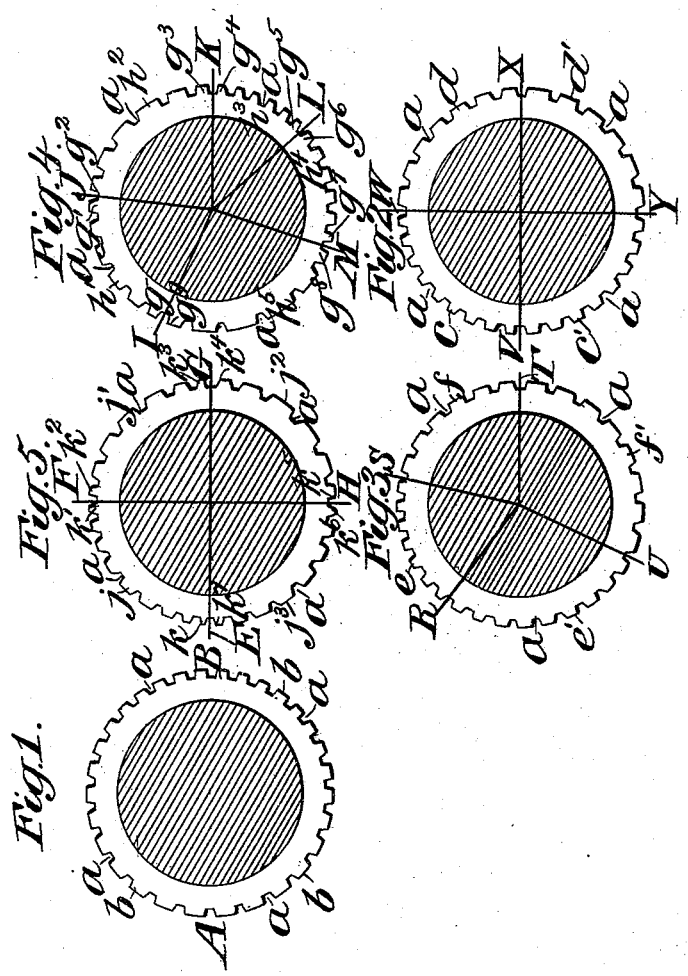
(No Model.)

J. DODD.

FLUTED OR GROOVED DRAWING ROLL.

No. 494,271. Patented Mar. 28, 1893.



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JOHN DODD, OF OLDHAM, ENGLAND.

FLUTED OR GROOVED DRAWING-ROLL.

SPECIFICATION forming part of Letters Patent No. 494,271, dated March 28, 1893.

Application filed January 23, 1892. Serial No. 418,978. (No model.) Patented in England September 28, 1889, No. 15,276.

To all whom it may concern:

Be it known that I, JOHN DODD, machinist, of the firm of Platt Brothers & Co., Limited, of Hartford Works, Oldham, in the county of Lancaster, England, have invented certain new and useful Improvements in Fluted or Grooved Drawing-Rolls, (for which I have obtained Letters Patent of the United Kingdom of Great Britain and Ireland, dated September 28, 1889, and numbered 15,276,) of which the following is a specification.

In the accompanying drawings Figures 1, 2, 3, 4, and 5 represent sections of fluted rollers drawn to an enlarged scale of about twice the actual size of the rollers, in order that the relative form, size and proportion of the flutes or grooves and the teeth of the rollers may be more clearly represented.

The number of flutes shown in the drawings is only about half the usual number. This is done to further enlarge the flutes or grooves and teeth, which are shown about four times their actual size, to enable them the more effectually to illustrate my invention. The actual sizes of the flutes are very small, (a roller one inch in diameter in some cases having from fifty-four to sixty-two flutes in its circumference,) and it would be impossible to correctly represent them in a drawing if drawn to their actual size.

The fluted or grooved metal rollers used in machinery or apparatus for preparing and spinning fibrous materials, are well known devices for the drawing or elongation of those fibrous materials, and are technically known as "drawing" rollers.

