

No. 790,022.

PATENTED MAY 16, 1905.

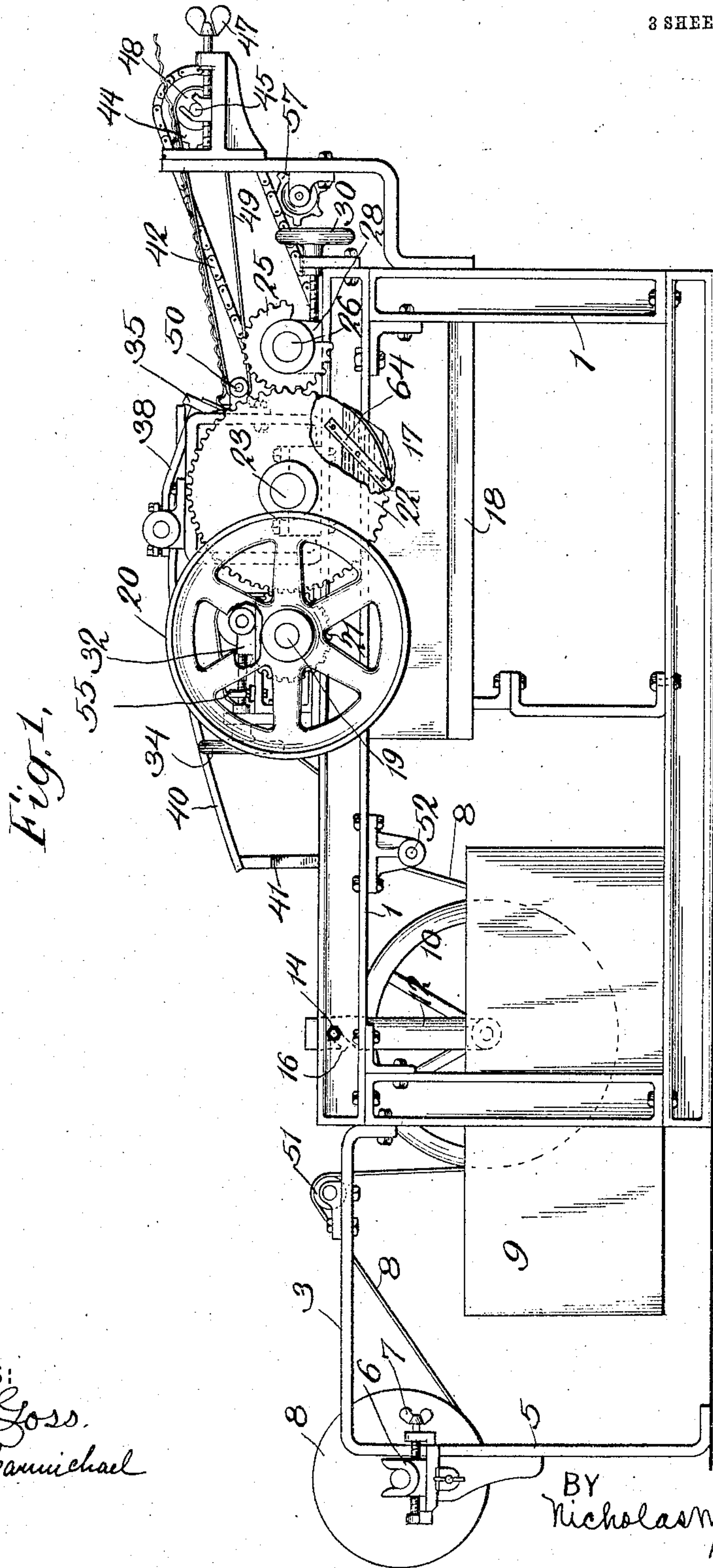
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W. J. & B. ARKELL, EXECUTORS.

MECHANISM FOR MAKING STRETCHABLE CRINKLED PAPER.

APPLICATION FILED JULY 17, 1903.

