No. 705,041. Patented July 22, 1902.

A. W. COPLAND.

CRACKER MACHINE.

(Application filed Oct. 31, 1901.)

(No Model.) 3 Sheets—Sheet 1.

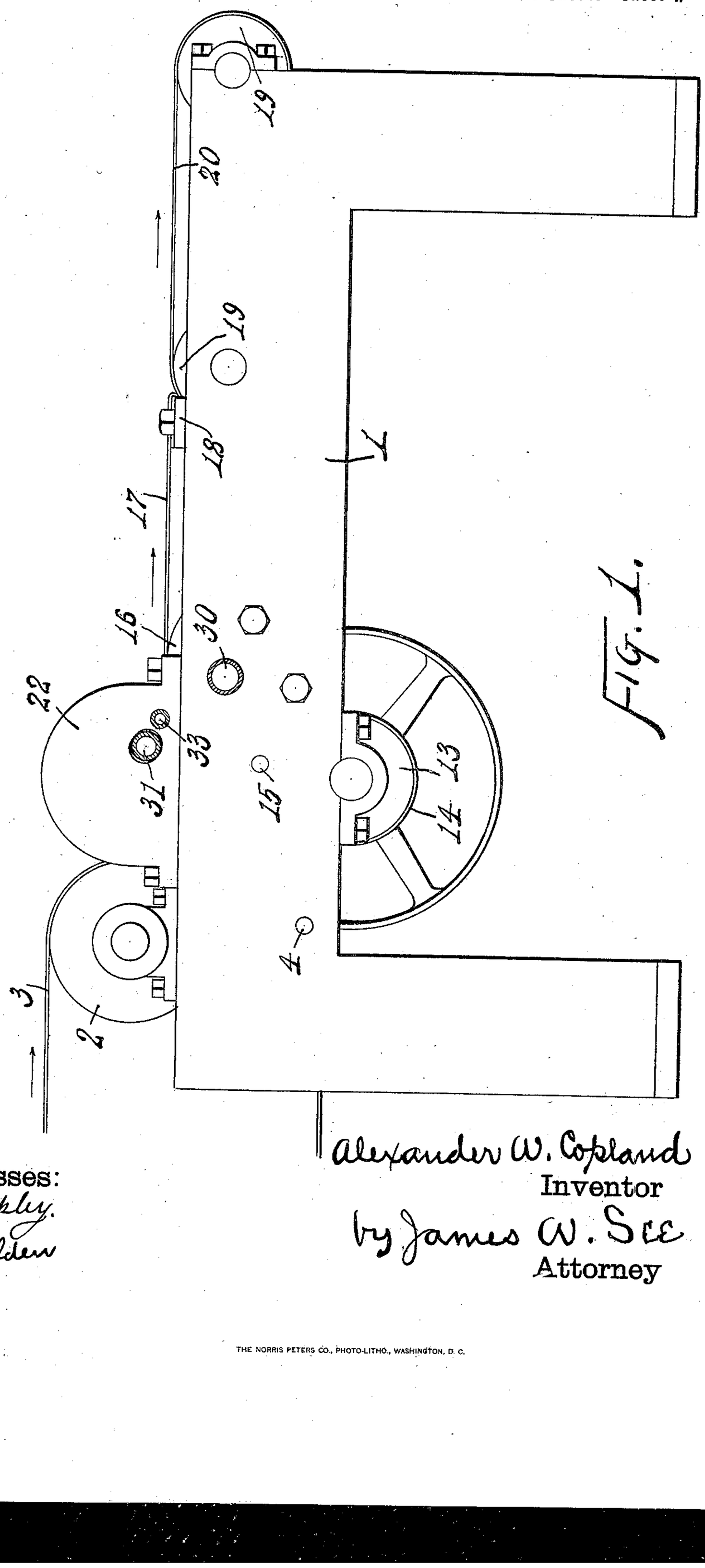

FIG. 1.

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M. S. Belden

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(No Model.) 3 Sheets—Sheet 2.