Drawing rollers are of two kinds. In one kind the flutes or grooves are formed on the surface of the roller with a uniform pitch, that is to say, in which the distance between the center of one flute and the center of the next flute, or the distance from the point of one tooth to the point of the next tooth, is equal in every part of the circumference of the roller. In the other kind of "drawing" rollers, the flutes are formed on the surface of the roller with a varying pitch, which is technically known as "eccentric" fluting. The distance between the flutes is either constantly increasing or decreasing, as will be seen on referring to Fig. 1. On one side of the roller, the pitch is greater than on the opposite side of the roller, that is to say, beginning with the least pitch at B (Fig. 1), the distance between the flutes gradually increases to the part marked A, from which part, to the part marked B, the pitch decreases in the same manner, and in the same ratio as it increased. Thus in one half of the circumference of the roller, the pitch is gradually increasing, and in the other half of the circumference of the roller the pitch is gradually decreasing.

The particular mode of action in the operation of "drawing" or elongating fibrous materials both in preparing and spinning machinery, is well known, and need not be explained here, excepting in so far as to state that it is necessary, for the perfect action of the "top rollers" that their surfaces should be cylindrical, smooth and of uniform diameter.

The teeth of the drawing rollers produce corresponding impressions or indentations on the surface of the leather or parchment covered top rollers, and when the pitch or distance between the flutes or grooves is uniform (whatever may be the relative diameters of the top rollers and the drawing rollers) the teeth of the bottom roller in rotating, continually enter into the same or similar impressions or indentations, thereby producing what is technically known as a "fluted top roller" which necessitates the continual renewal of the covering of the top rollers, to enable them to do their work effectually. A similar effect is also produced with bottom rollers in which the pitch is "variable" whether made in the ordinary way, or according to my invention, whenever the top and bottom rollers are of the same diameter, because the angular velocity of the two rollers being the same the teeth of the bottom roller, in rotating continually enter the same indentations or impressions on the leather or other covering of the top rollers, thus producing fluted top rollers.

Drawing rollers known as "eccentrically" fluted rollers are formed with all the flutes of a uniform width, and as the distance or pitch from one flute to another continually changes from the smallest pitch to the largest pitch, or vice versa, it follows that the

width of the tops of the teeth will be increased or diminished to the same extent as the pitch of the flutes is increased or diminished.

When the top roller is larger than the bottom drawing roller the impressions made by one revolution of the bottom roller on the leather or other surface of the top roller will operate only on so much of the circumference of the top roller as is equal to the entire circumference of the bottom roller, leaving a portion of the "top roller" without impressions. When the bottom roller in its second or subsequent revolution, has turned sufficiently to complete the first revolution of the top roller, the pitch of the teeth of the bottom roller, which now begin to make a second impression upon the top roller will be different from that of the teeth which made the first impression upon the top roller at the first revolution. Thus, the top roller instead of becoming fluted by the teeth of the bottom roller constantly acting on the same part of the leather or other surface of the top roller, will continually receive impressions from a different part of the bottom roller so that after a certain number of revolutions of the bottom roller every portion of the surface of the top roller will have received a passing, transitory or momentary impression from the teeth of the bottom roller; the impressions made by one revolution of the bottom roller being so to speak, effaced by succeeding revolutions, leaving the surface of the top roller smooth and workable for a much longer period than would be the case if the bottom rollers had flutes of a uniform pitch. Notwithstanding the eccentric fluting, it is found however in some cases that the top rollers become fluted. In most of these cases it arises from the fact that the ratio of variation in the pitch of the flutes of the bottom roller is so slight between one flute and the adjoining flute, that the top roller (owing to the fact that it is mounted loosely on its shaft, and is driven by contact) yields to the tendency of the teeth to enter into the impressions first made on it by the bottom roller, a kind of slipping or creeping action taking place, somewhat as if two unequally pitched wheels were working together. The top roller thus receives an irregular motion, which once established soon causes it to become fluted.