3 SHEETS--SHEET 1.



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James Arkell,
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William J. Arkell,
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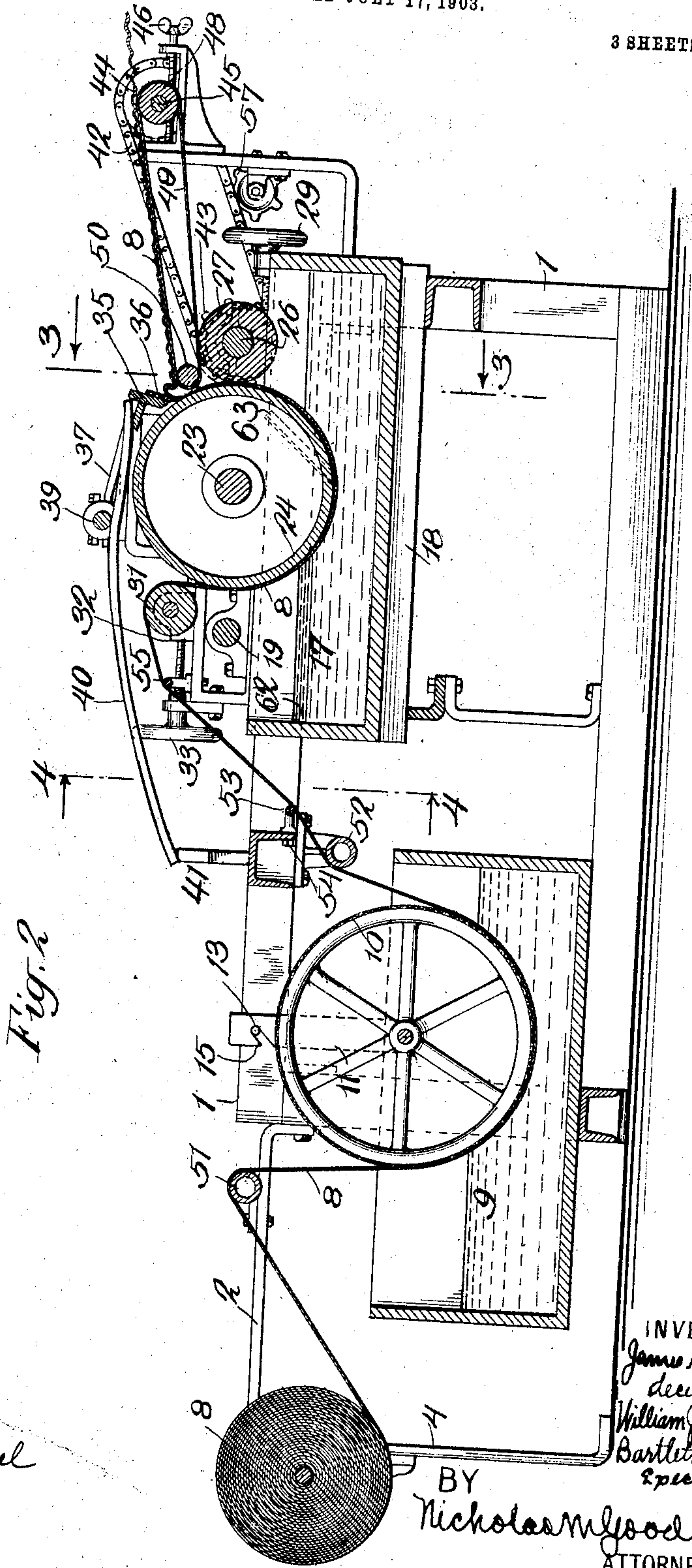