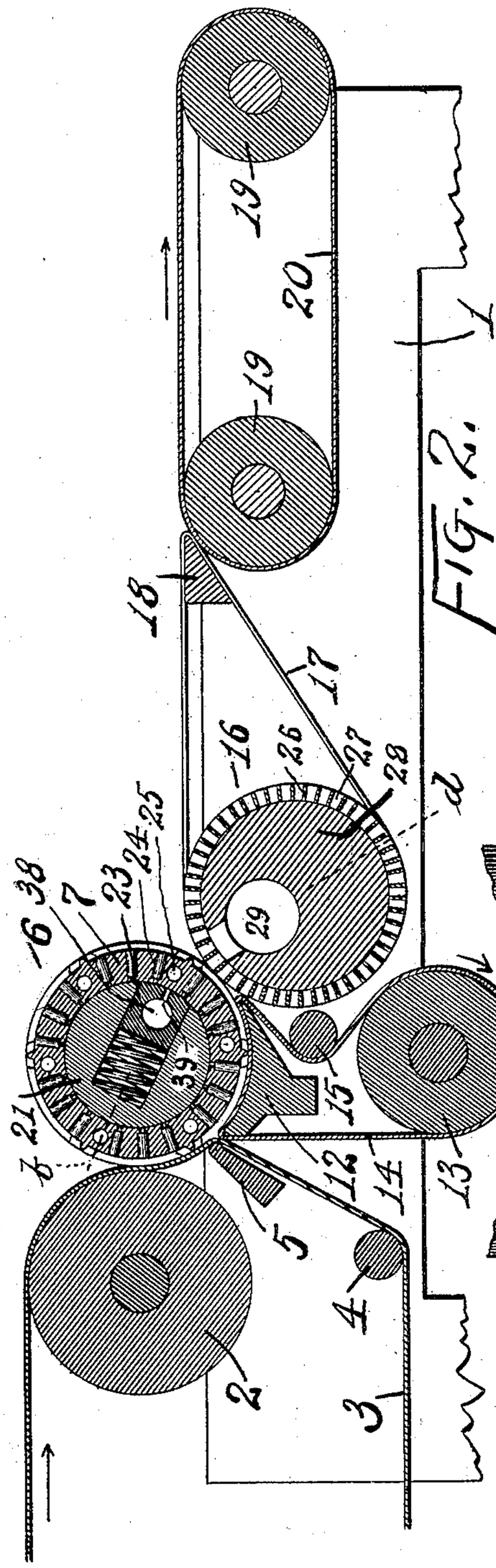

FIG. 2.

