June 3, 1941. R. A. KETTLEY 2,244,461

FIBER WORKING ROLL FOR TEXTILE MACHINES

Filed Oct. 15, 1938

Fig. 1

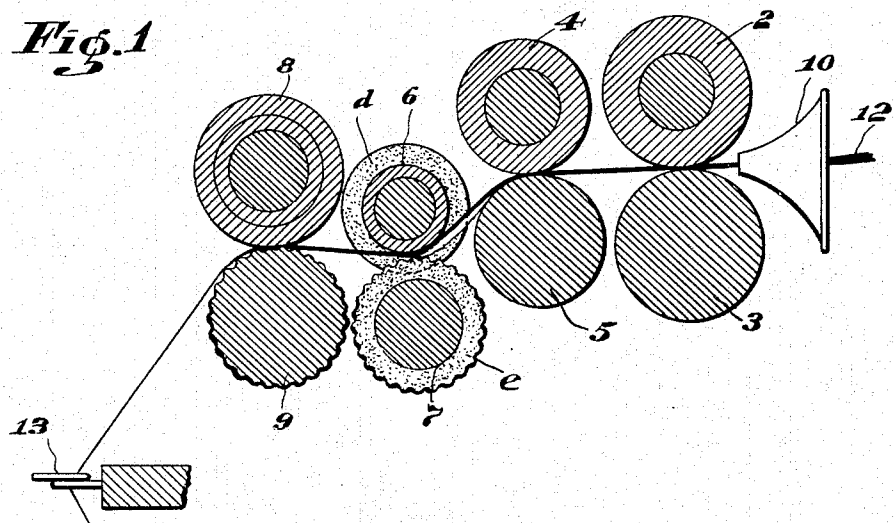


Fig. 2

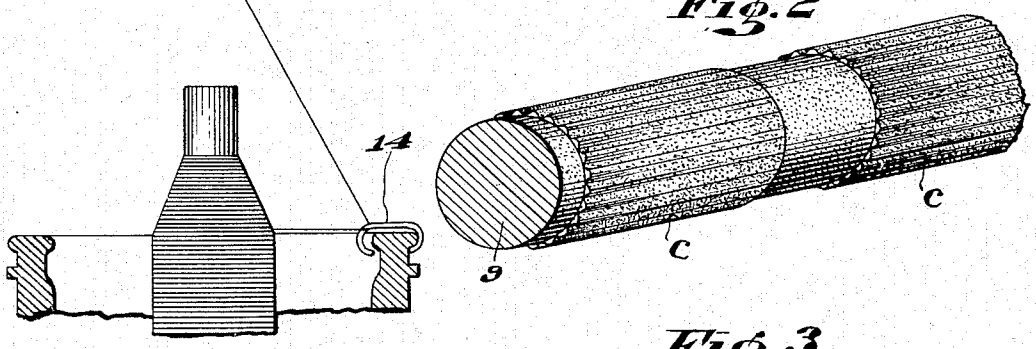


Fig. 3

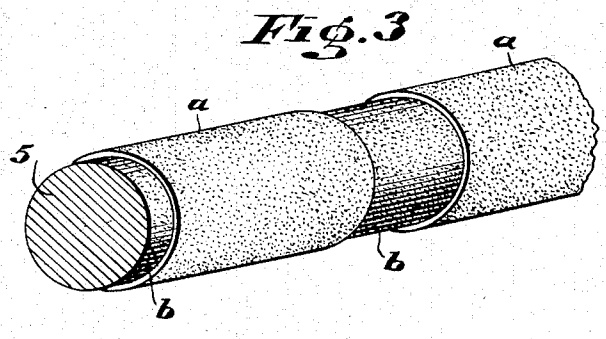
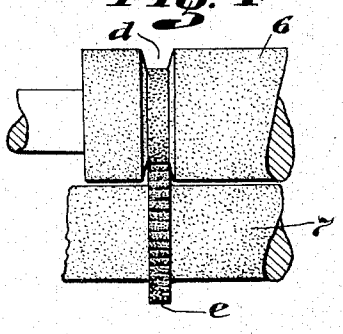


Fig. 4



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FIBER WORKING ROLL FOR TEXTILE MACHINES

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7 Claims. (Cl. 19—130)

This invention relates to the rolls of textile fiber working machines and will be herein disclosed as embodied in a drawing mechanism of the type commonly used in spinning, twisting and roving frames.

A common roll arrangement in machines of this type consists of, or comprises, a series of pairs of rolls, arranged one in advance of the other, with the individual rolls of each pair located one above the other, and the lower rolls of successive pairs being driven at progressively increased speeds so that the mechanism operates to feed and simultaneously to draw out or attenuate a roving, sliver, or other strand of textile fiber. Practically always the lower rolls are provided with bosses or portions of enlarged diameter, each of these portions serving the purpose of an individual roll in cooperating with and driving an upper roll. A single strand customarily is fed by each boss and its cooperating upper roll. In order to enable these bossed surfaces of the lower rolls to exert the necessary grip on the strands which they feed and draw, it is the custom to flute them longitudinally.