Fig. 2

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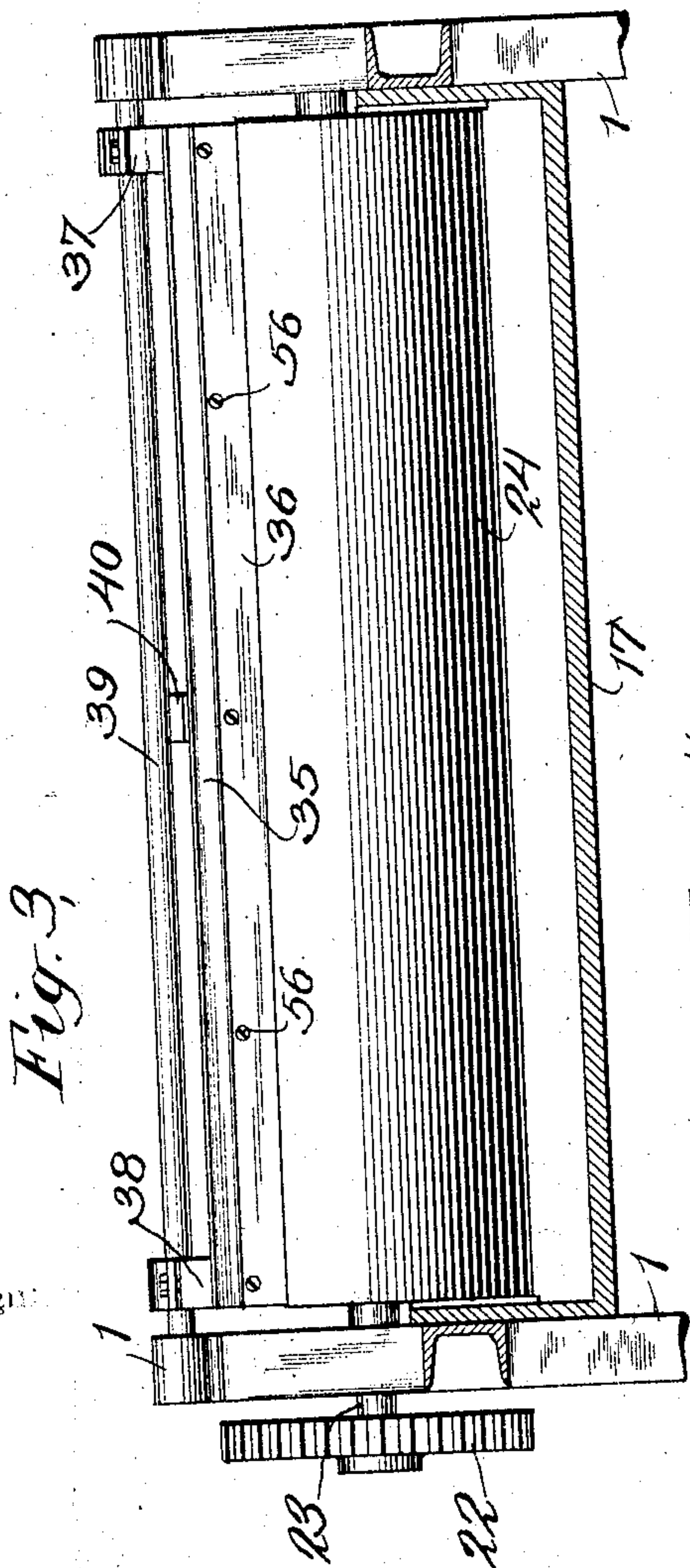


Fig. 3.