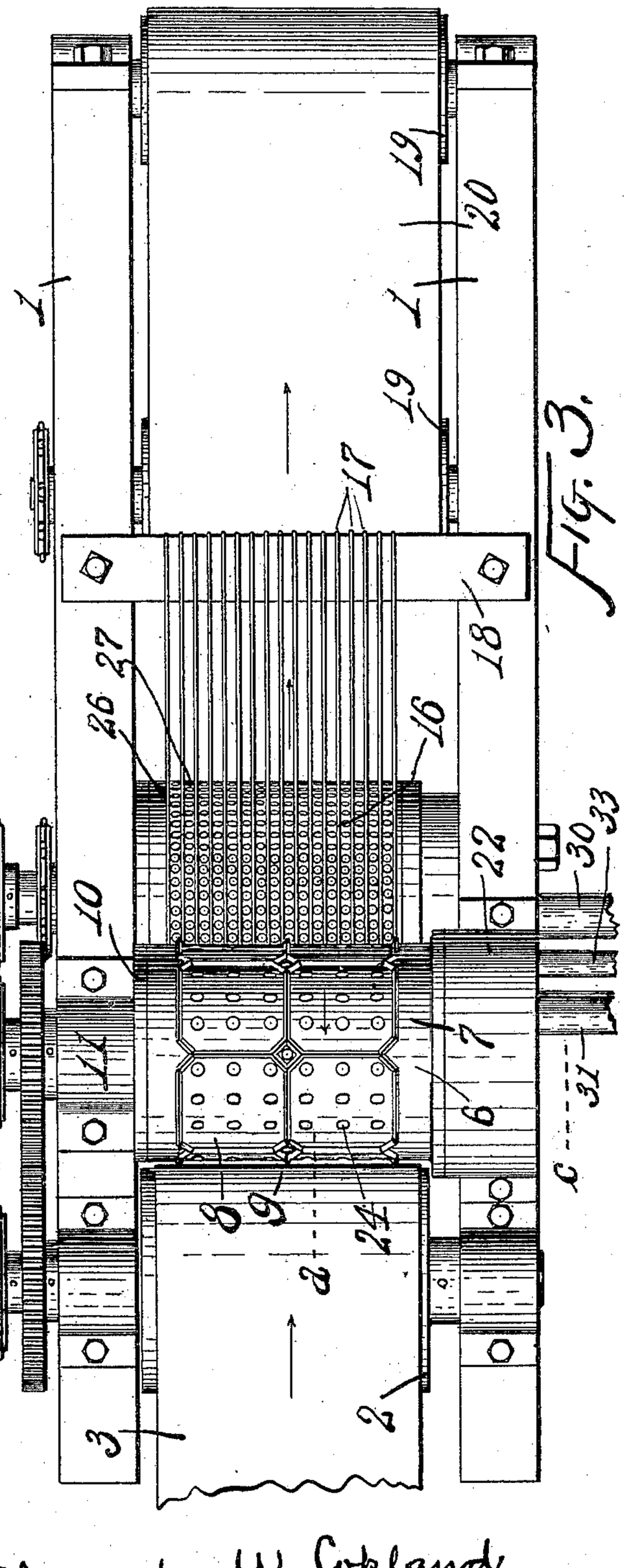

FIG. 3.

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(Application filed Oct. 31, 1901.)

(No Model.) 3 Sheets—Sheet 3.

