

No. 775,495.

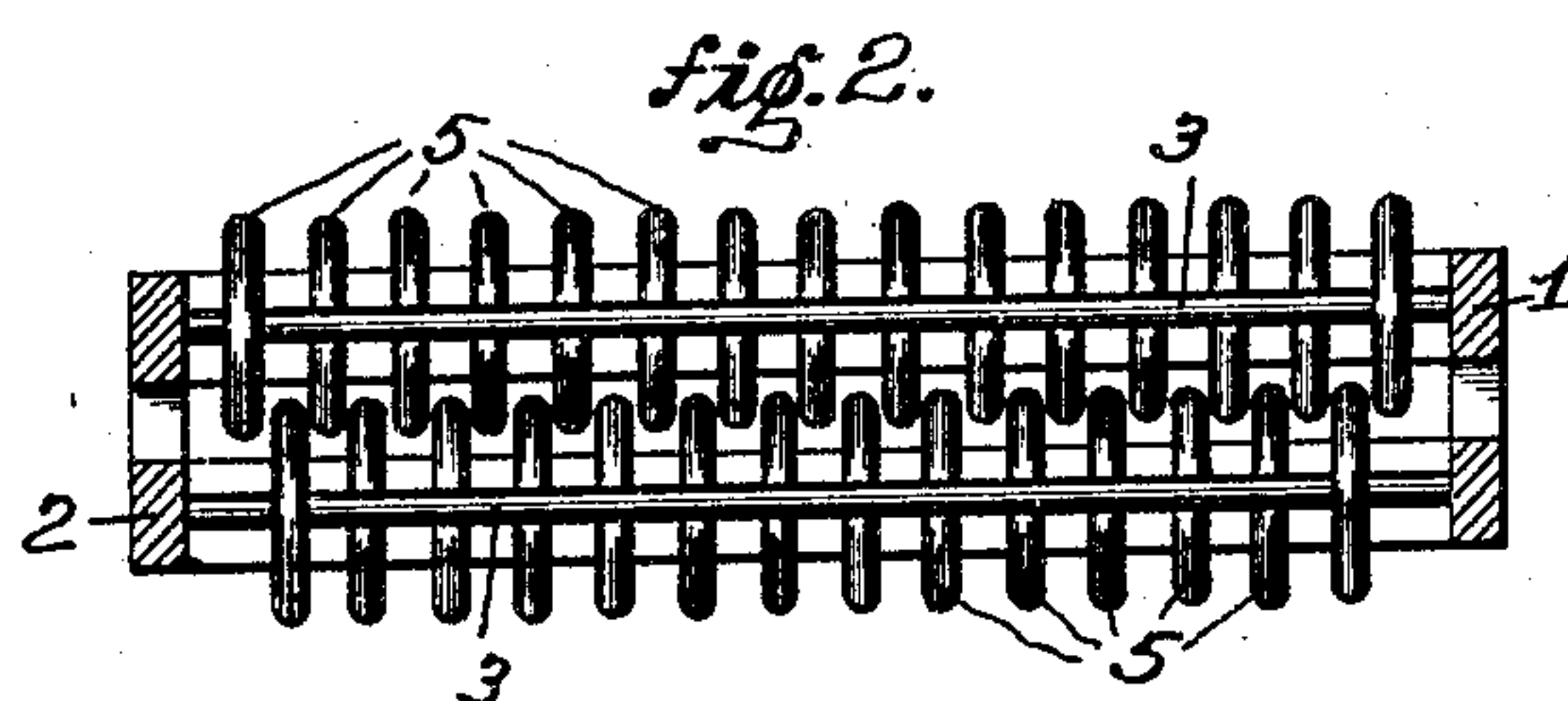
