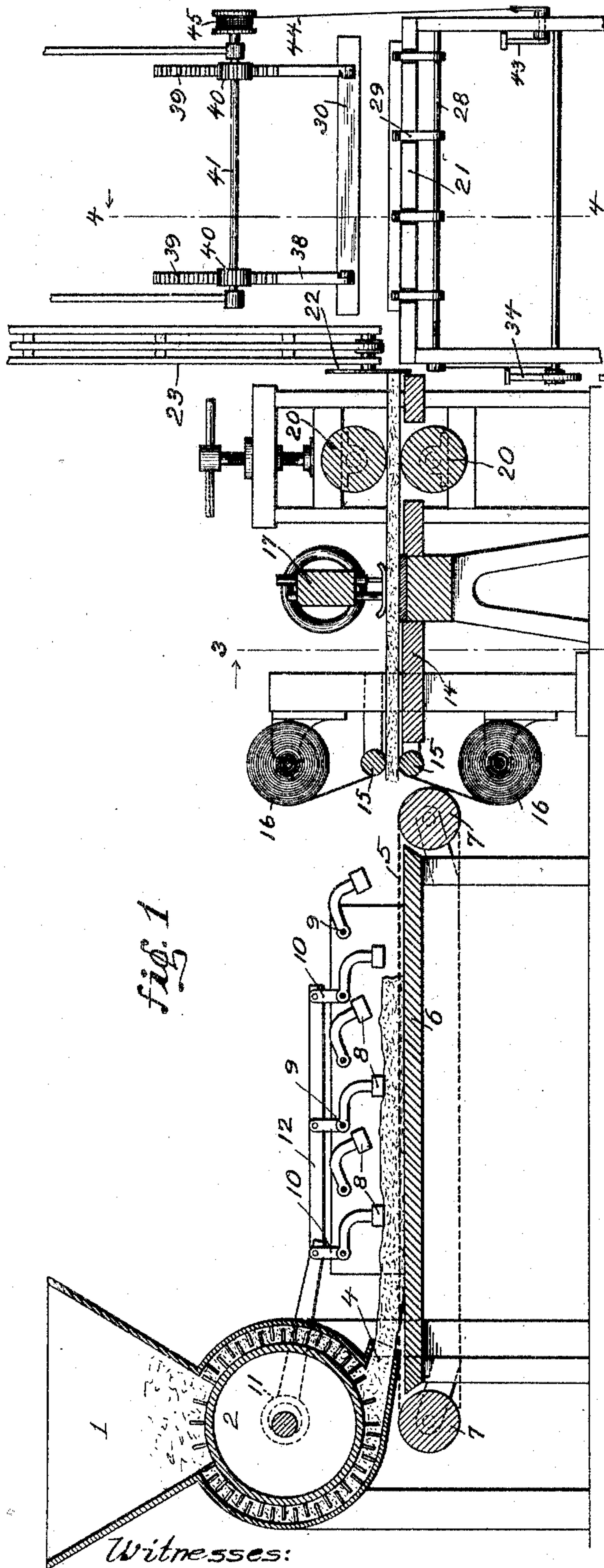


fig. 1

Witnesses:  
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J. R. Keller

