No. 852,503. PATENTED MAY 7, 1907.

W. R. GREEN.

FLAX BREAKING APPARATUS.

APPLICATION FILED FEB. 23, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

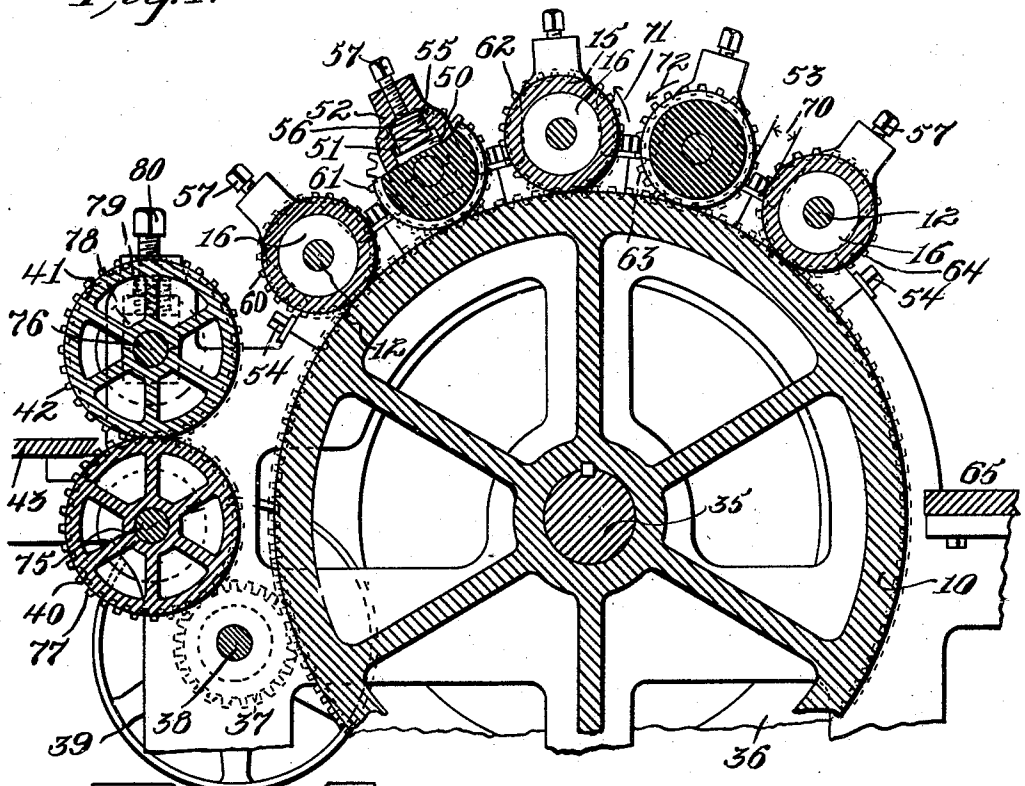
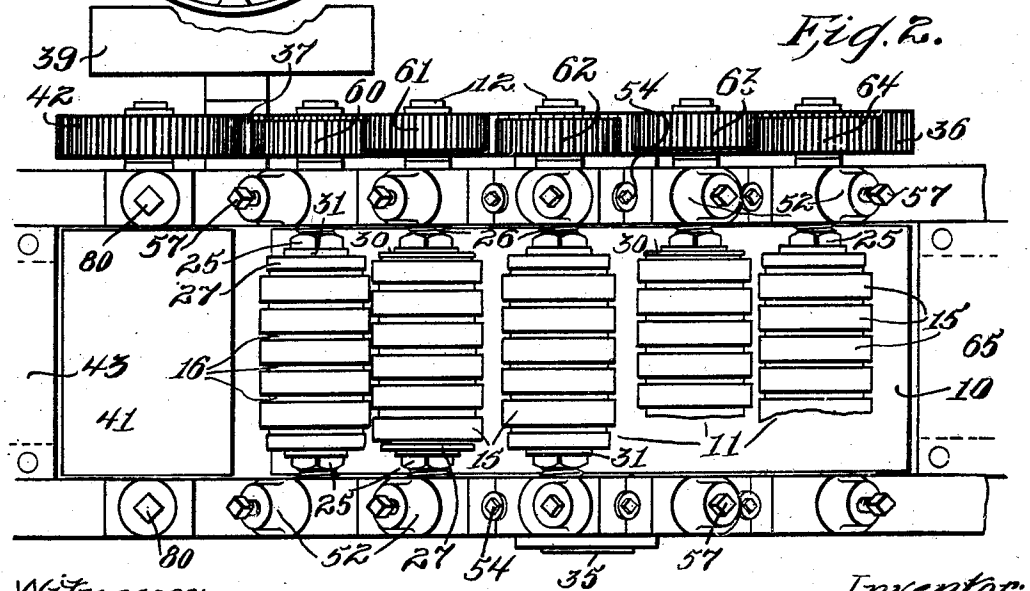