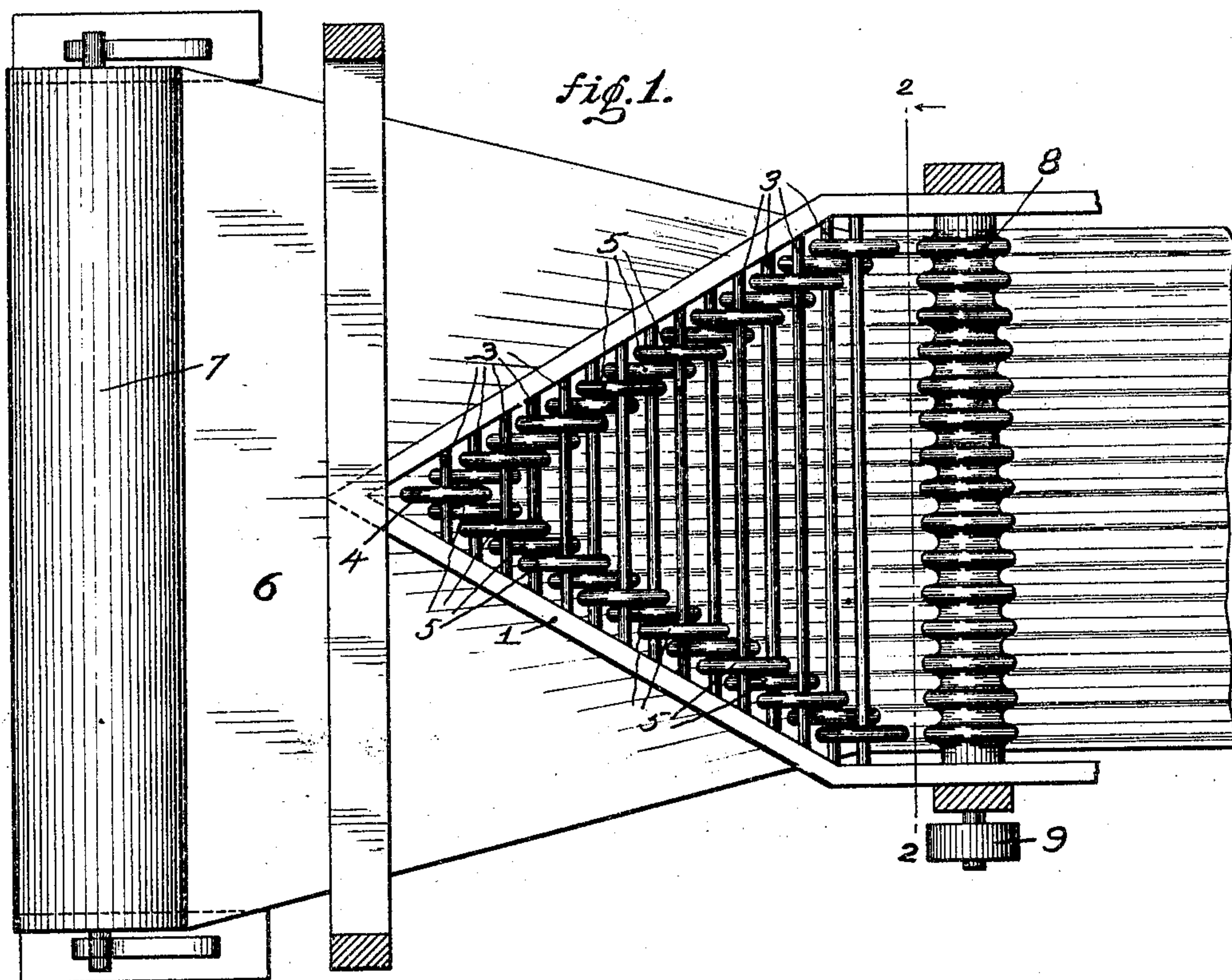
PATENTED NOV. 22, 1904.

