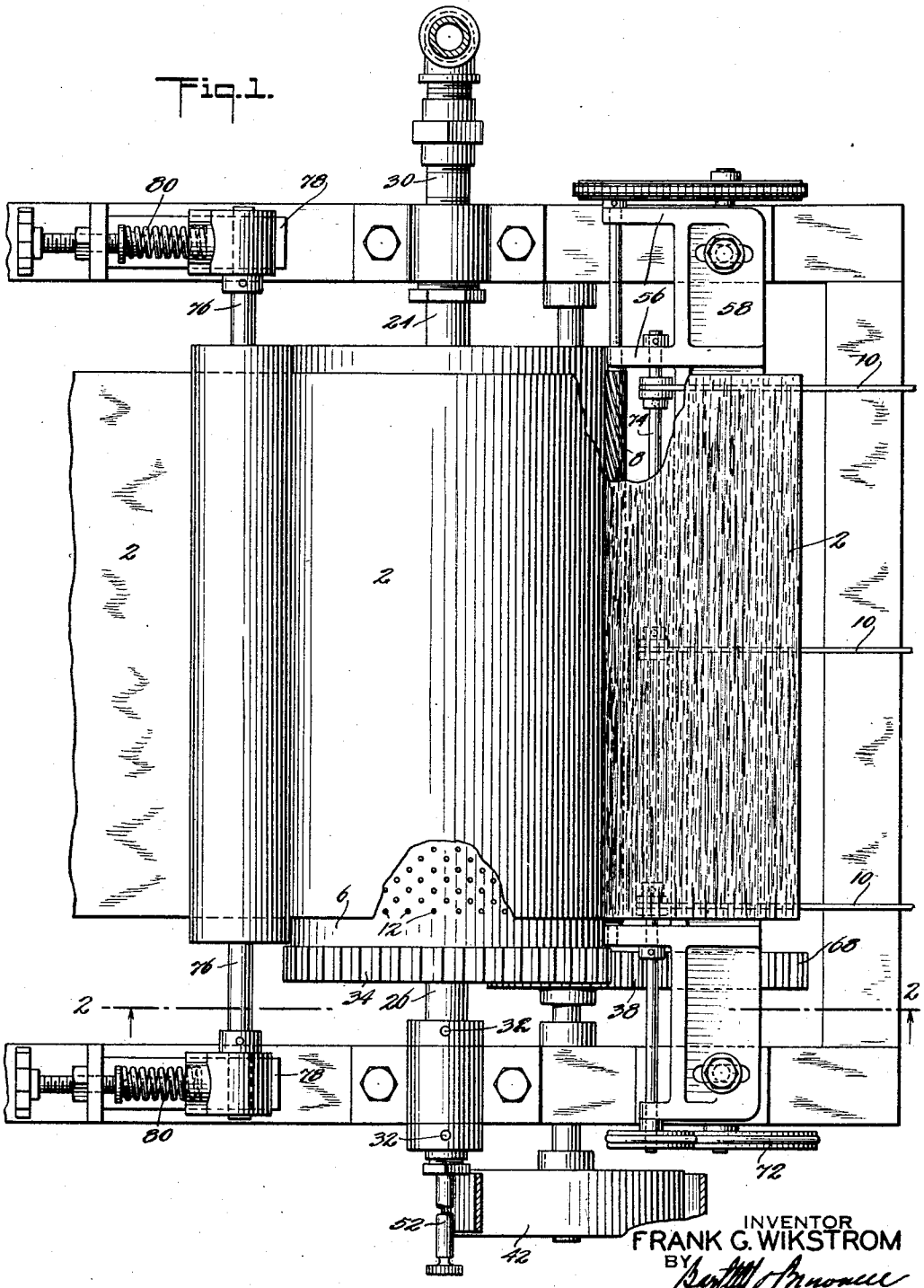
April 12, 1932. F. G. WIKSTROM 1,853,591

CRINKLING MACHINE

Filed June 26, 1928 3 Sheets-Sheet 1

Fig. 1.