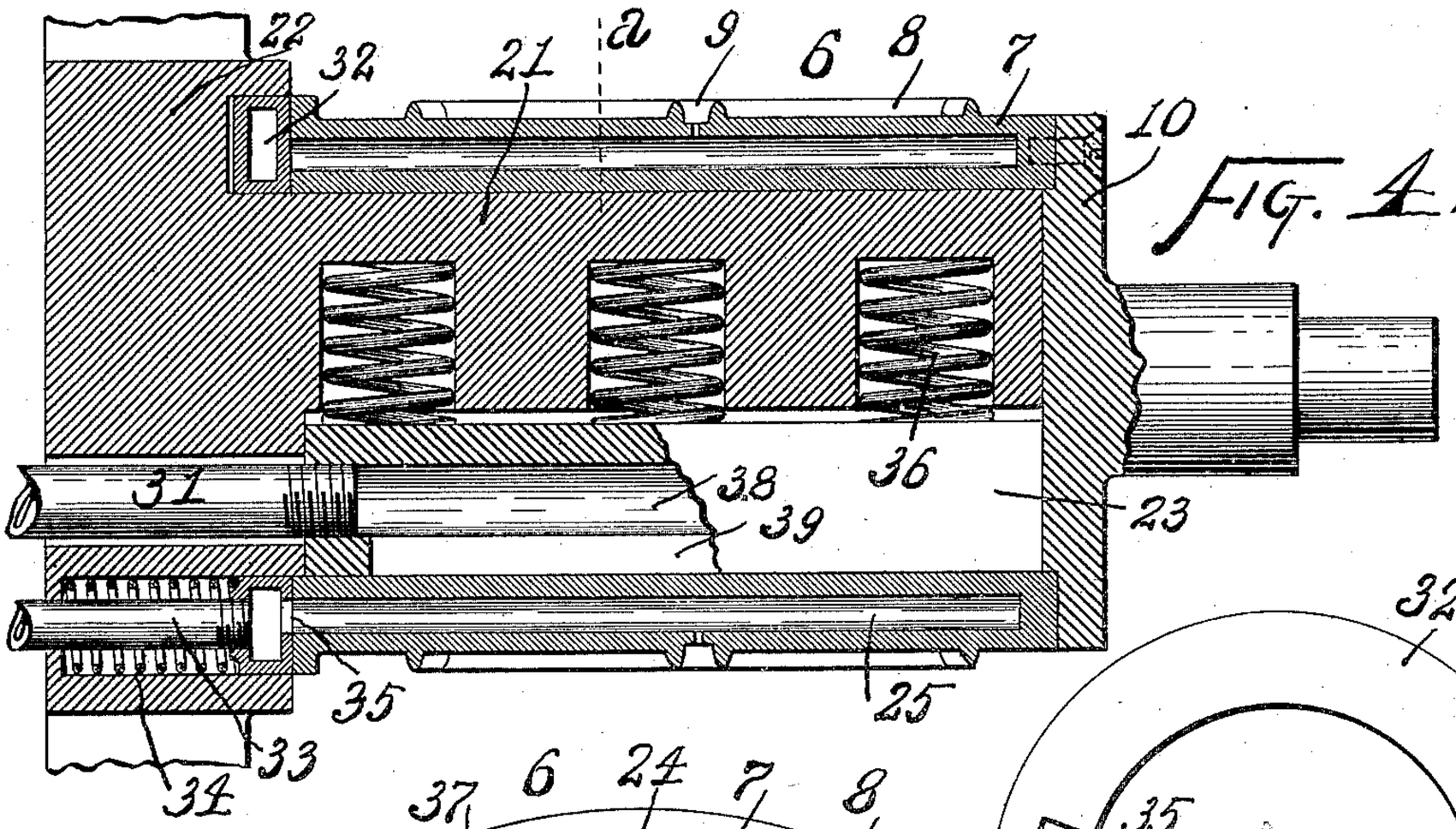

FIG. 4.

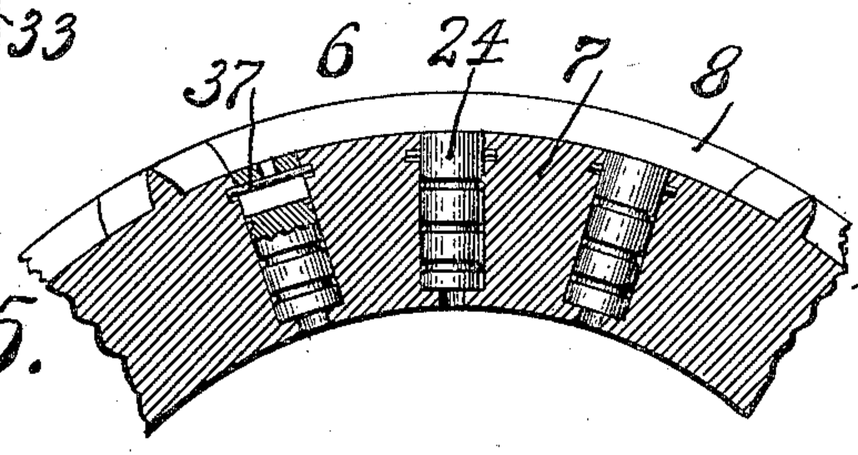

FIG. 5.

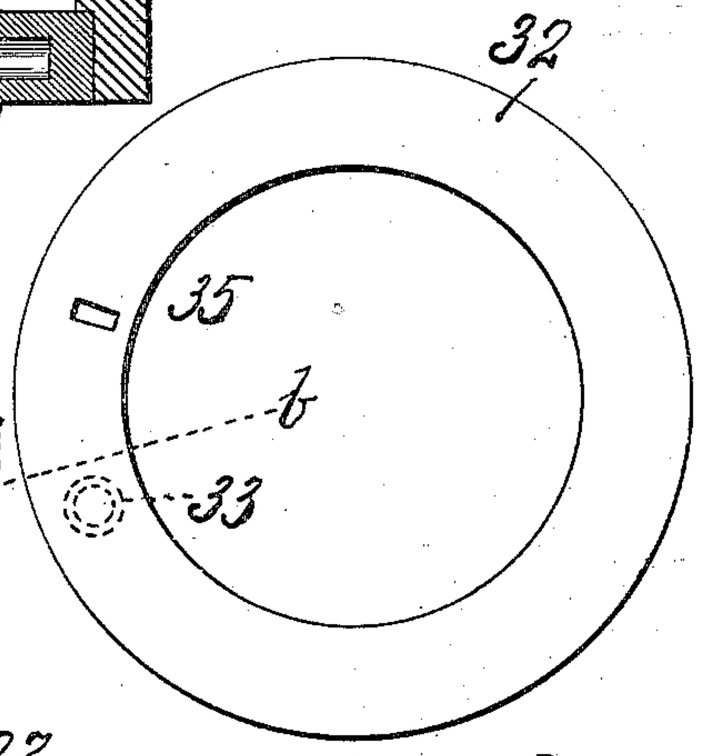

FIG. 6.