In the case of an ordinary eccentrically fluted roller such as is shown in Fig. 1 the broad teeth of the coarsest pitched part A of the roller have less power of drawing than the fine teeth of the finer pitched part B of the roller and for this reason in some cases it is found necessary (in order to get rid of the blunt teeth of the coarse pitched part of the roller and to obtain the greatest drawing power) to employ rollers fluted with a uniform pitch, in which there is no variation in the drawing power, notwithstanding the objection that with such rollers the top rollers soon become "fluted."

The object of my invention is to form the flutes and teeth of drawing rollers so that while maintaining a high drawing power I am able to prevent the objectionable fluting of the top rollers.

Referring to the drawings, Fig. 1 shows a cross section of an ordinary drawing roller known as an eccentrically fluted roller. All the flutes or grooves *a* are of the same width and depth. The pitch of the flutes is greatest at A and least at B. Beginning with the greatest pitch at A the pitch is gradually decreased until attaining the least pitch at B thus making the flutes of a variable pitch. This arrangement of roller forms no part of my invention and it is only intended to illustrate the disadvantages my invention is intended to overcome.

According to my invention I divide up the surface of each fluted roller into sections or divisions or groups in each of which are flutes or teeth or ridges either of uniform or variable pitch or width but so arranged that the flutes or teeth or ridges in each section, division or group whether of uniform or variable pitch for each division are different either in pitch or in variation of pitch or both in pitch and in variation of pitch from the contiguous section, division or group or sections, divisions or groups, and also so arranged that the pitch of the flutes or grooves in any section, division or group shall not be a continuation of a variation of the pitch in a contiguous section, division or group. So long as the flutes or grooves in one section, division or group are different in pitch or variation of pitch or both in pitch and in variation of pitch from those in the contiguous section, division or group or sections, divisions or groups which are not contiguous to be alike in the flutes or grooves which they contain. The sections, divisions or groups may be equal or unequal and may be two or more in number. There are two modes in which my invention may be carried into effect. According to the first of these modes I form the flutes or grooves around the roller into equal or unequal sections or groups and while causing the flutes or grooves of each section to be of uniform "pitch" throughout such section or group I also cause the flutes or grooves of each section or group to be of a pitch different from that of the flutes or grooves of the other section or sections. According to the second of the said modes I form the flutes or grooves around the roller into equal or unequal sections or groups the "pitch" of the flutes or grooves in each section or group being variable, that is, so arranged that the "pitch" of such flutes or grooves commences at one "pitch" at one end of the section or group and gradually increases and then gradually diminishes toward the other end of the section or group, or so arranged that the pitch of the flutes or grooves in one section commences at one pitch and gradually diminishes and then gradually increases, or so arranged that the pitch of the flutes or grooves in one section commences at one pitch at one end of

the section and increases to the other end of the section where it joins up to the next section, which is formed in a similar manner. Thus the coarsest pitch of one section is contiguous to the finest pitch of the adjoining section. The "pitches" of the flutes or grooves in each of the contiguous sections or groups will be different and the difference may be made more or less but the variation of pitch of the flutes or grooves in one section or group must not be a continuation or a reversal of a variation in a contiguous section, division or group.

By employing rollers having the flutes or grooves therein formed as above described I in so far as it is practicable to do so, avoid the cutting or formation of grooves or ridges in or upon the leather parchment or other covering upon the rollers used in conjunction with such rollers.

Fig. 2 shows a cross section of a drawing roller made according to my invention and divided into four equal sections by the radial lines V. W. X. Y. the section inclosed by the radial lines V. W. having nine teeth, the section inclosed by the lines W. X. having seven teeth, the section inclosed by the lines X. Y. having six teeth, and the section inclosed by the lines Y. V. having eight teeth. The flutes *a* in each section are of uniform pitch, but the pitch of the flutes in each of the sections differs from those of the flutes in the other sections.

Fig. 3 shows a cross section of a drawing roller divided into four unequal sections by the radial lines (R. S. T. U.) the section inclosed by the radial lines (R. S.) having seven teeth, the section inclosed by the lines (S. T.) having six teeth, the section inclosed by the lines (T. U.) having eight teeth, and the section inclosed by the lines (U. R.) having nine teeth. The flutes in each separate section are of a uniform pitch. The pitch of the flutes in each of the aforesaid sections differs from that of the flutes in the other sections.