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

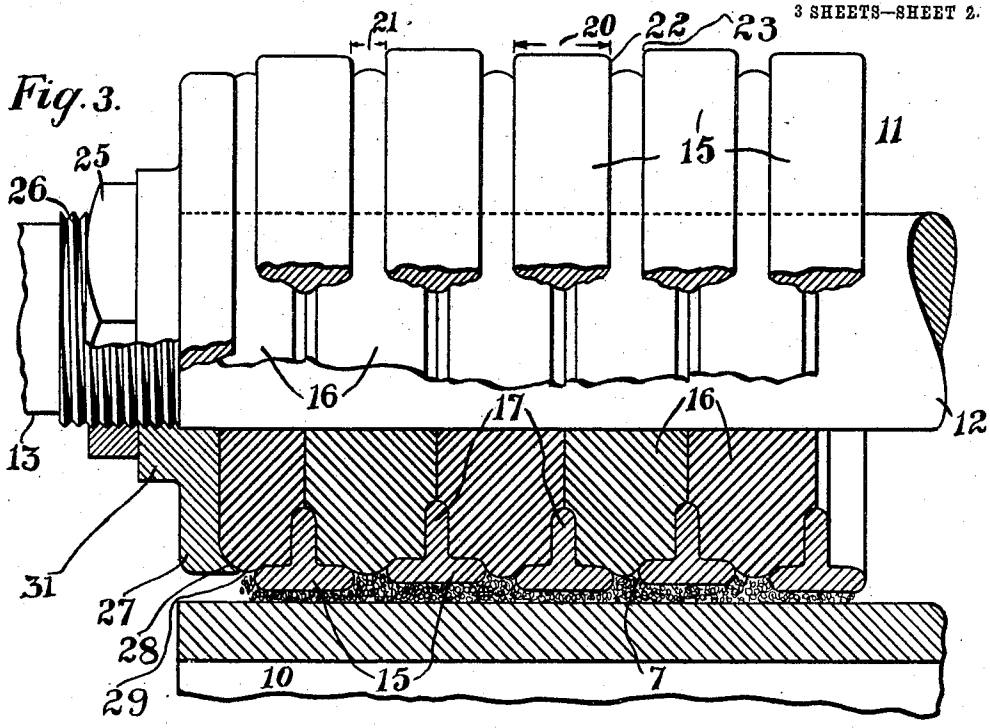
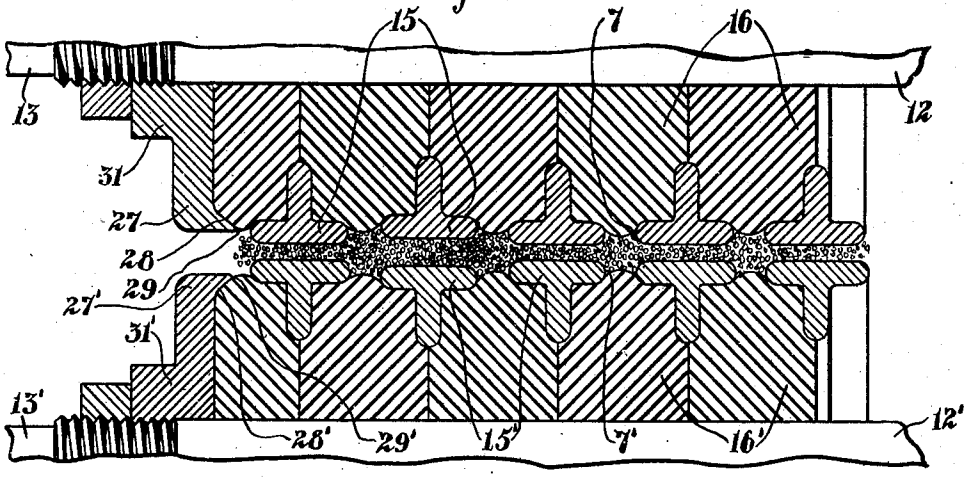