Practically throughout the history of the textile industry since roll drafting came into use, experimental work has been carried on looking to the improvement of these fluted structures and methods of producing them. In a substantial measure these experiments have been directed to improving the action of the rolls on the fibrous material being treated, but a very considerable part of such effort also has had for its object to reduce the expense of manufacture of these fluted rolls. For some years it has been generally recognized that in operating on cotton the leading edges of the flutes should be kept at a very definite degree of sharpness sufficient to seize against the under side of the strand passing over it, while still avoiding any cutting of the component fibers. Accordingly, the manufacture of these rolls is conducted with the utmost care and requires a long series of operations to machine out the grooves between the flutes with the necessary precision, to remove the burrs resulting from this operation, to stone and polish the flutes to the desired degree of perfection, and then to harden the finished surface so that the structure thus laboriously produced will give a reasonable period of service without suffering substantial change.

The present invention is especially concerned with the foregoing considerations and it aims to improve drafting rolls with the object of reducing very materially the expense involved in their manufacture.

With a view to realizing the foregoing object, I contemplated roughening the fiber feeding or working surfaces of the rolls as, for example, by sand blasting, and utilizing these roughened surfaces to perform essentially the same functions heretofore performed by the fluted areas of the rolls. Actual trials of such rolls under mill conditions demonstrated that they not only would serve the desired purposes but that, in addition, these roughened surfaces were surprisingly free from the common tendency to collect and hold fiber and fly.

Further utilization of the same idea, accompanied by an incidental roughening of the non-working surfaces of the rolls adjacent to the drafting areas, and which surfaces customarily are polished and designed to be kept clean, developed the additional surprising phenomenon that lint and fly did not adhere to the sand blasted surfaces but did collect upon the polished areas. The latter was a well known phenomenon, and is a common source of annoyance since it is important to the production of good yarn and thread to keep the machine clean and free from such accumulations of lint and fly.

Accordingly, these collateral and unexpected advantages of roughening the surfaces of the roll, are extremely valuable in solving problems which have long been very troublesome in connection with the operation of a wide variety of textile machines.

The invention will be more completely disclosed in connection with the accompanying drawing, in which

Figure 1 is a vertical, sectional view, somewhat diagrammatic in character, showing a set of drafting rolls arranged in the manner common in cotton roving and spinning frames;

Figs. 2 and 3 are perspective views of different lower rolls in the mechanism illustrated in Fig. 1; and

Fig. 4 is a front view of a small section of the folding rolls also shown in Fig. 1.

Referring first to Fig. 1, the drawing mechanism there shown comprises upper and lower rear rolls 2 and 3, respectively, a second or intermediate pair of upper and lower rolls 4 and 5, upper and lower folding rolls 6 and 7, and upper and lower front rolls 8 and 9. Immediately behind the rear rolls 2 and 3 is a trumpet 10 for guiding a cotton sliver, roving, or the like, 12, into the bite of said rolls. The second pair of rolls 4 and 5 revolve at a somewhat higher peripheral speed than the rear rolls in order to give the desired draft, and the front rolls 8 and 9 are driven at

a considerably higher peripheral speed than the rolls 4 and 5. Usually a very slight draft occurs between the second pair of rolls and the folding rolls. From the front rolls the drawn or attenuated strand runs through a guide eye 13 to the traveller 14 of a ring twisting mechanism or, in the case of a roving frame, to a flyer. The arrangement above described is a well known drawing mechanism and is shown here simply as illustrative of one type of mechanism in which this invention is very useful. According to the customary practice the lower rolls 3, 5 and 9 are ordinarily fluted. The upper rolls 2, 4 and 8 usually are of the covered type and have relatively yielding surfaces.

According to the present invention all of the metal rolls, including the folding rolls 6 and 7, are, or may be, provided with sand blasted or similarly roughened surfaces. Each of the lower rolls 3, 5 and 9 may be of the construction shown in Fig. 3, this roll being provided with the usual bosses *a—a* separated by short intervening lengths or "necks" *b—b*, and all of these surfaces being sand blasted. Because the lower front roll 9 is required to perform heavier duty than either of the rolls 3 or 5, it is found desirable with certain types of fiber to flute the bossed portions *c—c* of this roll, as shown in Fig. 2, and the flutes may be sand blasted or similarly roughened. It is not necessary, however, in a roll so constructed to make the flutes with the precision and accuracy required in prior rolls of this character. On the contrary, the flutes may consist of wavy corrugations which can be produced far more economically than by the methods required in making the prior art fluted rolls.

The folding rolls 6 and 7 are provided, one with a groove *d* and the other with an annular rib *e* entering the groove, so that they cooperate in folding the flattened roving as it passes from the bite of the intermediate rolls to that of the front rolls. The sand blasting of these surfaces, as well as the adjacent normally polished areas, is of particular advantage in preventing the accumulation of fly which has been a very troublesome factor in the operations of machines thus equipped.