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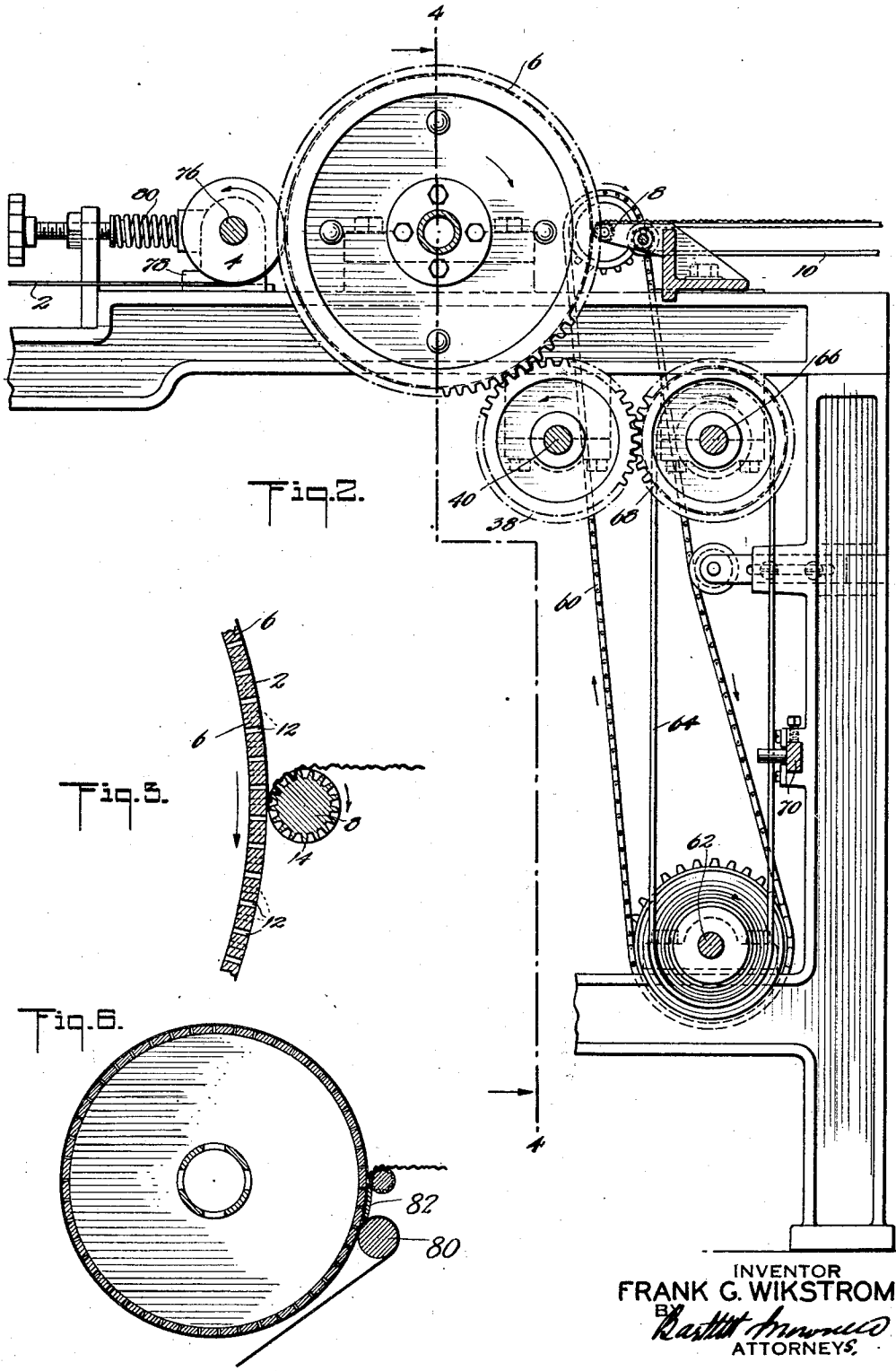

Fig. 2.

Fig. 3.

Fig. 6.

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Fig. 4.