Fig. 4 shows a cross section of a drawing roller divided into five unequal sections by the radial lines (I. J. K. L. M.). Each of these sections has six teeth. Therefore the pitch of the flutes in each separate section differs from the pitches of the flutes in the other sections. In this case the flutes in each separate section are of a variable pitch, that is to say not uniform; thus in section (I. J.) the pitch of the flutes beginning at the least pitch *g* is gradually increased until it attains the greatest pitch at *h'*. The pitch is then gradually decreased until it attains the least pitch at *g'*.

In each of the sections shown in Fig. 4 the pitch of the flutes and also the variation of the pitch of the flutes differ from the pitches of the flutes and the variations in the pitch of the flutes of the other section. The description of the variation in the pitch of the section (I. J.) will suffice if the other letters be substituted to describe a similar kind of variation in each of the other sections.

Fig. 5 shows a cross section of a drawing roller divided into four equal sections by the radial lines (E. F. G. H.) the section inclosed by the radial lines (E. F.) having nine teeth, the section inclosed by the lines (F. G.) having seven teeth, the section inclosed by the lines (G. H.) having six teeth, and the section inclosed by the lines (H. E.) having eight teeth. The flutes in each separate section are of a variable pitch; thus in the section (E. F.) the pitch of the flutes beginning at the least pitch *k* is gradually increased until it attains the greatest pitch at *j*. The pitch is then gradually decreased until it attains the least pitch at *k'*.

In each of the sections shown in Fig. 5 the pitch of the flutes and also the variation in the pitch of the flutes differs from the pitch of the flutes and the variations in the pitch of the flutes of the other section. The description of the variation in the pitch of the section (E. F.) will suffice if the other letters be substituted to describe a similar kind of variation in each of the other sections.

By employing my invention I am enabled to make more advantageous variations in the pitch of the flutes and teeth and thus reduce the tendency of the teeth to re-enter the impressions first made upon the surface of the top roller by the bottom roller and prevent the slipping or creeping action previously referred to.

The division of the drawing rollers into sections, having flutes and teeth of different pitches causes impressions of such a varying character to be made on the top roller (while retaining the efficient drawing power of the roller) that the impressions of the teeth of the bottom roller are prevented from injuriously forming indentations in the circumference of the top roller.

I would have it understood that the arrangements hereinbefore shown and described in reference to Figs. 2, 3, 4, and 5 may in some cases be varied. For instance, the number of sections into which the roller is divided may be varied without departure from my invention. The arrangements illustrated in Figs. 2 and 3 will probably be found more generally advantageous than the arrangements illustrated in Figs. 4 and 5.

In the accompanying drawings I have in every case shown the sections, divisions, or groups into which I divide the flutes or grooves of a roller constructed according to my invention as being each of a different pitch which is the form to be preferred. I would nevertheless have it understood that in some cases I may cause two or more sections, divisions or groups which are not contiguous to be formed with teeth of a similar pitch.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A grooved or fluted drawing roller the circumference of which is divided into sec-

tions or groups of flutes or grooves, and the flutes or grooves of one of which sections or groups are of different pitch from those of the other of said sections or groups, substantially as herein set forth.

2. A grooved or fluted drawing roller the circumference of which is divided into sections or groups of flutes or grooves and the flutes or grooves of certain of which sections or groups are of a different pitch from those of the adjacent section or group, substantially as and for the purpose herein set forth.

3. A grooved or fluted drawing roller the circumference of which is divided into sections or groups of flutes or grooves the flutes or grooves in each of said sections or groups being of a different varied pitch, substantially as herein set forth.

4. A grooved or fluted drawing roller the circumference of which is divided into sections or groups of flutes or grooves, the flutes or grooves in each of said sections or groups being of varied pitch and the variation of pitch in each of said sections differing from the variation of pitch in the other sections, substantially as herein set forth.

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