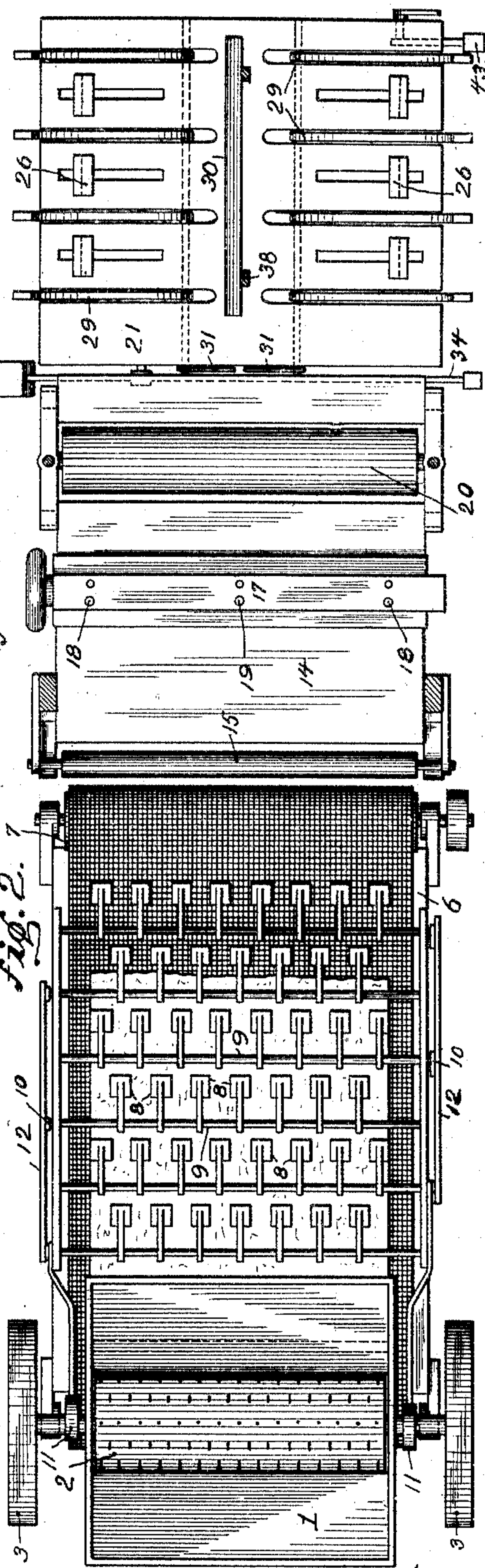


fig. 2

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