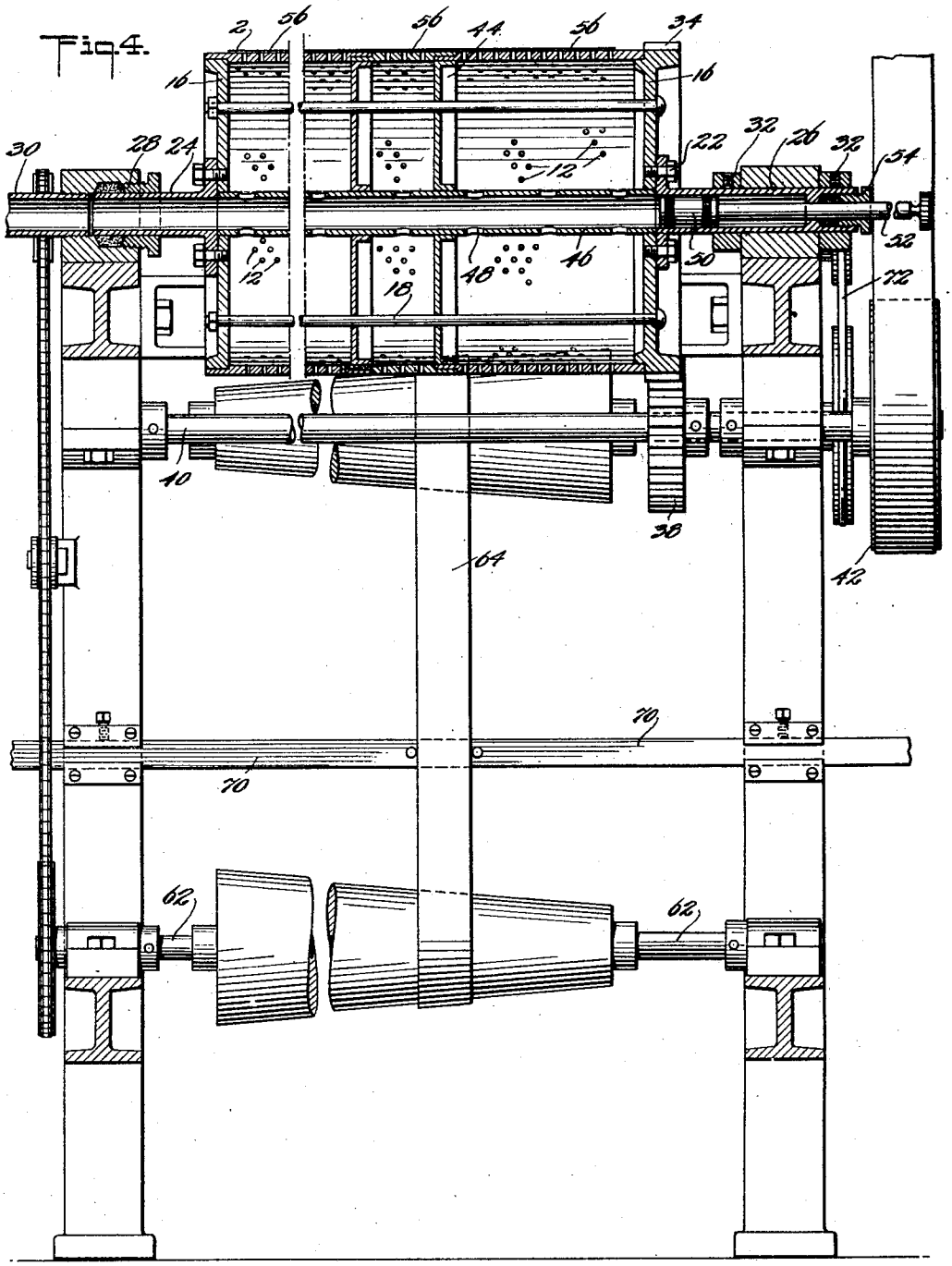
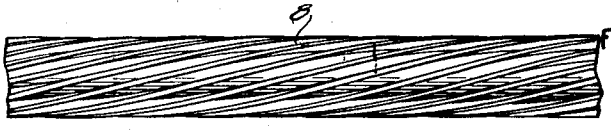


Fig. 5.



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UNITED STATES PATENT OFFICE

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CRINKLING MACHINE

Application filed June 26, 1928. Serial No. 288,342.