J. A. McCONNELL.
APPARATUS FOR CORRUGATING.

APPLICATION FILED FEB. 23, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:

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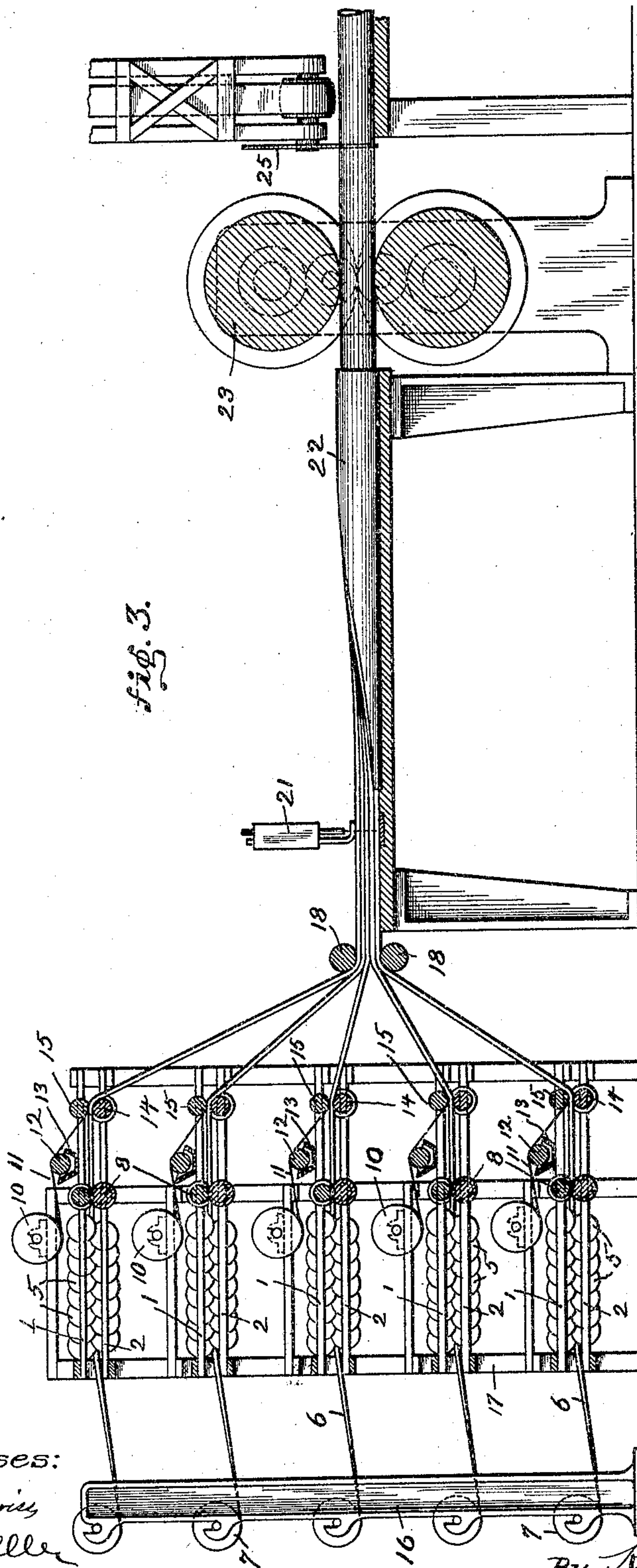
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

JOHN A. McCONNELL, OF ALLEGHENY, PENNSYLVANIA.

APPARATUS FOR CORRUGATING.

SPECIFICATION forming part of Letters Patent No. 775,495, dated November 22, 1904.

Original application filed February 13, 1902, Serial No. 93,933. Divided and this application filed February 23, 1904. Serial No. 194,807. (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 Corrugating; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for corrugating or fluting long strips or sheets of paper or other material longitudinally; and the object is to provide apparatus for this purpose which is more efficient than prior proposed devices and which will corrugate or flute the paper or other material without danger of breaking or tearing the same.

Heretofore paper and similar material has never in actual practice been corrugated or fluted longitudinally in long strips, although apparatus for doing this has been proposed; but as far as I know it has never been used in the trade. In the proposed prior devices for longitudinally corrugating long strips or sheets of paper all of the corrugations were to be commenced either simultaneously or else the corrugating was to be begun at the outer edges of the sheet and progress toward the center thereof. With such apparatus exceedingly nice adjustment of the depth of corrugations must be made; otherwise the sheet or strip will be either corrugated insufficiently or else there will be danger of rupturing or tearing the paper. Furthermore, difficulty will occur when changing from one thickness of material to another, so that the nice adjustment of the apparatus to regulate the depth of the corrugations is a difficult one and necessitates frequent adjustment to meet different characters or thicknesses of material.