The best method of producing these roughened surfaces which I have so far discovered is by sand blasting, it being understood that the grit used in performing this operation may sometimes take the form of small steel shot, or finely pulverized sand or similar material. The minute indentations or craters produced by the sand blasting process apparently act very efficiently in frictionally engaging the fibrous surfaces of roving, slivers, and similar strands made of textile fibers, affording the desired grip to feed and draw these strands, while still cooperating with the yieldingly surfaced upper rolls to handle them with sufficient nicety to prevent any substantial breakage of the fibers. The degree of roughness can, of course, be predetermined by properly selecting the grade of grit used. It is contemplated, however, that such a roughened surface can be produced by other methods as, for example, by hammering, chemically etching or engraving, although no process which I have so far discovered produces the great multiplicity of minute, closely related, haphazard arrangement of smooth edged indentations admirably adapted for this purpose as economically as does sand blasting.

It has been found by experimentation that a roughened surface particularly adapted to certain operations is produced by a combination of these sand blasted methods as, for example, by first blasting with shot and later with sand or fine grit. A shot tends to throw up a rim of roughly circular form slightly above the surface which it strikes. If followed by blasting with a grit, the shallow and rather coarse pits formed in the shot blasting have their surfaces modified by the subsequent operation of the finer abrading material. In the same way the surfaces of the flutes produced by machining are modified, and the results of this practice has been found especially efficient in connection with the spinning of fibers of longer lengths, or those of a brittle nature which must be handled with corresponding gentleness.

After the roll has been given the desired surface characteristics, it is surface hardened so that the efficiency of its fiber feeding or working areas will be retained during a relatively long period of service.

As above indicated, rolls having surfaces so produced are valuable both because of their effectiveness in feeding and drawing the fibrous strands, their freedom from lap-up, and also in substantially preventing the adhesion of lint and loose fibers either to the fiber working areas or to the non-working surfaces of the roll which normally are polished. Polishing has been resorted to customarily for the purpose of facilitating the work of keeping the rolls clean but this result is accomplished far more effectively by roughening these surfaces in the manner above described. Just why this change in surface structure should produce these highly desirable advantages is extremely difficult, if not impossible, to determine, but the important consideration is the result itself and the fact that it can be produced with certainty.

It will be observed, however, that the roughening of the surface produced in the manner above described is a mild effect totally different from the customary fluted surfaces produced on the fiber working areas of rolls to enable them to grip a sliver or roving securely. The sand blasted surface has merely a slight or relative roughness, as compared to surfaces which have been made smooth by machining operations customarily performed for this purpose, such as polishing, buffing, and some grinding operations. As above stated, however, the pits or craters produced by the sand blasting operation are smooth edged and they are necessarily shallow, so that while they modify the surface texture and feel, they are, nevertheless, free from sharp edges and they provide a surface finish very different from any heretofore used on drawing rolls, so far as I have been able to learn.

The invention has proved of value not only in operating on the ordinary textile fibers, but also on synthetic fibers, such as those made of glass and which have heretofore given great trouble in drafting.

While I have herein shown and described a typical embodiment of my invention, it will be understood that this disclosure has been made rather by way of explanation than limitation and that the invention may be embodied in many forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. In a textile fiber working machine, a plurality of pairs of rolls arranged, one in advance of another, for acting successively on a strand

of fibrous material to feed and draft it, one at least of said rolls having a sand blasted surface area.

2. In a textile fiber working machine, a plurality of pairs of rolls arranged, one in advance of another, for acting successively on a strand of fibrous material to feed and draft it, one at least of said rolls having a sand blasted fiber engaging surface.

3. In a textile fiber working machine, a plurality of pairs of rolls arranged, one in advance of another, for acting successively on a strand of fibrous material to feed and draft it, one at least of said rolls having a sand blasted circumferential area adjacent to the fiber feeding surface of said roll.

4. In a textile fiber working machine, a plurality of pairs of rolls arranged, one in advance of another, for acting successively on a strand of fibrous material to feed and draft it, the entire external surface of one at least of said rolls which is exposed to contact with fiber and fly being sand blasted.

5. In a textile fiber working machine, a drawing mechanism comprising cooperating folding rolls, one provided with a circumferential groove and the other with a circumferential rib to run in said groove, the surfaces of said rib and said groove being sand blasted.

6. In a textile fiber working machine, a drawing mechanism comprising cooperating rolls, one of which includes sections of larger diameter alternating with sections of smaller diameter, the surfaces of certain of said sections being sand blasted.

7. In a textile fiber working machine, a drawing mechanism comprising cooperating rolls, one of which includes a circumferential series of longitudinally disposed flutes, the surfaces of said flutes being sand blasted.

R. A. KETTLEY.