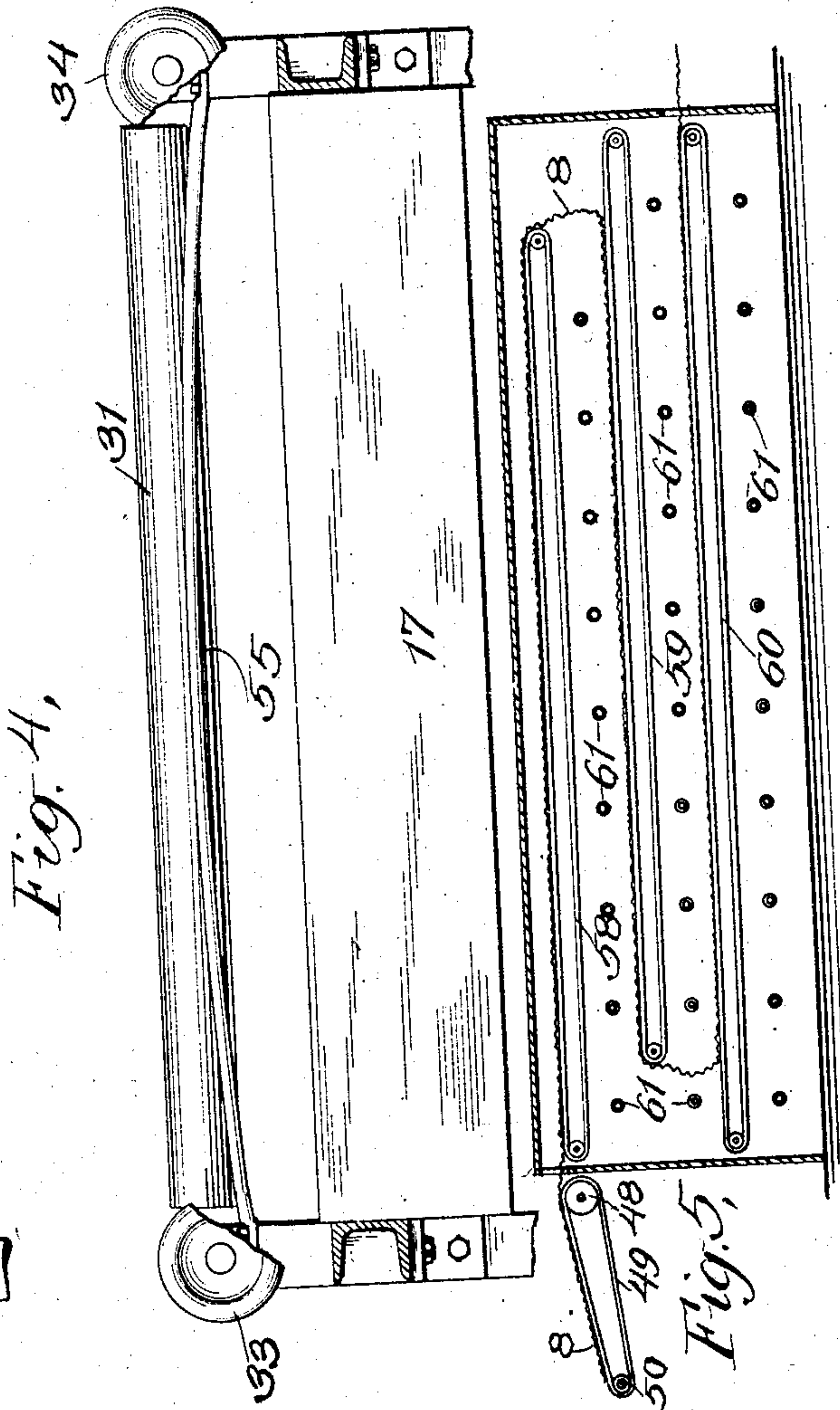


Fig. 4.