My invention relates to machines for crinkling paper and other fabric, and has for its object generally to provide a novel and improved machine of this character. It further has for its object to provide a machine of this character which is capable of producing crinkled paper of the maximum degree of uniformity, fineness and stretchability, which is capable of operation at high speed, and which may be easily adjusted to meet different conditions. Still further objects of the invention are to provide a novel and improved crinkling cylinder and doctor for crinkling machines.

The several features of the invention, whereby the above-mentioned and other objects may be attained, will be clearly understood from the following description and accompanying drawings, in which:

Figure 1 is a plan view of a portion of a machine embodying the features of the invention in their preferred form;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a detail transverse sectional view of a portion of the crinkling cylinder, and doctor of the machine;

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a detail side view of a portion of the doctor; and

Fig. 6 is a transverse sectional view, partly diagrammatical, through the crinkling cylinder and doctor roll of the machine and showing the paper strip presented to the crinkling cylinder in a different manner than is shown in Figs. 1 and 2.

In my improved machine as illustrated in the drawings, the paper 2 to be crinkled is passed beneath a guide roll 4, over the upper half of a crinkling cylinder 6, and is then stripped from the cylinder by means of a doctor 8 which delivers the crinkled paper to a suitable belt conveyor 10 for conveying it from the machine.

In the illustrated machine the necessary adherence of the paper to the crinkling cylinder 6 is accomplished by atmospheric pressure. To provide for this, the crinkling cylinder is of hollow construction, its peripheral surface is provided with perforations 12, and means is provided for exhausting air from the interior of the cylinder. The perforations are preferably arranged in uniformly staggered relation as shown, so that the paper will resist the stripping action of the doctor at closely spaced diagonally or zigzag varying points throughout the width of the paper.

The doctor 8 is in the form of a roll of small diameter with relation to the crinkling cylinder, the doctor in the machine at present constructed being three quarters of an inch in diameter while the crinkling cylinder is nine inches in diameter. The doctor roll is grooved, or fluted, to provide a plurality of equally spaced radially projecting ribs 14 which extend spirally longitudinally of the roll. The doctor roll is arranged in substantial contact with the crinkling cylinder and is driven in the same direction as and at a less surface speed than the cylinder. The proper relative speeds of the cylinder and roll depend on the quality or thickness of the paper and the fineness and stretchability of the crinkling desired. Accordingly, means is provided in the illustrated machine for varying the relative surface speeds of the cylinder and doctor roll as desired to meet different conditions.

With this construction it will be apparent that due to the spiral form of the projecting ribs of the relatively small doctor roll, as the paper approaches the bite of the crinkling cylinder and roll the ribs continuously and uniformly act on the paper at a plurality of spirally changing points throughout the width of the paper to strip the paper from the crinkling cylinder, the crinkles as they are formed in the paper freely entering the grooves in the roll. This action of the doctor roll taken together with the manner in which the paper is caused to adhere at uniformly staggered points on the crinkling cylinder as above described, ensures the crinkling of the paper being accomplished with the desired fineness and stretchability, and without danger of uncrinkled spots or lines occurring in the completed product.

Due to the nature of the crinkling action of

my improved crinkling cylinder and doctor roll, the machine may be run at much higher speed for the quality of work produced than the machines heretofore in general commercial use. Also, very little preliminary moistening of the paper is required, and in fact with certain of the finer grades of paper, such moistening may be dispensed with entirely.

The crinkling cylinder 6 comprises a cylindrical shell having the perforations 12 therein. The ends of this shell are closed by walls 16 which are held in place by bolts or rods 18, and are respectively secured by bolts 22 to axially arranged tubular trunnions 24 and 26. The trunnion 24 is tubular and is journaled in a stuffing box 28 mounted in one of the machine side frames. The inner end of this trunnion is in communication with the interior of the crinkling cylinder, and its outer end is in alinement with a pipe 30 for connection with a suitable suction fan or other suction means for exhausting air from the interior of the crinkling cylinder. The right-hand trunnion 26 is journaled in a suitable bearing in the machine frame and is held from axial movement so as to hold the crinkling cylinder from axial movement by means of collars 32 secured thereon.