Fig. 4.



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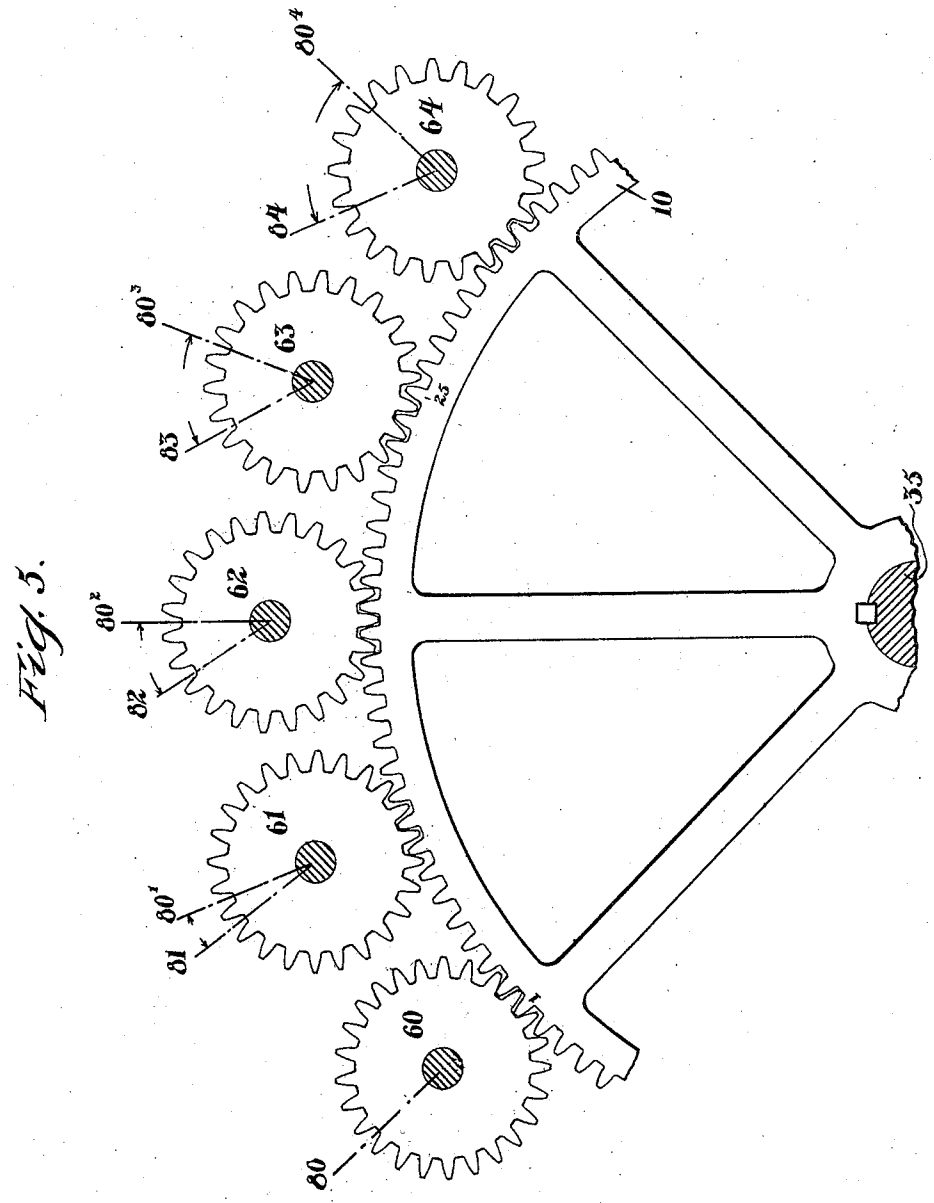
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FLAX BREAKING APPARATUS.