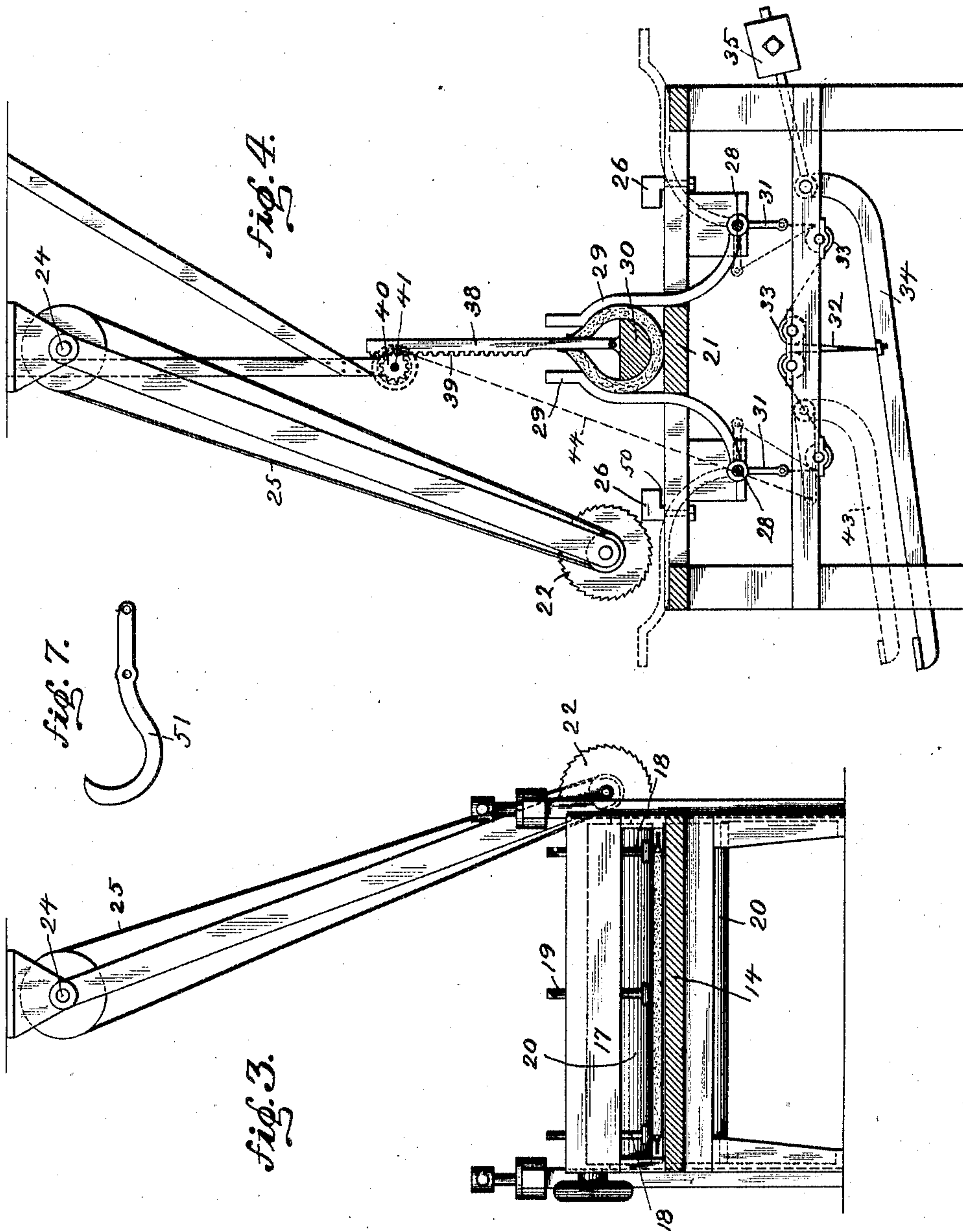
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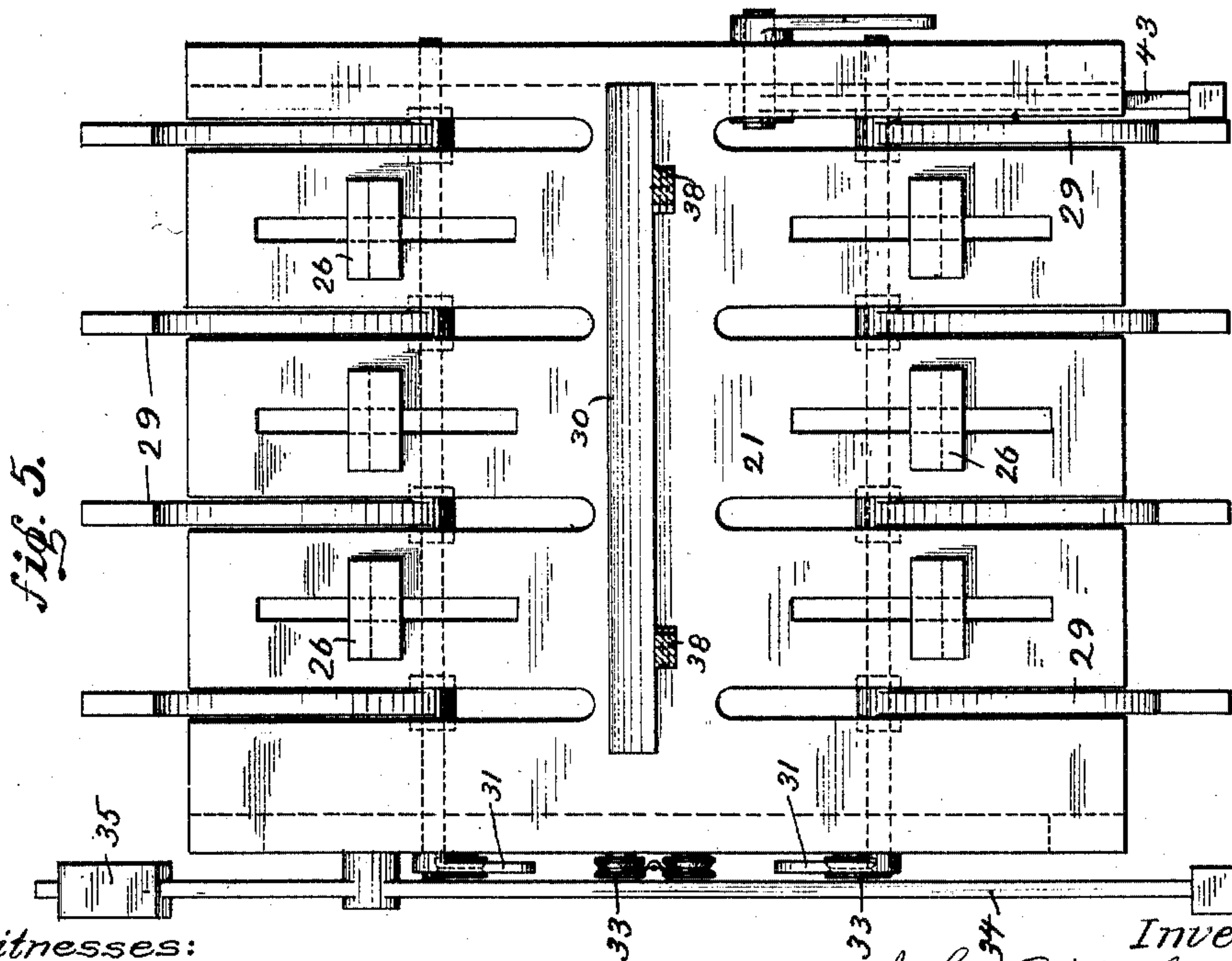