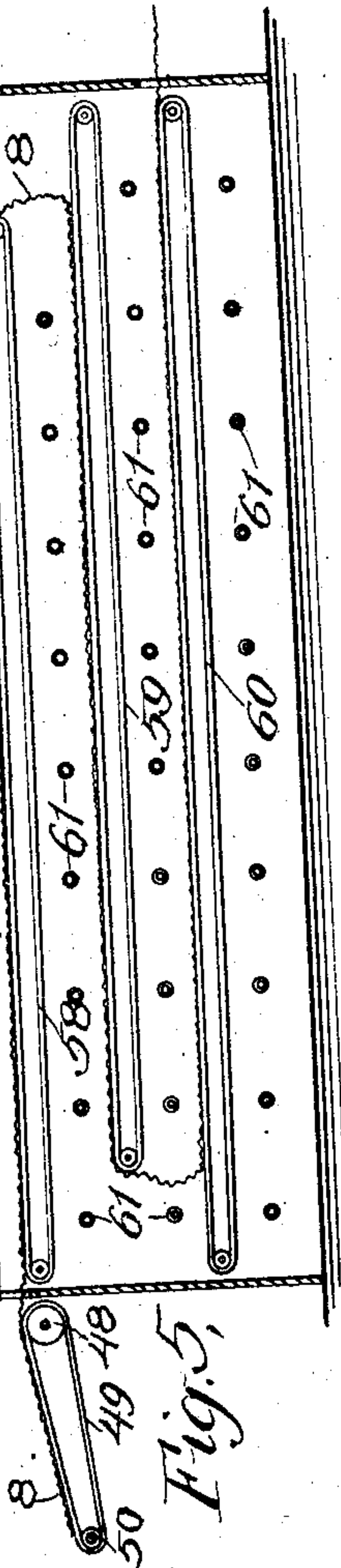


Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIAM J. ARKELL AND BARTLETT ARKELL, OF NEW YORK, N. Y.,
EXECUTORS OF JAMES ARKELL, DECEASED.

MECHANISM FOR MAKING STRETCHABLE CRINKLED PAPER.

SPECIFICATION forming part of Letters Patent No. 790,022, dated May 16, 1905.

Application filed July 17, 1903. Serial No. 165,906.

To all whom it may concern:

Be it known that we, WILLIAM J. ARKELL and BARTLETT ARKELL, citizens of the United States, residing in the city, county, and State of New York, are the executors of the last will and testament of JAMES ARKELL, deceased, late of Canajoharie, county of Montgomery, State of New York, and that the said JAMES ARKELL did invent new and useful Improvements in Mechanism for Making Stretchable Crinkled Paper, of which the following is a specification.

This invention relates to mechanism designed to make stretchable crinkled paper.

The mechanism in its preferred form and as shown in the accompanying drawings is more particularly designed to operate on the heavier grades of plain-finished paper, and the finished product is thus suitable for wrapping and packing purposes and has special advantages. The paper is rendered stretchable by means of the crinkles formed in it, and is thus capable of withstanding strains which would break the paper if it were not crinkled.

In the accompanying drawings, forming part of this specification, is shown one embodiment of the various features constituting the invention.

In said drawings, Figure 1 is a side elevation of the mechanism except the drying-machine. Fig. 2 is a central longitudinal sectional elevation of the mechanism shown in Fig. 1. Fig. 3 is a sectional elevation taken on the line 3 3 of Fig. 2. Fig. 4 is a sectional elevation taken on the line 4 4 of Fig. 2, and Fig. 5 is a sectional elevation diagrammatically showing an apparatus for drying the crinkled paper immediately after the paper is crinkled.

Referring now to said drawings, 1 is the main frame of the machine.

2 and 3 are rails supported by legs 4 and 5 and bolted to the main frame. On the legs 4 and 5 are supported the boxes, such as 6, adjustable by means of screws 7 and carrying the rotatable roll of plain paper 8, which is to be crinkled.

9 is a tank designed to carry a bath of suit-

able liquid, generally water. In this tank rotates a drum 10, preferably made of foraminous material and supported by arms 11 and 12, which depend from bolts 13 and 14, fixed in the upper part of the frame. These bolts enter slots 15 and 16 in the arms, so that the latter, together with the drum, may be removed. 17 is another tank designed to contain a bath of suitable liquid, generally water, and supported by the shelf 18, carried by the main frame.

19 is the driving-shaft on which are secured the driving-wheel 20 and the gear 21, which latter meshes with the gear 22 on the shaft 23. The shaft 23 carries a smooth-faced receiving-roll, preferably of iron and rotating partly submerged in the tank 17. Meshing with the gear 22 is a gear 25, carried on the shaft 26, which carries a roll 27, preferably having a rubber or other yielding surface. This roll 27, which works in close proximity to the roll 24, for a purpose hereinafter to be explained, is carried in boxes 28, supported by the main frame. These boxes 28 are adjustable to and from the roll 24 by the screws 29 and 30, so as to vary the pressure of the roll 27 against the roll 24.

31 is a guide-roll working in boxes 32, adjustable by screws 33 and 34 and operating to guide the paper web to and deposit it upon the receiving-roll 24.