APPLICATION FILED FEB. 23, 1905.

3 SHEETS—SHEET 3.

Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLARD R. GREEN, OF MUSCATINE, IOWA, ASSIGNOR TO UNITED STATES TEXTILE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

FLAX-BREAKING APPARATUS.

No. 852,503. Specification of Letters Patent. Patented May 7, 1907.

Application filed February 23, 1905. Serial No. 246,837.

To all whom it may concern:

Be it known that I, WILLARD R. GREEN, a citizen of the United States, residing in Muscatine, in the county of Muscatine and State of Iowa, have invented certain new and useful Improvements in Flax-Breaking Apparatus, of which the following is a specification.

This invention relates to and has for an object to provide an improved flax treating apparatus.

In the drawings accompanying and forming a part of this specification, a form of embodiment of my invention is illustrated and wherein

Figure 1 is a central longitudinal section. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged side view of one of the rolls, it being partly shown in central longitudinal section. It is also illustrated in connection with the perimeter of the drum or roll with which it co-acts and flax stalks are shown passing between such roll and the drum. Fig. 4 is a similar view of the abutting or co-acting perimeters of two rolls or drums of similar formation, and Fig. 5 is a detail somewhat diagrammatic of the train of gears for driving the rolls at gradually increasing speeds.

In treating the stalks of fibrous material, such as flax, unless the same is fed with great evenness to the rolls there will be an unevenness of action. For instance, if the rolls are solid the flax stalks at one end may be thicker than those at the other, or more stalks may be fed to one end of the rolls than to the other, in which event the rolls will be unevenly forced apart with a resultant unevenness of action. But in my present improvement the rolls are so constructed that the perimeter of each roll is divided into a number of independently elastically movable lengths which will accommodate any local inequalities, each length having to deal with the material which is presented to it, irrespective of the conditions obtaining at other portion of the roll. This can best be seen by reference to Fig. 3, wherein the flax stalks designated by 7, are seen as passing in an uneven layer between a drum or roll 10, and one of the rolls 11 which drum may in practice be a solid inelastic drum or roll, although in certain employments it may be found expedient to construct the roll 10 in a manner similar to the construction of the rolls bearing upon it, as illustrated for instance in Fig. 4 wherein the roll shown as the upper roll bears the same reference characters as the roll similarly situated in Fig. 3 and the lower roll, these figures primed, which rolls are designated in a general way by 11, each comprising a shaft portion 12 having journals 13 which may be turned upon on the shaft. The working perimeter of each roll comprises a number of rings 15 adapted to be normally in surface engagement with the perimeter of the roll or drum 10, and to engage the flax stalks and break the same against such roll. The rings are supported by the shaft so that they may be elastically yieldable relatively to such shaft, to the perimeter of the drum 10, and independently one relative to the other, in the accomplishment of which end some elastic device will be interposed between the rings and the shaft. In the present illustration there are shown a number of elastic bodies 16 which may be rubber disks fastened to the shaft 12 and carrying the rings 15. The roll may be regarded as made of elastic material and provided with a number of armor bands, so that it will be an armored elastic roll. The various portions of the armor being capable of independent yielding and the elastic body tending to return such armor bands to normal position after distortion by contact with the material being worked upon. The bands will in some instances have a tendency to creep along the elastic cylinder and to prevent any such movement they may be provided upon their inner sides with flanges as 17, which if the elastic portion of the roll is made up of a number of disks will occupy positions between the abutting or end faces of such disks.