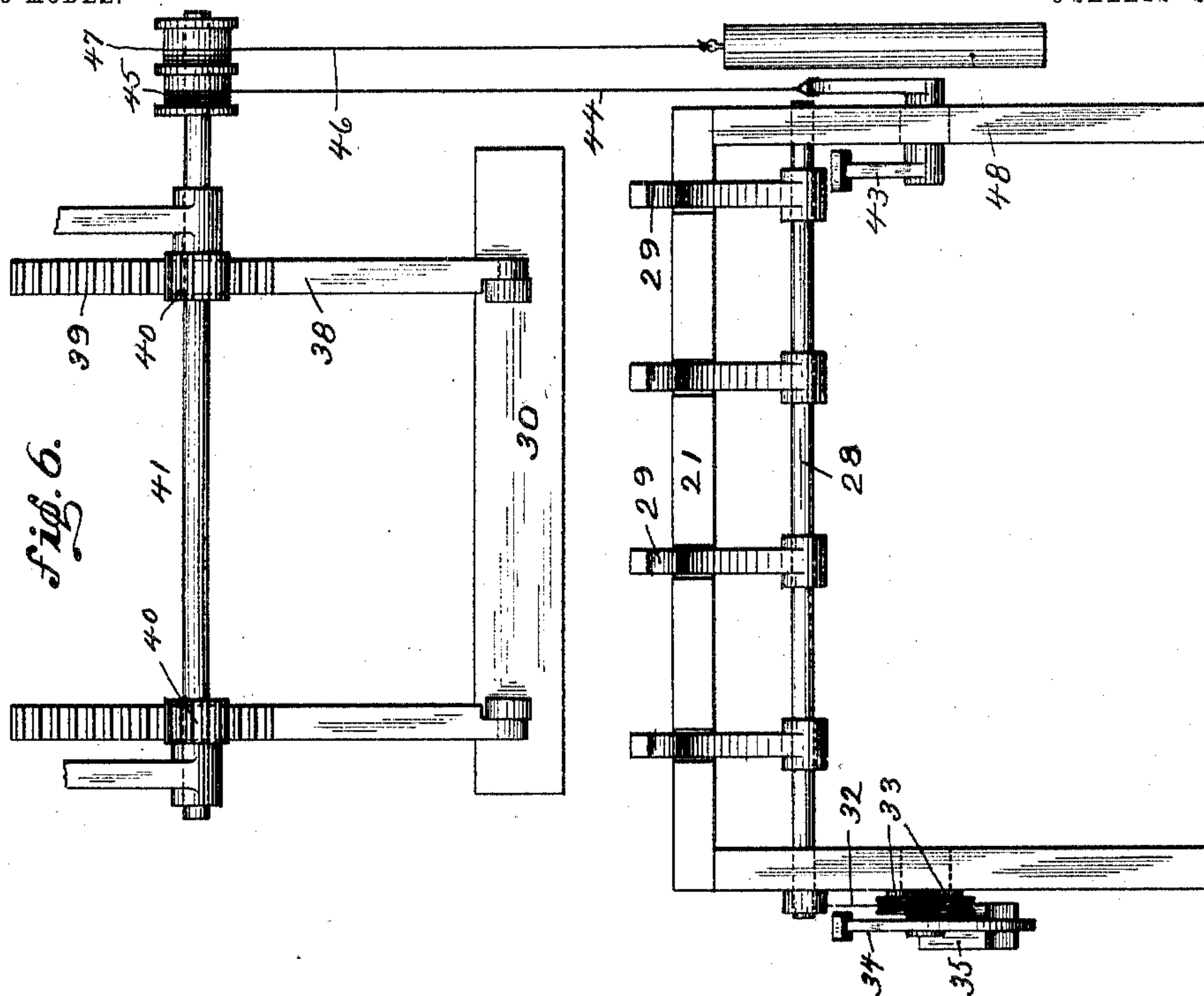
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NO MODEL.