Associated with the roll 24 is a doctor consisting of a cross-bar 35, having a blade 36, which is preferably secured to and removable from the cross-bar by screws 36. (See Fig. 3.) The doctor is carried by two arms 37 and 38, which are pivotally supported by the cross-rod 39, so that the doctor may be swung up away from the roll when required. The doctor is pressed down in contact with the roll by means of a variable-pressure device, preferably consisting of a bent iron bar 40. This bar extends beneath the rod 39 and has one end resting upon the doctor and the other end supported by an adjusting-wedge 41. This bar 40 is elastic, and by adjusting the wedge 41 the pressure which the bar imparts to the doctor may be varied as required.

42 is a sprocket-chain driven from a

sprocket-wheel 43 on the shaft 26 and passing around a sprocket-wheel 44, carried on the shaft 45, which latter is adjustable in its bearings by means of screws 46 and 47. The shaft 45 carries a roll 48, which drives the carrier 49, extending around the roll 50, supported in close proximity to the doctor. The carrier 49 operates to carry away the crinkled paper as it is stripped from the roll 24 by the doctor and deliver it to the drying apparatus. (See Fig. 5.)

51 and 52 are rods or rolls for guiding the paper in its progress.

53 is a curved cross-rod adjustable up and down by means of bolts 54 and against which the wet paper passes on its way to the roll 24. 55 is a similar curved rod horizontally adjustable and operating for the same purpose as the rod 53.

57 is an adjustable wheel to take up slack in the sprocket-chain 42.

After the paper has been crinkled it is then delivered to a drying apparatus which may be of any suitable construction capable of drying the paper, so as to make the crinkles therein permanent, and thus render the paper stretchable. In Fig. 5 is shown diagrammatically the preferred arrangement of such drying apparatus and by means of which the paper is subjected to a drying atmosphere. Referring now to Fig. 5, the paper 8 having been crinkled is delivered by the carrier 49 to the drying apparatus, whose receiving end is arranged in close proximity to the delivery end of the carrier 49. This drying apparatus, as shown in Fig. 5, consists of a plurality of endless carriers 58, 59, and 60, between which are arranged steam-pipes 61. The paper is first delivered to the carrier 58 and by it delivered to carrier 59. The carrier 59 delivers the paper to carrier 60, from which the paper issues as a finished product. By means of this arrangement of the drying apparatus the paper is carried back and forth several times and as many as may be desired, while the heat from the steam-pipes acts to dry the paper. Thus it will be seen that the paper is not stretched nor the crinkles removed; but, on the other hand, the crinkles are made permanent and the paper rendered thereby stretchable.

It is sometimes desirable to waterproof the paper at some stage during its passage through the apparatus. In effecting this result the waterproofing material, such as paraffin, is preferably turned in on top of the water in the tank 17 and on the front side of the roll 24. The presence of such waterproofing material is indicated in Fig. 2 at 62 by the heavier shade-lines representing the liquid in the tank 17. This waterproofing material 62 floats on the surface of the water, and in order to prevent it from passing to the rear side of the tank by the action of the rotating roll 24 baffle-plates 63 and 64 are fixed on the inner sides of the tank 17, opposite the ends of the

roll 24. These baffle-plates prevent the waterproofing material from passing around the ends of the roll 24 to the rear of the tank, where it would not effectively reach the paper.

In the operation of the machine the paper is taken from the roll, passes thence over the guide bar or roll 51, through the tank 9, where it is submerged by means of the drum 10. Thence it passes over the guide bar or roll 52, against the curved bars 53 and 55, over the guide-roll 31, down and around the roll 24, which submerges the paper in the liquid contained in the tank 17. Thence it is carried by the roll 24 up against the doctor, which crinkles the paper and strips it from the roll 24 and deposits it upon the carrier 49, whence the moist crinkled paper is delivered to the carrier 58 of the drying apparatus, at which carrier the paper is stretched to reduce the crinkles, as heretofore explained. The roll 27 presses the paper against the roll 24 just before the paper meets the doctor. This accomplishes two results. First, it causes the paper to smoothly and firmly adhere to the smooth face of the roll 24, so that the paper in its adherence to the roll 24 may resist the action of the doctor sufficiently to cause the doctor to crowd the paper back against itself, and thereby crinkle it. Moreover, the roll 27 operates to extract or press out any surplus moisture that may be retained by the paper just before it meets the doctor. These purposes may be effected by other means without departing from the scope of the invention. As the paper emerges from the tank 9 it swells because of the moisture absorbed and is therefore wrinkled. It is desirable to remove these wrinkles before the paper reaches the doctor, and for this purpose suitable means are employed to extend the paper laterally before it reaches the doctor. In the present form of apparatus shown in the accompanying drawings the curved rods 53 and 54 are employed for this purpose, the paper passing over the rods and being thereby smoothed out, so that it may be deposited upon the roll 24 smooth and free from wrinkles. In some cases only one curved rod need be used.