It will be noticed that the working face 20 of each ring is greater than the free or clear space 21 between the end faces 22 and 23 of the rings, and that such space 21 is sufficiently wide to prevent the interaction of the faces 22 and 23 in gripping or holding the fibrous material which passes under the roll. Were such faces in engagement or very nearly approaching each other the independent action of the rings radially of the roll in their yielding and returning would have a tendency to work the fibers between the end faces of the rings, and as soon as this was done to any extent the material being acted upon would immediately be wrapped upon and about the roll.

By referring to Figs. 1 and 2 it will be seen that the apparatus may be equipped with a number of rolls as above described and each provided with a series of rings spaced apart and independently movable radially of the roll, and it will also be observed that the spaces in one roll are out of alinement with the spaces of the succeeding roll. In practice the spaces and rings of alternate rolls may respectively be alined and the spaces and rings of successive rolls may respectively be staggered or out of alinement. This will permit the stalks escaping breaking at the spaces of one roll to be properly broken by the working faces of the next roll.

To the end that the rolls may be interchangeable and yet be capable of the staggered arrangement above referred to they may be fastened upon their shafts by means of set nuts 25 engaging screw threads 26, the nut bearing upon an end plate 27 which will have an overhanging flange 28 for overlying the perimeter 29 of the elastic cylinder and counteract the reaction of the ring 15 upon such end disk or the end of the elastic cylinder, the diameter of such plate being less than the diameter of the rings 15 so that it will not normally touch the material passing under the roll. The plate 27 at one end may be provided with plane faces 30 for the engagement of the said nut and the plate 27 at the other end may be provided with a boss or hub 31 for engagement with the nut so that the nut at said latter end of the shaft will press the active face of the roll farther toward the other end. By properly regulating the height of the collar or boss 31 in a longitudinal direction the position of the spaces and working faces may be accurately gaged.

In Figs. 1 and 2 the shaft 35 of the roll 10 is assumed to be in practice mounted in suitable bearings and such shaft is shown as having fast thereon a gear wheel 36 meshing with a gear wheel 37 fast upon the driving shaft 38 which also carries a pulley 39 driven by a belt from some suitable source of power not shown. A pair of feed rolls 40 and 41 of any suitable construction are mounted on shafts 75 and 76, respectively, the shaft 75 having fast upon it a gear wheel 77 in mesh with the gear wheel 37 and also in mesh with the rear wheel 42 fast on the shaft 76 and the feed rolls feed the material to be acted upon along the table 43 and against the perimeter of the roll 10 when it will be passed onwardly toward the first of the rolls 11. The shaft of the feed roll 41 is shown as carried by bearing boxes 78, pressed by suitable springs 79 and adjustable by set bolts 80.