The object of my invention is to provide corrugating apparatus of this character wherein the foregoing difficulties are overcome and whereby long strips of paper or similar material may be corrugated longitudinally and to any desired depth of corrugations without danger of breaking or tearing the material and without the necessity of adjusting the apparatus when changing from one thickness of material to another.

To this end the invention consists, generally stated, in providing two series of corrugating-rollers arranged to act on opposite sides of the strip or sheet and cooperating to produce the corrugations, said rollers being so arranged that the corrugating will begin at the center of the strip and extend thence out to the edges thereof, thus overcoming liability to rupture the paper or other material, as would happen if the outer edges were held against inward movement and a centrally-arranged roller or rollers should press the corrugations to a greater depth than permitted by the width of the sheet.

In the accompanying drawings, Figure 1 is a plan view of my corrugating apparatus. Fig. 2 is a section thereof on the line 2 2, Fig. 1; and Fig. 3 is a vertical section showing the same applied for corrugating a plurality of strips to be afterward bent into tubular form.

My corrugating apparatus comprises two sets of rollers, one above and the other below the sheet to be corrugated and so arranged as to be slightly interlocking. These two sets of rollers are mounted in suitable frames 1 and 2, respectively, which are of general triangular form, as shown, and placed one above the other. The corrugating-rollers are mounted in these frames on a series of transverse shafts 3. The shafts in the two frames are not set directly one above the other; but each is slightly behind the corresponding shaft in the other frame. On the first shaft there is only a single roller 4; but on each successive shaft in both frames there are a pair of similar rollers 5, and these are set farther and farther away from the central longitudinal line of the frames, so as to form, in effect, a V shape, the apex of which is the roller 4, as shown in Fig. 1. These rollers therefore begin the corrugating at the center of the sheet and gradually and progressively narrow the sheet, drawing it in from both edges, as shown in Fig. 1. The rollers are of such size and the frames in which they are mounted are set such a distance apart that the rollers will interlock, as shown in Fig. 2.

In operation the sheet of paper 6 is placed

upon a suitable roll or spool 7 and is drawn thence through this frame. The first or foremost roller 4 is in the upper frame and will grip the sheet along its central line, while the next two rollers 5 are in the lower frame and slightly to the rear, as well as to the sides, of this central roller, so that they will bend the paper up at each side of the central roller 4, thus forming a trough or groove in the paper and drawing the paper in from both edges. The next two rollers are again in the upper frame and slightly to the rear of and at each side of the two rollers last mentioned, and they will press the paper in the opposite direction or downwardly, giving it two additional bends and further drawing the paper in from the edges, and so on continuously until the entire width of the sheet has been fluted or corrugated. To the rear of these fluting or corrugating rolls in each of the frames 1 and 2 is mounted a grooved roller 8, said rollers intermeshing, as indicated, and serving to finish the corrugating and to hold the sheet in shape. The rollers 8 may be driven in any suitable means, such as the pulley 9, and serve to draw the sheet through the device.

It will be obvious that with this corrugating device there is no danger of rupturing the paper. Since the sheet is first gripped in the middle, the depth of corrugation is compensated for by the edges of the sheet moving inwardly, the sheet being free to do this because the edges thereof are not confined. If the rollers happen to be placed too deep in mesh, it might result in forming a corrugated sheet not of the full width of the finishing-rolls 8; but it could not result in damaging the paper.

To permanently hold the corrugated sheet in shape, there will preferably be pasted onto the same a plain or uncorrugated backing or binding sheet. This may be effected by mounting above the frames 1 and 2 a spool 10, containing a roll of the backing-sheet 11, which is led over a paste-roll 12, running in the paste-trough 13, and thence into contact with the fluted sheet, the latter at the point of application of the backing-sheet being supported by grooved roll 14 and the backing-sheet being pressed onto the fluted sheet by a pressure-roller 15. In this manner the backing-sheet will be pasted onto the fluted sheet, and thus hold the latter in form.