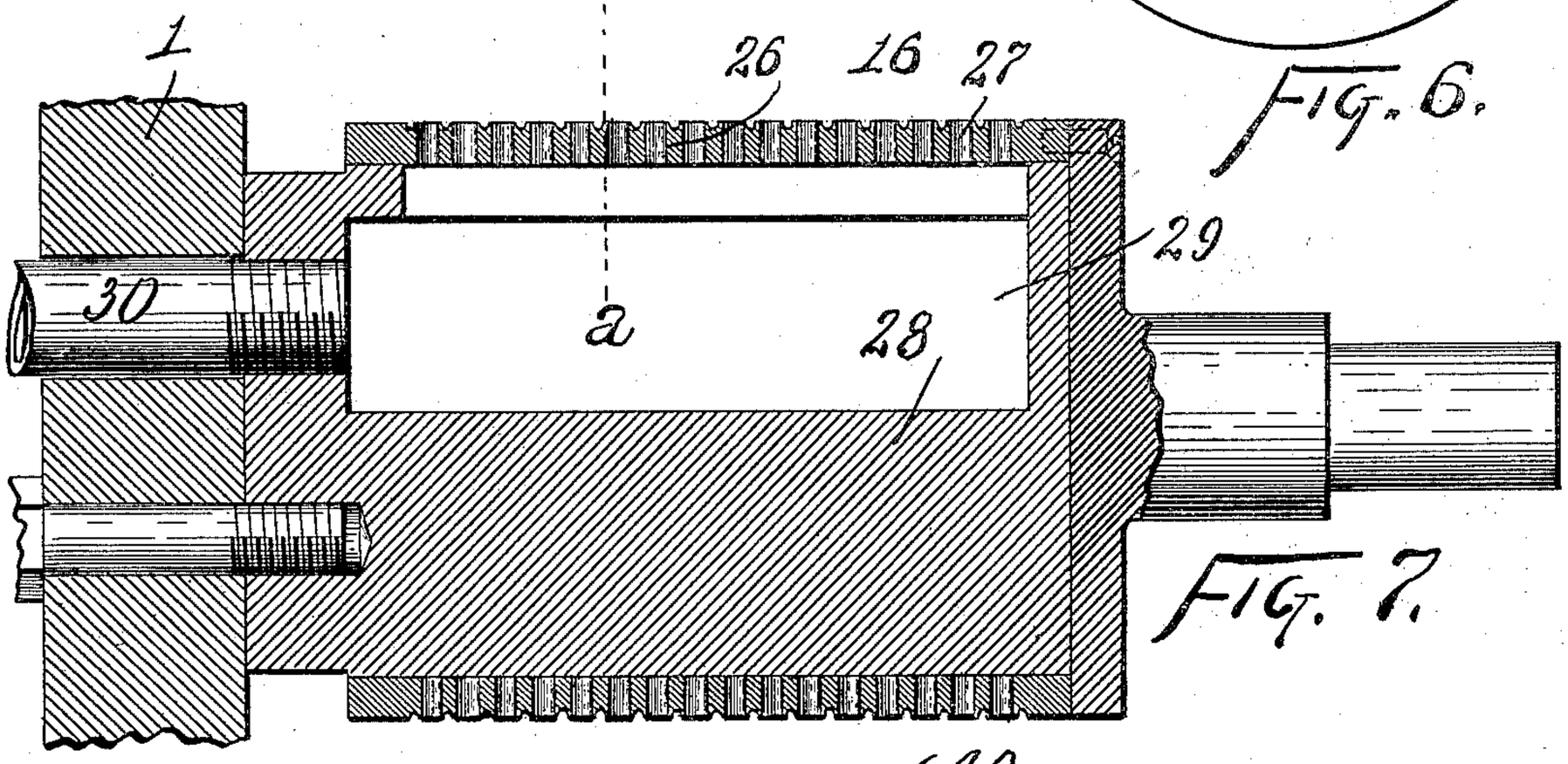

FIG. 7.

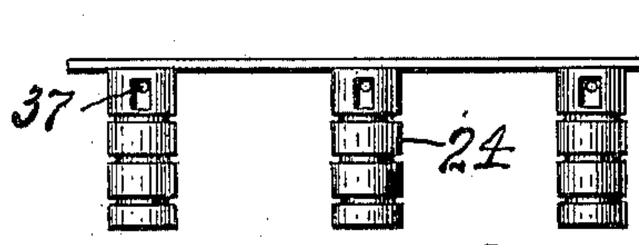

FIG. 8.

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UNITED STATES PATENT OFFICE.

ALEXANDER W. COPLAND, OF CAMBRIDGE, MASSACHUSETTS.

CRACKER-MACHINE.

SPECIFICATION forming part of Letters Patent No. 705,041, dated July 22, 1902.

Application filed October 31, 1901. Serial No. 80,598. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER W. COPLAND, a citizen of the United States, residing in Cambridge, Middlesex county, Massachusetts, (post-office address No. 24 Irving street, Cambridge, Massachusetts,) have invented certain new and useful Improvements in Cracker-Machines, of which the following is a specification.