The crinkling cylinder is driven by a gear 34 formed on one end wall 16 which is operatively engaged by a gear 38 secured on the main shaft 40 of the machine, which shaft may be driven by a belt and pulley 42.

In order to accommodate the crinkling cylinder for different widths of paper, the interior thereof is divided into a plurality of compartments by means of transverse partitions 44, and means is provided for shutting off one or more of the compartments from the air exhausting means so that only those compartments over which the paper passes will be in communication with the air exhausting means. To provide for this, a pipe 46 extends axially through the crinkling cylinder with its ends secured in apertures in the end walls 16, one end thereof being in communication with the exhaust pipe 30 through the associated tubular trunnion 24. The pipe 46 is provided with apertures 48 leading into each of the compartments in the crinkling cylinder. The right-hand trunnion 26 is bored out to receive an air tight piston 50 which is provided with an operating stem or rod 52 extending through a stuffing box 54 in the trunnion. With this construction, by shifting the piston 50 longitudinally, one or more of the compartments in the crinkling cylinder may be shut-off from the air exhaust pipe 30.

In some cases, however, in order to accommodate different widths of paper, it may be found desirable to lengthen or shorten the crinkling cylinder. To this end, the cylinder shell is made in separate sections 56 which are arranged end to end, and are all detachably held together by means of the bolts 18 so that the sections may be easily taken apart and a less number used or others substituted.

Also, it is sometimes desirable to substitute another cylinder of different diameter or having a perforated surface of a different length. This, of course, may be easily accomplished upon removing the bolts 24 so as to detach the cylinder from its trunnions 24 and 26.

Thus various means are provided for increasing or decreasing the width of the perforated suction surface of the crinkling cylinder to accommodate different widths of paper to be operated upon, so as to ensure the paper completely covering all of the perforated upper portion of the crinkling cylinder in communication with the air exhausting means, thus insuring the paper uniformly adhering to the crinkling cylinder throughout its width.

The doctor roll 8 has reduced ends that are journaled in the ends of rearwardly projecting bracket arms 56 on a cross-bar 58 secured on the machine frame, the cross-bar being adjustably secured on the frame to permit the doctor roll to be accurately adjusted with relation to the crinkling cylinder.

The driving connection between the doctor roll and the main shaft 40, comprises a sprocket chain 60 which passes over sprocket wheels respectively secured on one of the reduced ends of the doctor roll and a countershaft 62 mounted in bearings in the lower part of the machine frame. This countershaft is driven by a belt 64 which passes over a cone pulley thereon and an oppositely arranged cone pulley on a shaft 66 which is driven by a gear 68 thereon that engages a gear 38 on the main shaft 40. A belt shifting rod 70 is provided for shifting the belt on the cone pulleys to vary the speed of the doctor roll with relation to the speed of the crinkling cylinder as desired.

The belt conveyor 10 is driven by a belt 72 which passes over a pulley on the shaft 74 of the conveyor, and a pulley on the countershaft 66.

The guide roll 4 is secured on a shaft 76 which has its ends journaled in blocks 78 mounted to slide on the machine frame. The blocks are pressed forwardly by adjustably mounted coiled springs 80 to cause the guide roll to tightly press the paper against the crinkling roll.

The perforations in the under portion of the crinkling cylinder may be closed from the suction device by any suitable means so as to prevent leakage of air through them. If desired, this result may be accomplished by first passing the paper over a guide roll 80, (Fig. 6) spaced a distance below the doctor roll and in close proximity to the crinkling cylinder and then back over the crinkling cylinder to the doctor roll. The perforations

between the guide roll 80 and the doctor roll may be closed by a suitable cover 82.

As will be evident to those skilled in the art my invention permits various modifications without departing from the spirit thereof or the scope of the appended claim.

What I claim is:

In a machine for crinkling paper and other fabric, a crinkling cylinder of hollow construction having its peripheral wall provided with perforations arranged in substantially staggered relation, means for creating a partial vacuum in the cylinder to cause the fabric to be held to the surface of the cylinder, and a doctor for stripping the fabric from the cylinder comprising a roll having radially projecting ribs arranged spirally longitudinally thereof.

In testimony whereof, I have signed my name to this specification this 19th day of June, 1928.

FRANK G. WIKSTROM.