My apparatus is of special value in the formation of non-heat-conducting coverings, bottle-packing, &c., which must be composed of a plurality of sheets. In such event the spools 7, containing the sheets to be corrugated, are placed in a frame 16, and there will be as many frames 1 and 2 as there are sheets to be corrugated, Fig. 3 showing five such pairs of corrugating-frames supported in a suitable frame 17, and in this frame, above each corrugating device, is a support for a spool 10. con-

taining a backing-sheet. The various sheets are drawn through the several corrugating devices and are each then supplied with the backing-sheet, as above described. After this they are passed through suitable guide-rollers 18, whereby they are assembled one on the other, after which they are suitably secured together, as by means of the stitching or stapling mechanism 21, and are then bent into tubular or other desired form, as by being drawn through a suitable forming-bell 22 by any suitable means, such as the grooved rolls 23, whereby said sheets are formed into tubular shape, after which they are secured together by bands and then cut into sections by any suitable means, such as the saw 25. The details of the mechanism for forming the assembled sheets into tubes is not disclosed herein, being claimed in my application Serial No. 93,933, filed February 13, 1902, of which application the present one is a division.

The apparatus described will corrugate or flute any thickness of sheet within limits and to any depth of corrugation and without liability of breaking or rupturing the paper. While it has been described particularly for the corrugating or fluting of paper, it will be equally effective for corrugating any other long strips of material, such as asbestos sheets and fabrics of various kinds.

What I claim is—

1. In apparatus for longitudinally corrugating long strips of material, the combination of two sets of intermeshing rollers, each of said sets having the first or foremost rollers close together and the succeeding ones successively farther apart, and having adjacent rollers of the same set overlapping to such an extent as to leave no space in which the previously-corrugated paper can expand, and means for drawing the strips of material through said sets of rollers.

2. In apparatus for longitudinally corrugating long strips of material, the combination of two sets of intermeshing rollers, the rollers of one set being slightly in advance of the corresponding rollers of the other set and the rollers in both sets being close together at the entrance end and gradually diverging, the axes of the rollers in the two sets being set in staggered relation, a pair of grooved rollers to the rear of said sets of diverging rollers, and means for drawing the strips of paper through said rollers.

3. In apparatus for longitudinally corrugating long strips of material, the combination of two sets of intermeshing rollers, the rollers of one set being slightly in advance of the corresponding rollers of the other set, the foremost roller of one set being single and the succeeding rollers of both sets being double and successively set farther apart, a pair of grooved rollers to the rear of said sets of diverging rollers, means for driving said grooved roll-

ers, and means for pasting a backing-strip to the corrugated strip.

4. In apparatus for longitudinally corrugating long strips of paper or other fabric, the combination of intermeshing corrugating devices, means for drawing the strips of fabric through said corrugating devices, a support for a backing-strip, a paste-applying device, a grooved roller over which the corrugated sheet passes, and a pressure-roller cooperating therewith for applying the backing-strip to the corrugated strip.

5. In apparatus for longitudinally corrugating long strips of paper or other fabric, the combination of two sets of intermeshing rollers, the rollers of one set being slightly in advance of the corresponding rollers in the other set and the rollers in both sets being close together at the entrance ends and gradually diverging, means for drawing the strips of fabric through said sets of rollers, a support for

a backing-strip, a paste-applying device, and means for applying the backing-strip to the corrugated strip.

6. In apparatus for longitudinally corrugating long strips of paper or other fabric, the combination of two sets of intermeshing rollers, each set having the first or foremost rollers close together and the succeeding ones farther apart and gradually diverging, means for drawing the strips of fabric through said sets of rollers, a support for a backing-strip, a paste-applying device, a grooved roller over which the corrugated sheet passes, and a pressure-roller cooperating therewith for applying the backing-strip to the corrugated strip.

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

JOHN A. McCONNELL.

Witnesses:

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G. KREMER