It is to be understood that the various combinations of features constituting the invention may be variously modified from what is specifically shown in the drawings without departing from the invention.

What is claimed, and desired to be secured by Letters Patent, is—

1. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; and a receptacle containing a bath through which the paper passes before it reaches the doctor.

2. In a machine for making stretchable crinkled paper, the combination of a smooth-faced

receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the doctor; and means for extracting the surplus moisture from the paper before it reaches the doctor.

3. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the doctor; and a pressure-roll arranged to press the wet paper in close adherence to the receiving-roll.

4. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the doctor; and means for extending the paper laterally after it has been wet and before it reaches the doctor.

5. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; and a receptacle containing a bath through which the paper passes before it reaches the receiving-roll.

6. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the receiving-roll; and means for extracting the surplus moisture from the paper before it reaches the doctor.

7. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the receiving-roll; and a pressure-roll arranged to press the wet paper in close adherence to the receiving-roll.

8. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the receiving-roll; and means for

extending the paper laterally after it has been wet and before it reaches the doctor.

9. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the doctor; means for extracting the surplus moisture from the paper before it reaches the doctor; and means for extending the paper laterally after it has been wet and before it reaches the doctor.

10. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the doctor; a pressure-roll arranged to press the wet paper in close adherence to the receiving-roll; and means for extending the paper laterally after it has been wet and before it reaches the doctor.

11. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the receiving-roll; a pressure-roll arranged to press the wet paper in close adherence to the receiving-roll; and means for extending the paper laterally after it has been wet and before it reaches the doctor.

12. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the doctor; and one or more curved transverse rods over which the wet paper passes before it reaches the doctor and operating to extend the paper laterally.

13. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the receiving-roll; and means for extending the wet paper laterally before it reaches the receiving-roll.

14. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is car-

ried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the receiving-roll; and one or more curved transverse rods over which the wet paper passes before it reaches the receiving-roll and operating to extend the paper laterally.

15. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the doctor; and an adjustable pressure-roll arranged to press the wet paper in close adherence to the receiving-roll.

16. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper before it reaches the doctor; and means for subsequently extracting the surplus moisture from the paper before it is crinkled.

17. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper before it reaches the doctor; and means for pressing the paper in close adherence against the receiving-roll after it has been wet and before it reaches the doctor.

18. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper before it reaches the doctor; and means for extending the paper laterally after it has been wet and before it reaches the doctor.

19. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper before it reaches the receiving-roll; and means for extending the wet paper laterally before it reaches the doctor.

20. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor bearing upon said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper before it reaches the doctor; and means

for varying the pressure of the doctor against the receiving-roll.

21. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor bearing upon said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper before it reaches the doctor; and a spring-bar for varying the pressure of the doctor against the receiving-roll.

22. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper before it reaches the doctor; means for extending the wet paper laterally; and means for pressing the wet paper in close adherence to the receiving-roll before it reaches the doctor.

23. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper before it reaches the receiving-roll; means for extending the wet paper laterally; and means for pressing the wet paper in close adherence to the receiving-roll before it reaches the doctor.

24. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper before it reaches the doctor; a pressure-roll for pressing the paper in close adherence against said receiving-roll after it has been wet; and means for adjusting said pressure-roll.

25. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; and a receptacle containing a bath in which the receiving-roll rotates with the paper.

26. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath in which the receiving-roll rotates with the paper; and a pressure-roll arranged to press the wet paper in close adherence to the receiving-roll after the paper leaves said bath.