3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR MAKING NON-CONDUCTING COVERINGS.

SPECIFICATION forming part of Letters Patent No. 775,849, dated November 22, 1904.

Original application filed February 13, 1902, Serial No. 93,934. Divided and this application filed February 23, 1904. Serial No. 194,808. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN A. McCONNELL, a resident of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Making Non-Conducting Coverings; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for making non-conducting coverings for steam-pipes, refrigerator-pipes, boilers, and the like, and more especially for making such coverings from a layer or layers of loose fibrous material—such as hair, asbestos fiber, or other suitable non-heat-conducting material—enveloped in layers of paper, felt, or other suitable material.

This application is a division of my application, Serial No. 93,934, filed February 13, 1902.

In the manufacture of tubular non-heat-conducting coverings of the character above described it has been the custom to interpose a layer of the fibrous material between enveloping sheets, suitably secure the same together, and then wrap the same around a mandrel into tubular form. It has been the custom to make such coverings in sections about three feet long, and the operations described have had to be repeated for each of said sections and were performed entirely by hand. This is a slow process, so that by the most improved apparatus heretofore in use it has not been possible for two persons operating such apparatus to make more than one thousand feet per day of covering for small-sized pipes and a very much less quantity for larger sizes.

The object of my invention is to provide apparatus for making tubular coverings of the kind described, whereby said coverings are made at quick intervals from practically continuous strips of enveloping material, such as paper or cloth, and a continuous layer of filling material, so that almost an unlimited quantity of covering can be made in a day and

in such a manner that said covering is provided with only a single longitudinal joint.

To these ends my invention consists, generally stated, in providing apparatus whereby enveloping strips of paper, felt, cloth, or other similar material may be laid together with an interposed layer or layers of loose non-conducting material—such as asbestos fiber, mineral wool, or hair—together with means for cutting the assembled strips and layers into sections of the desired length, means for suitably securing the same together, and means for bending such cut-off assembled sections into tubular form.

More specifically stated, my invention comprises an arrangement of apparatus whereby loose fibrous material is laid down in a continuous layer of uniform thickness and compacted and then introduced between the enveloping sheets, the latter then secured together by stitching or stapling and then cut into sections and bent into tubular form, the bending device acting intermittently and the other parts of the apparatus also necessarily acting intermittently to supply the assembled sections to the bending mechanism at suitable intervals.

My invention also consists in details of construction and arrangement of parts, as will hereinafter appear.

In the accompanying drawings, Figure 1 is a longitudinal section through my apparatus. Fig. 2 is a plan view of the same. Fig. 3 is a section on the line 3 3, Fig. 1. Fig. 4 is a similar section on the line 4 4, Fig. 1. Figs. 5 and 6 are respectively plan and side views of the bending mechanism, on an enlarged scale; and Fig. 7 is a detail of a modified form of bending-arm.

The loose fibrous material is laid down in a practically continuous layer and compacted and then introduced between the enveloping strips. The loose fibrous material is placed into a hopper 1 of a rotary picker 2, which is positively driven from any suitable source,



such as the belt-pulleys 3, and which picker delivers the fibrous material in a thin uniform layer through the spout 4 upon an apron, belt, or chains 5, running over the table 6. This apron or belt at each end of the table passes over rollers 7, which are driven from any suitable source of power.

To compact or felt the fibrous material on the apron or belt 5, I provide a series of hammers 8, mounted on rock-shafts 9, extending transversely over the table 6 and having connected thereto the arms 10, which are actuated from any suitable source, such as eccentrics 11 on the picker-shaft, which eccentrics are connected by suitable rods 12 to the arms 10 of the rock-shafts. Alternate ones of these rock-shafts 9 are preferably connected to separate eccentrics, as shown in plan view, Fig. 2, wherein an eccentric is provided on each end of the picker-shaft, and the connecting-rods 12 on the two sides are connected to alternate ones of the rock-shafts. These two eccentrics are placed in reverse position on the picker-shaft, so that when one half of the hammers are raised the other half will be depressed, as indicated in Fig. 1. Through the action of the eccentrics these hammers alternately rise and fall and stamp or press the loose fibrous material down upon the apron 5 upon the table and compact the same.