In the present illustration there are shown five rolls each having its journal portions 13 mounted in bearing boxes 50, which boxes are supported in ways 51 in blocks 52 which are fastened to the frame of the machine, designated in a general way by 53, by tap bolts 54. Resting upon each of the bearing boxes 50 is shown a coiled spring 55 having an abutment plate 56 upon it, and the tension of the spring will be adjusted by means of a set screw 57 engaging such plate 56. The springs 55 will be relatively strong, that is the springs on each roll should be strong enough to press the working face of the roll normally into contact with the face of the drum 10 and when excess of material or other reason causes one of the rings 15 to yield away from the drum the springs should be so strong that the compression of the elastic member of the roll by such movement will not affect the position of the shaft 12 nor cause its movement radially of the drum 10. The springs should be able to withstand a tendency of the shaft 12 to move radially of the drum 10 induced by a movement of the rings 15 radially of the roll 11. Each of the shafts 12 will carry a gear wheel in mesh with the gear wheel 36, such gear wheels being indicated respectively as 60, 61, 62, 63 and 64, and the pitch line of the gear wheel 60 may be such that the surface speed of the first roll will be constant with the surface speed of the drum 10, and the wheel 61 may have one less tooth than the wheel 60, and each successive wheel may have one tooth less than the one preceding it, so that the wheel 64 will have four teeth less than the wheel 60, thus giving each roll a surface speed in excess of the surface speed of the roll preceding it and in excess of the surface speed. It will be seen that pinion 60 has twenty-five teeth, pinion 61 twenty-four, 62 twenty-three, 63 twenty-two and 64 twenty-one. The radius line 80 of pinion 60 coincides with the radius of gear wheel 10, and upon the rotation of the gear wheel bringing tooth 25 to the position occupied by tooth 1, pinion 60 will make a complete revolution and the radius 80 will occupy the same relative position. In the same advance of the gear wheel 10, the radius of the pinon 61 coinciding with the radius 80′ of such gear wheel at the commencement of the advance above referred to will assume the position 81 at the completion of such advance, indicating that the pinion 61 has run 25 teeth over gear wheel 10 which caused it to travel one tooth more than a complete revolution. Similarly pinion 62 will travel two teeth more than a complete revolution, see difference between radius lines 82 and 80^2. Pinion 63 will travel three more teeth and pinion 64 four more teeth than a complete revolution, as indicated by their radius lines 83 and 80^3, and 84 and 80^4 respectively. There will be a slight elongation of material being acted upon and this accelerated speed will accommodate this elongation, and as the breaking continues the difference in surface

speed between the drum and rolls will produce a scrubbing action upon the fibers to assist in the operation of the machine, the extent of the scrubbing may be regulated by regulating the timing of the rolls and will depend upon the results desired and upon the material being treated. The material as it issues from the rolls may fall upon some suitable table 65 and be removed therefrom by any means found expedient in practice. The material will be fed over the table 43, passed between the feed rolls 40 and 41 and be led to the first roll 11 which will partially break the stalks. The stalks passing between the space 21 will be engaged by the working faces of the next roll and broken. The various successive rolls may be set toward the face of the drum 10 with greater force by means of the set screw 57, so that as the stalks are broken down by one roll the succeeding roll will carry on the work of reduction. After the material has left the last roll it may fall upon a table 65 or other suitable device and be removed for further treatment.

It will be found practicable to have the space or distance 70 between the perimeters of the adjacent rolls comparatively slight so that the tendency of the material to follow the rolls will be overcome. For instance, assuming that the material had the tendency to follow up the roll in the direction of the arrow 71, indicating the direction of movement of such roll, if the space 70 is narrow the action of the next roll by its movement in the direction of the arrow 72 will return the material into the line of feed and will suppress any tendency of the material to follow the first roll.

It will be apparent to those skilled in the art that changes may be made in construction without departing from the spirit of this invention. The device as set forth in the drawing is presented for the purpose of illustration, and it will also be apparent that in some cases a single roll acting upon the drum may be employed without a multiplication of such rolls.

Having thus described my invention, I claim:

1. In a flax treating machine, the combination with a relatively inelastic drum, of a series of rings normally in surface engagement with said drum, and elastic means for independently supporting said rings and spacing the end faces of the same apart.

2. In a flax treating machine, the combination with a relatively inelastic drum, of a series of relatively inelastic rings normally in surface engagement with said drum, and elastic means for supporting said rings and spacing the end faces of the same apart.