This invention, pertaining to cracker-machines employing rotary cutters, will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a cracker-machine exemplifying my invention, certain pipes appearing in vertical section in the plane of line *c* of Fig. 3; Fig. 2, a vertical longitudinal section in the plane of line *a* of Figs. 3, 4, and 7; Fig. 3, a plan; Fig. 4, a longitudinal section of the rotary cutting-cylinder in the plane of line *b* of Figs. 2 and 6; Fig. 5, a vertical transverse section, on an enlarged scale, of a portion of the shell of the cutting-cylinder in the plane of line *a* of Figs. 3, 4, and 7; Fig. 6, an elevation of the inner face of the valve-box; Fig. 7, a longitudinal section of the stripping-cylinder in the plane of line *d* of Fig. 2, and Fig. 8 an elevation of three of the stripping-pistons illustrated as being connected by a plate.

In the drawings, giving principal attention to Fig. 2, 1 indicates fixed members forming side frames for the machine; 2, a roll disposed across the frame; 3, an apron running on this roll and adapted to bring to the machine the sheet of dough from the usual sheeting and gaging rolls; 4, a roll disposed across the machine below roll 2; 5, a cross-bar extending across the machine somewhat in advance of roll 2 and disposed within the apron 3, which engages it over a comparatively thin rounded edge; 6, a rotary cutting-cylinder considered as a whole, the same being disposed across the machine in advance of roll 2 and having a portion of its periphery in wrapping engagement with apron 3, between roll 2 and cross-bar 5; 7, the shell of the cutting-cylinder, the same being provided with a cylindrical bore; 8, the cracker-spaces formed by suitable outlining cutting-ribs on the periphery of the cylinder, the spaces illustrated being such as appropriate to a square cracker with its corners cut off; 9, the scrap-spaces formed by the cutting-ribs of the cutting-cylinder at the corner junctures of the cracker-spaces; 10, a flange secured to one end of the shell of the cutting-cylinder and provided with a gudgeon; 11, a bearing secured to one of the side frames and supporting the gudgeon of the cutting-cylinder; 12, a cross-piece disposed across the frame below the cutting-cylinder and having thin edges close to the cutting-cylinder; 13, a roll disposed across the frame below the cross-piece 12; 14, an apron engaging the cross-piece 12 and roll 13 and running between the cross-piece and the cutting-cylinder and having wrapping contact with the cutting-cylinder, the cross-piece presenting a thin rear edge contiguous to the edge of cross-bar 5, so that apron 14 runs over the cross-piece 12 in a line practically continuing the curved line of apron 3, the cross-piece 12 also having a thin front edge; 15, a roll exterior to apron 14, between roll 13 and the cross-piece and serving to deflect the front portion of apron 14 rearwardly as it turns over the front edge of the cross-piece; 16, the stripping-cylinder, considered as a whole, disposed across the frame in advance of, but close to, the front edge of the cross-piece 12, this cylinder running in contact or very close to the cutting-cylinder; 17, a series of cords running over the stripping-cylinder and forming, in effect, a skeleton traveling apron, these cords being preferably arranged in peripheral grooves in the stripping-cylinder; 18, a cross-bar supported by the frame in advance of the stripping-cylinder and furnishing a support for the advance portions of the cords which pass over it and turn back over a rounded thin edge; 19, a pair of rolls supported by the framing in advance of cross-bar 18, the rearmost one being close to the cross-bar; 20, an apron running over rolls 19 and forming at its upper portion a continuation of the carrier formed by the cords 17; 21, a fixed cylindrical core supported by the frame and engaging the bore of the shell of the cutting-cylinder, this core being provided with a longitudinal groove; 22, the head of this core, the same being secured to the side frame of the machine opposite the one supporting the bearing 11; 23, a loose segment