At the end of the table 6 is another table, 14, at the forward end of which are the guide-rollers 15. The enveloping strips of paper, canvas, or other material are carried on spools or rolls 16, suitably supported one above and the other below the table 14. From these spools the layers of enveloping material are led over the guide-rollers 15, one above and the other below the layer of fibrous material which is fed forward by the apron or belt 5. The combined layers of fibrous material and enveloping strips are then fed forward to suitable stitching or stapling mechanism 17, which will unite the enveloping strips at their edges, as indicated at 18, so as to inclose the fibrous filling, and preferably will also unite the layers along the center, as at 19. From this stitching mechanism the filled covering passes through a pair of plain-faced feed-rollers 20, which press or compact the same and also feed it forward. These rollers are adjustable by means of ordinary adjusting-screws and they feed the filled covering onto the table 21, where a section of the desired length is cut off by any suitable means, such as the saw 22, mounted in the lower end of a swinging frame 23, suspended on a counter-shaft 24, mounted on the ceiling overhead, so that said frame and saw can be swung transversely across the path of the filled covering and cut off a section of the desired length. The saw is driven from the counter-shaft 24 by a suitable belt 25 passing over pulleys on the counter-shaft and saw-arbor, respectively.

The bending mechanism may be of any of the forms shown in my application Serial No. 93,934, and the specific bending mechanism shown herein is one of the forms shown in the said application, but not claimed therein. This specific bending mechanism comprises the table 21, adapted to support the cut-off sections and provided with suitable guides or gages 26 for engaging the edges of said section and positioning the same. Mounted under this table are two rock-shafts 28, each carrying a series of bending-arms 29, which normally lie in approximately a horizontal position, as shown in dotted lines, Fig. 4, and which are adapted to be swung upwardly and toward each other, so as to engage the edges of the sections and bend the same into tubular form around a suitable mandrel 30. For this purpose the rock-shafts 28 are provided with arms 31, which are connected by means of cords or chains 32, passing over suitable guide-pulleys 33 to the counterweighted treadle 34. By pressing on this treadle the rock-shafts 28 will be actuated to swing the arms 29 from the dotted-line position (shown in Fig. 4) to the full-line position thereof, thus bending the assembled section around the mandrel 30. Upon releasing the treadle 34 the counterweight 35 will permit the arms 29 to return to their normal positions. These arms are slightly curved, as shown, so as to bend the covering into proper form.

The mandrel 30 presses the material along its longitudinal center down onto the table 21 and holds the same in position while the edges are being bent upwardly by the arms 29 to the position shown in Fig. 4, the article then being approximately a tube open at its upper edge. The mandrel is then withdrawn and bands or the like are applied to the article to complete its formation into tubular shape and to hold it in such shape. The mandrel 30 is secured to the lower end of plungers 38, and in order to permit its easy withdrawal from the bent-up article it is hinged to the lower ends of said plungers, as shown, and has one edge thereof weighted, so that when pressure is relieved it will assume a vertical position, as shown in Fig. 6; but when pressed onto the article it will swing down into the horizontal position. (Shown in Fig. 4.)

The plungers 38 are moved upwardly and downwardly by any suitable mechanism—such, for instance, as by having formed thereon the racks 39, which are engaged by gears 40 on a suitable overhead shaft 41, so that when this shaft is rotated in one direction the plungers 38 will be depressed, thereby carrying the mandrel 30 downwardly to press the filed section upon the table 21, while when said shaft is rotated in the opposite direction the mandrel will be raised and withdrawn from the bent-up covering.

Any suitable mechanism may be used for



rotating the shaft 41—such, for instance, as a treadle 43, cord 44 connected thereto and wound on a drum 45 on the shaft 41, and the cord 46, wound on a drum 47 and having at its free end the counterweight 48. By depressing the treadle 43 the shaft 41 will be rotated to lower the mandrel 30 and wind the cord 46 on the drum 47; but when said treadle is released the counterweight 48 will rotate the shaft in the opposite direction and elevate the mandrel. Various other forms of mechanism for doing this may be provided.