27. In a machine for making stretchable

crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the receiving-roll; and a second receptacle containing a bath in which the receiving-roll rotates with the paper.

10 28. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the receiving-roll; a pressure-roll arranged to press the wet paper in close adherence to the receiving-roll; and a second receptacle containing a bath in which the receiving-roll rotates with the paper.

25 29. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the receiving-roll; means for extending the paper laterally after it has been wet and before it reaches the doctor; and a second receptacle containing a bath in which the receiving-roll rotates with the paper.

30 30. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the receiving-roll; a pressure-roll arranged to press the wet paper in close adherence to the receiving-roll; means for extending the paper laterally after it has been wet and before it reaches the doctor; and a second receptacle containing a bath in which the receiving-roll rotates with the paper.

31. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath in which the receiving-roll rotates with the paper; and means for wetting the paper before it reaches the receiving-roll.

60 32. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; a receptacle

containing a bath in which the receiving-roll rotates with the paper; means for wetting the paper before it reaches the receiving-roll; and a pressure-roll arranged to press the wet paper in close adherence to the receiving-roll after the paper leaves said bath.

33. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper while on the receiving-roll; and means for wetting the paper before it reaches the receiving-roll.

34. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper while on the receiving-roll; means for wetting the paper before it reaches the receiving-roll; and means for extracting the surplus moisture from the paper before it reaches the doctor.

35. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper while on the receiving-roll; means for wetting the paper before it reaches the receiving-roll; and a pressure-roll arranged to press the wet paper in close adherence to the receiving-roll.

36. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper while on the receiving-roll; means for wetting the paper before it reaches the receiving-roll; and means for extending the paper laterally after it has been wet and before it reaches the doctor.

37. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper while on the receiving-roll; means for wetting the paper before it reaches the receiving-roll; a pressure-roll arranged to press the wet paper in close adherence to the receiving-roll; and means for extending the paper laterally after it has been wet and before it reaches the doctor.

38. In a machine for making stretchable crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with

said roll and against which the paper is carried on said roll for crinkling; a receptacle containing a bath through which the paper passes before it reaches the doctor; and means
5 for drying the crinkled paper and thereby making the crinkles permanent and rendering the paper stretchable.

39. In a machine for making stretchable crinkled paper, the combination of a smooth-
10 faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wet-
15 ting the paper before it reaches the doctor; means for pressing the paper in close adherence against the receiving-roll after it has been wet and before it reaches the doctor; and means for drying the crinkled paper and thereby making the crinkles permanent and render-
20 ing the paper stretchable.

40. In a machine for making stretchable crinkled paper, the combination of a smooth-
faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with
25 said roll and against which the paper is carried on said roll for crinkling; means for wetting the paper before it reaches the doctor; means for extending the paper laterally after it has been wet and before it reaches the doctor; and
30 means for drying the crinkled paper and thereby making the crinkles permanent and rendering the paper stretchable.

41. In a machine for making stretchable crinkled paper, the combination of a smooth-
35 faced receiving-roll adapted to have the paper

deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wet-
ting the paper while on the receiving-roll; means for wetting the paper before it reaches
40 the receiving-roll; and means for drying the crinkled paper and thereby making the crinkles permanent and rendering the paper stretchable.

42. In a machine for making stretchable
45 crinkled paper, the combination of a smooth-faced receiving-roll adapted to have the paper deposited thereon; a doctor associated with said roll and against which the paper is carried on said roll for crinkling; means for wet-
50 ting the paper while on the receiving-roll; means for wetting the paper before it reaches the receiving-roll; a pressure-roll arranged to press the wet paper in close adherence to the receiving-roll; means for extending the paper
55 laterally after it has been wet and before it reaches the doctor; and means for drying the crinkled paper and thereby making the crinkles permanent and rendering the paper stretchable.
60

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

WILLIAM J. ARKELL,
BARTLETT ARKELL,
Executors of the estate of James Arkell, deceased.

Witnesses:

DANIEL E. WING,
GEORGE L. LEWIS.