3. In a machine for treating fibrous material the combination with a roll and means for rotating the same, of a roll in surface engagement therewith and having its perimeter divided into short lengths independently elastically yieldable radially of the roll and spaced apart sufficiently widely to prevent the engagement of the fibers by the end faces of contiguous lengths.

4. In a machine for treating fibrous material the combination with a drum and means for rotating the same, of a roll normally in engagement therewith, and a number of rings on the perimeter of said roll independently elastically yieldable radially of the roll, and spaced apart to prevent interaction of the edge faces of contiguous rings upon the fibers.

5. In a machine for treating fibrous material the combination with a drum and means for rotating the same, of a roll normally in engagement therewith, and a number of rings on the perimeter of said roll elastically yieldable radially of the roll and independently of each other, and spaced apart to prevent interaction of the edge faces of contiguous rings upon the fibers, and elastic means for holding said rings and drum in engagement.

6. The combination with a drum, of a series of rolls normally in surface engagement with said drum and each roll embodying an elastic body portion, and armor bands upon the said elastic body portion, separated one from the other by an appreciable space, the spaces of the alternate rolls being alined and the spaces of successive rolls being out of alinement.

7. The combination with a drum, of a roll normally in surface engagement with said drum and embodying an elastic body portion and armor bands upon the said elastic body portion, separated one from the other by an appreciable space.

8. The combination with a pair of rotatable rolls, of a series of bands carried upon the perimeter of one of said rolls and spaced apart one from the other, and elastic means for permitting individual yielding of said bands.

9. The combination with a drum, of a number of rolls each having upon its perimeter a number of circumferential bands spaced apart and elastic means for supporting said bands, the spaces between the bands of adjacent rolls being out of alinement.

10. The combination with a drum and means for driving the same, of a number of rolls each having upon its perimeter a number of circumferential bands spaced apart and elastic means for supporting said bands, the spaces between the bands of adjacent rolls being out of alinement, and means for driving said rolls at progressively increasing speed.

11. The combination with a relatively inelastic drum, of a number of rolls each having a number of circumferential bands spaced apart one from the other and normally in

surface engagement with said drum, elastic means for severally holding said bands in normal position, and elastic means for severally pressing the rolls toward the said drum.

12. The combination with a drum and means for rotating the same, of a roll and means for rotating the same, said roll having a shaft portion provided with journals, a number of rings upon the perimeter of the roll spaced apart one from the other and elastic means for independently holding said rings in normal position, and elastic means, stronger than the elastic means holding the rings, bearing upon each journal for normally holding said rings in engagement with the drum.

13. The combination with a relatively inelastic drum and means to rotate the same, of a number of rolls normally in surface engagement therewith and each embodying a shaft having journals, an elastic drum on said shaft, a number of relatively inelastic rings on said elastic drum, spaced apart and having webs embedded in said elastic drum, relatively strong springs bearing on said journals and pressing the roll toward the said inelastic drum, and means to rotate said rolls at progressively increasing surface speed.

14. The combination with a drum and means to rotate the same, of a number of rolls normally in surface engagement therewith and each embodying a shaft having journals, an elastic drum on said shaft made up of a number of disks, a number of relatively inelastic rings on said elastic drum and each ring having a web held between the end faces of adjacent disks, relatively strong springs bearing on said journals and pressing the roll toward the said drum, and means to rotate said rolls at progressively increasing speed.

15. The combination with a drum, of a roll having its perimeter composed of a number of circumferential sections spaced apart one from the other and normally in surface engagement with the drum, elastic means bearing upon each end of the roll for pressing the same toward the drum radially thereof, and elastic means pressing upon each of the said sections for individually holding the same at normal position radially of the roll.

Signed at Nos. 9 to 15 Murray street, New York, N. Y., this 18th day of February 1905.

WILLARD R. GREEN.

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