It will be observed that the bending mechanism described operates intermittently, and as a consequence the driving means for the picker for the belt 5 and for the feed-rollers 20 will also operate intermittently, so as to remain idle during the bending of one section; but as soon as the mandrel 30 is elevated these several mechanisms will again be put in action to supply and feed forward a new section. The treadle 43 therefore may be connected to a suitable clutch mechanism for throwing into and out of operation the driving means for the picker, for the belt 5, and for the feed-rollers 20 and may also control suitable mechanism for swinging the saw-frame 23 to carry the saw across the path of the assembled strips to sever the same. In coverings of this character it is desirable to have one of the enveloping strips somewhat wider than the other, so as to form a projecting flap to cover over the joint. The mechanism described is adapted for forming such extension-flap by merely having the material on one of the rolls 16 wider than that of the other. In this event one of the guides 26 will be provided with a slot or groove 50 for receiving the projecting portion of the wider enveloping strip.

Various modifications may be made in the mechanism described without departing from my invention. In lieu of the bending-arms 29 I may provide substantially hook-shaped arms 51. (Shown in Fig. 7.) With the latter, however, the mandrel 30 will not be used, as it could not be withdrawn from the tube because of the projecting ends of the hooks 51. In lieu of the bending mechanism shown I may employ the preferred form of bending mechanism shown and claimed in my application above mentioned, wherein the mandrel 30 serves as a plunger to force the section down into a suitable slot in a table or frame, so that the side walls of said slot will bend the edges of the sections up around the mandrel and into approximately tubular form.

The operation of the apparatus described will be readily understood, the picker 2 serving to lay the loose fibrous material in a continuous and uniform layer onto the belt 5, where it is compacted by the hammers 8 and fed forward and introduced between the en-

veloping sheets coming from the rolls 16. The whole is then suitably secured together by the stitching or stapling mechanism 17 and fed forward intermittently by the rollers 20 onto the bending-table 21. The saw 22 is periodically swung across the path of the assembled layers and severs a section of suitable length. As soon as the saw begins to cut off the section the forward feeding mechanism and picker come to a stop. By the time the section is severed the mandrel 30 will have been brought into contact with the section to firmly press the same down upon the table 21. The arms 29 are then immediately swung up into the position shown in Fig. 4, thus bending the section into approximately tubular form. The treadle 43 is then released, so as to permit the mandrel to be withdrawn, and bands or the like are applied to the article to complete its formation into tubular shape and to hold it in such shape, after which the arms 29 are permitted to resume their horizontal positions and the picker and feeding mechanism are again set in operation and again feed the assembled layers onto the table 21, when the foregoing operations will be repeated.

By means of the apparatus described a rapidly-intermittent operation is provided, and a very large quantity of the character of covering described can be made by two persons. The apparatus is simple, efficient, and not liable to get out of order.

What I claim is—

1. In apparatus for forming pipe-coverings, the combination of supports for strips of paper or other fabric, a picker or the like for introducing a layer of loose fibrous material between said sheets or strips, means for severing said strips and interposed layers, intermittently-acting bending mechanism for bending the united layers into tubular form, and intermittently-acting feeding mechanism for feeding the layers to said bending mechanism.

2. In apparatus for forming pipe-coverings, the combination of supports for strips or sheets of paper or other fabric, a picker or the like for introducing between said strips or sheets fibrous material in a layer of uniform thickness, means for uniting said layers, means for cutting the layers into sections while in a flat condition, and means for bending the cut-off sections into tubular form.

3. In apparatus for forming pipe-coverings, the combination of supports for strips or sheets of paper or other fabric, a picker or the like for introducing between said sheets or strips fibrous material in a layer of uniform thickness, stitching or stapling mechanism for uniting said layers, means for cutting the layers into sections while in a flat condition, and means for bending the cut-off sections into tubular form.

4. In apparatus for forming pipe-coverings,



the combination of supports for sheets or strips of paper or other fabric, a picker or the like for introducing between said strips or sheets fibrous material in a layer of uniform thickness, means for uniting said layers, means for cutting the layers into sections while in a flat condition, intermittently-acting means for bending the cut-off sections into tubular form, and intermittently-acting feeding means for feeding the layers to said cutting and bending devices.