of the core of the cutting-cylinder, the same being disposed in the longitudinal groove thereof and adapted for radial motion therein; 24, a series of pistons disposed in radial cylinders formed in the shell of the cutting-cylinder, the outer portions of these pistons being normally flush with the floors of the cracker-spaces and the inner ends of the cylinders being open to the bore of the cutting-cylinder, these pistons fitting neatly but freely and being preferably provided with circumferential packing-grooves; 25, a series of longitudinal air-passages in the shell of the cutting-cylinder, there being one of these passages for each scrap-space in a circumferential series, each scrap-space in the cutting-cylinder having communication by a port with one of these passages; 26, the shell of the stripping-roll 16, this shell having a cylindrical bore and having a flange and gudgeon similar to the shell of the cutting-cylinder; 27, numerous radial perforations through the shell of the stripping-roll; 28, the fixed cylindrical core of the stripping-roll, the same fitting the bore of the stripping-roll and being bolted to one of the side frames of the machine; 29, an air-passage extending longitudinally through the core of the stripping-roll and communicating by longitudinal slot with the exterior of the core, so that as the shell of the stripping-roll turns upon the core a longitudinal series of the perforations 27 will be brought successively into communication with air-passage 29, the port from passage 29 being disposed just in advance of the tangent point of the cutting-cylinder and the stripping-roll; 30, a suction-pipe connected with air-passage 29 and adapted to be connected with any suitable air-exhausting agent; 31, a compressed-air pipe communicating with a longitudinal air-passage 38 in segment 23 of the cutting-cylinder, this pipe being screwed into the end of the segment and passing loosely through core-head 22, so as not to interfere with the proper radial movement of segment 23; 32, a valve-box disposed in core-head 22 and bearing against the end of the shell of the cutting-cylinder at the open ends of air-passages 25; 33, a compressed-air pipe communicating with the interior of the valve-box; 34, a spring urging this valve-box against the end of the shell of the cutting-cylinder, so as to maintain a rubbing air-tight contact therewith as the shell of the cutting-cylinder turns; 35, a port in the inner face of the valve-box adapted to be traversed successively by the air-passages 25 as the shell of the cutting-cylinder turns, whereby each of the passages 25 and the scrap-spaces communicating with them will be subjected to air under pressure, the angular disposition and length of port 35 being such that a given air-passage 25 will receive compressed air some little time after the passage has risen above the stripping-roll, or, say, at about the time the passage is in the horizontal plane of the axis of the cutting-cylinder; 36, springs disposed within the core of the cutting-cylinder and acting outwardly on segment 23, so as to hold the outer face of the segment in air-tight rubbing contact with the bore of the shell of the cutting-cylinder; 37, a pin disposed diametrically across each piston 24 and having its outer ends in engagement with an annular groove in the bore of the cylinder in which the piston works, the piston being slotted where it engages the pin, so that the piston can have longitudinal play upon the pin, the outer end of the piston having a perforation leading to the slot in which is seated the pin; 38, the longitudinal air-passage in the segment of the core of the cutting-cylinder, heretofore referred to; 39, a longitudinal slot in the segment placing air-passage 38 in communication with the outer face of the segment, so that as the shell of the cutting-cylinder turns upon the core and segment the longitudinal series of pistons 24 will in succession have compressed air admitted behind them, and 40, Fig. 8, a plate uniting a series of the pistons and forming a modification.

The pistons 24 in the cutting-cylinder tend to force the crackers out of the cracker-spaces when the compressed air is admitted behind the pistons, the pistons moving inwardly by their own gravity as they pass through the upper portions of their travel or being pressed inwardly by the dough as the cutting takes place. As each longitudinal row of pistons passes the slot 39 the air forces those pistons outwardly, thus pushing outwardly upon the crackers and tending to discharge them from the cracker-spaces. In the illustration I have shown each cracker-space as being provided with several longitudinal rows of the pistons, and it will be obvious that the first effect upon a given cracker is to force outwardly its advancing edge and later the following portions of the cracker. It is to be noted that the discharging of the pistons occurs at the same time the stripping-roll is sucking upon the opposite side of the cracker. Either the discharging-pistons or the sucking stripping-roll might effect the proper discharge of the crackers from the cracker-spaces and their delivery upon the cords 17; but the two agents supplementing each other insures the delivery. A single longitudinal row of pistons in each cracker-space will in many cases prove sufficient, and such single row should be located near the advancing edge of the cracker, so as to force that edge from the cracker-space and insure its proper seating against the stripping-roll, so that the suction can become effective. The pistons may act independently directly upon the cracker, or groups of the pistons may be coupled by means of plates, as indicated in Fig. 8. The advantage of a number of longitudinal rows of pistons is that the advancing edge of the cracker becomes first expelled and then the cracker becomes gradually peeled out of the cracker-space. The pins 37 prevent pistons dropping out of their cylin-

ders. In inserting a piston a pin is placed in the slot and then the piston pushed inward as far as the pin will permit. An implement is then inserted in the aperture in the end of the piston, so as to press upon the middle of the pin and bend it into a bow, thus shortening it and permitting it to pass into the cylinder until its ends reach the annular groove in the cylinder, after which the spring of the pin will cause it to straighten and lock in the groove, retaining the piston without interfering with its proper endwise motion. The sheet of dough is brought forward on the apron 3 and passes downwardly between roll 2 and the cutting-cylinder, where apron 3 has wrapping contact with the cutting-cylinder and is cut up by the latter, and the desire is that the crackers and scrap stay in the spaces of the cutting-cylinder until the proper time for their discharge. There is some tendency for them to cling to the apron 3, against which the cutting is done; but as this apron takes its sharp turn over cross-bar 5 the crackers, &c., preferring not to make this sharp turn, peel from apron 3 and continue on with the cutting-cylinder, following the upper portion of apron 14, where it runs over the cross-bar 12, this latter apron insuring the retention of the crackers in the cutting-cylinder until the stripping-roll is reached, at which time the stripping-roll is ready to receive them and carry them until the cords lift them and carry them onwardly to the carrier 20. The pistons or the suction of the stripping-roll, or both, insure the proper discharge of the crackers from the cutting-cylinder and their delivery to the cords, as heretofore explained. As the scrap-spaces pass upwardly after the crackers have been delivered, port 35 becomes effective in delivering compressed air to the cracker-scrap spaces, causing the scrap to be blown outwardly from the cutting-cylinder to be caught in any suitable trough or receiving agent.

It is to be observed that the two aprons 3 and 14 by reason of their wrapping contact with the cutting-cylinder form practically a continuous curved carrier from the cutting-point to nearly the line of contact between the suction-roll and cutter; but the subdivision of this carrier and the separation of the dough from the first portion of the carrier at cross-bar 5 causes the crackers to reach the discharging-point under favorable conditions for discharge, as they are not under clinging contact with the second portion of the carrier. The sharp turn of apron 3 over cross-bar 5 and the sharp turn of apron 14 over the edge of cross-bar 12 nearest to cross-bar 5 leave very little space between the contact of the aprons with the cutter. If the aprons passed over rollers at this point, there would be so much of the cutter uncovered that small crackers would be free to leave the cutter. By the use of the thin-edged support of cross-bar 12, which holds apron 14 in the rearward space produced by the positions of the cutter and suction-roll, the apron may continue its wrapping contact far into the narrow part of this space, and thus hold the dough into the cutter until very near the point where it is designed that the crackers shall leave the cutter. The advantage of thus holding the dough in the cutter by a wrapping-support moving uniformly with the crackers is very great. A non-moving support for this purpose requires that the dough slide over it, with the resultant danger that the crackers will stick and be mutilated.

What I claim is—

1. In combination a cylinder with cutting-ribs outlining spaces thereon; an apron in circumferential wrapping contact therewith; and means to give a sharp turn to the apron at one limit of such circumferential contact.

2. In combination a cylinder with cutting-ribs outlining spaces thereon; an apron in circumferential wrapping contact therewith; and means to give sharp turns to the apron at both limits of such circumferential contact.

3. In combination a cylinder with cutting-ribs outlining spaces thereon; a suction stripping-roll running in contact with said cylinder, and a cord-carrier the cords of which travel about the suction stripping-roll between it and said cylinder.

4. In combination a cylinder with cutting-ribs outlining spaces thereon; a suction stripping-roll having circumferential grooves; and a cord-carrier whose cords travel in the groove of the suction stripping-roll.

5. In combination a suction stripping-roll having circumferential grooves; a plurality of endless cords in those grooves; and a forward support for the cords about which they make a sharp turn.

6. In combination a cylinder with cutting-ribs outlining spaces thereon, and with radial cylinders; pistons in the radial cylinders; to act as strippers; and means to admit compressed air to the inner ends of the radial cylinders.

7. In combination a cylinder with cutting-ribs outlining spaces thereon; a traveling surface to feed the dough to that cylinder; means acting from within the cylinder to strip the cut dough from the spaces; and external suction stripping means acting in conjunction with the internal stripping means.

8. In combination, a rotary cutter provided with ribs outlining cutting-spaces thereon and provided with radial cylinders extending inwardly from said spaces, pistons in said cylinders, and means for moving said pistons outwardly to eject the dough from said spaces.

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