5. In apparatus for forming pipe-coverings, the combination of supports for strips or sheets of paper or other fabric, an intermittently-acting picker or the like for introducing a layer of loose fibrous material between said strips or sheets, means for uniting said layers, means for cutting the same into sections while in flat condition, an intermittently-acting device for bending the cut-off sections into tubular form, and intermittently-acting feeding means for feeding the layers of said cutting-off and bending devices.

6. In apparatus for forming pipe-coverings, the combination of supports for sheets or strips of paper or other fabric, a picker or the like for laying down a layer of loose fibrous material, means for compressing the same before introducing between the fibrous sheets, means for feeding said compressed layer between said strips, stitching or stapling mechanism for uniting said strips and layer, and means for bending said assembled strips into tubular form.

7. In apparatus for forming pipe-coverings, the combination of supports for strips or sheets of paper or similar material, a picker or the like for laying down a layer of loose fibrous material, a traveling apron for receiving said material from the picker and introducing it between the strips of paper, means for compressing said layer of fibrous material on said apron before introducing between said strips, stitching or stapling mechanism for uniting said strips and layer, and means for bending said united layers into tubular form.

8. In apparatus for forming pipe-coverings, the combination of supports for sheets or strips of paper or other fabric, a picker or the like for laying down a layer of loose fibrous material, a series of hammers for compressing said layer, means for introducing said layer between said sheets, and means for bending said assembled sheets and layer into form.

9. In apparatus for forming pipe-coverings or the like, the combination of a traveling belt, a picker for laying down on said belt a layer of loose fibrous material, a series of hammers for compressing the material on said belt, means for laying strips or sheets of paper or other fabric above and below said layer of fibrous material, and means for uniting said strips and layer.

10. In apparatus for forming pipe-coverings or the like, the combination of an endless traveling belt or apron, a picker or the like arranged to lay a layer of loose fibrous material on said belt, a series of hammers for compressing said layer on said belt, means for laying a strip or sheet of paper or other fabric above and below said layer, means for uniting said strips or layer, and mechanism for bending the same into tubular form.

11. In apparatus for forming tubular articles of fibrous material, a bending device comprising a table, vertically-movable means for holding the layers of material against said table along their longitudinal centers only, and mechanism for engaging the edges of the layers and bending the same up into tubular form.

12. In apparatus for forming tubular articles of fibrous material, a bending device comprising a table, a vertically-movable longitudinal mandrel arranged to clamp the material along its longitudinal center only against said table, and mechanism for engaging the edges of the material and bending the same up over the mandrel into tubular form.

13. In apparatus for forming tubular articles of layers of fibrous material, a bending device comprising a table, a vertically-movable mandrel for clamping the material along its longitudinal center only against said table, swinging arms arranged to engage the edges of the material, and means for swinging said arms to cause the same to bend the material around the mandrel into tubular form.

14. In apparatus for forming tubular articles of layers of fibrous material, a bending device comprising a table, a vertically-movable mandrel arranged longitudinally of said table and arranged to engage the material along its longitudinal center only, mechanism for raising and lowering said mandrel, swinging arms arranged transversely of the table and in position to engage the edges of the layers and bend them over the mandrel, and means for swinging said arms.

15. In apparatus for forming tubular articles of layers of fibrous material, a bending device comprising a table, a vertically-movable mandrel arranged longitudinally of the table and arranged to engage said material along its longitudinal center only, vertically-movable plungers to which said mandrel is hinged, pivoted arms arranged transversely of the table and in position to engage the edges of the layers and bend them over the mandrel, and means for swinging said arms.

16. In apparatus for forming tubular articles of layers of fibrous material, a bending device comprising a table, a vertically-movable longitudinal mandrel for clamping the layers along their longitudinal centers only against said table, longitudinally-arranged rock-shafts, a series of arms on said shafts



and arranged to engage the edges of the layers and bend them over the mandrel, and means for oscillating said rock-shafts.

5 17. In apparatus for forming tubular articles of layers of fibrous material, a bending device comprising a table, a longitudinally-arranged mandrel for clamping the layers against said table, longitudinally-arranged rock-shafts, a series of arms on said rock-shafts

arranged to engage the edges of the layers, a treadle, and connecting means between said treadle and said rock-shafts.

In testimony whereof I, the said JOHN A. McCONNELL, have hereunto set my hand.

JOHN A. McCONNELL.

Witnesses:

ROBERT C. TOTTEN,  
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