2 Sheets—Sheet 1.

O. W. CLARK.

Felt-Stretchers for Paper-Machines.

No. 210,097. Patented Nov. 19, 1878.

Fig. 1.

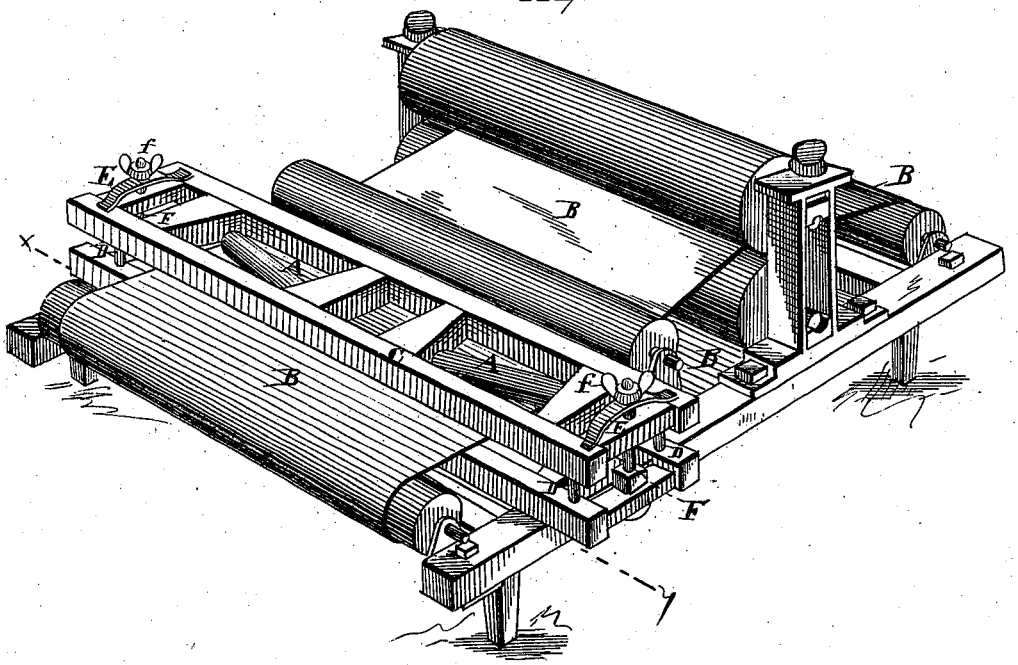
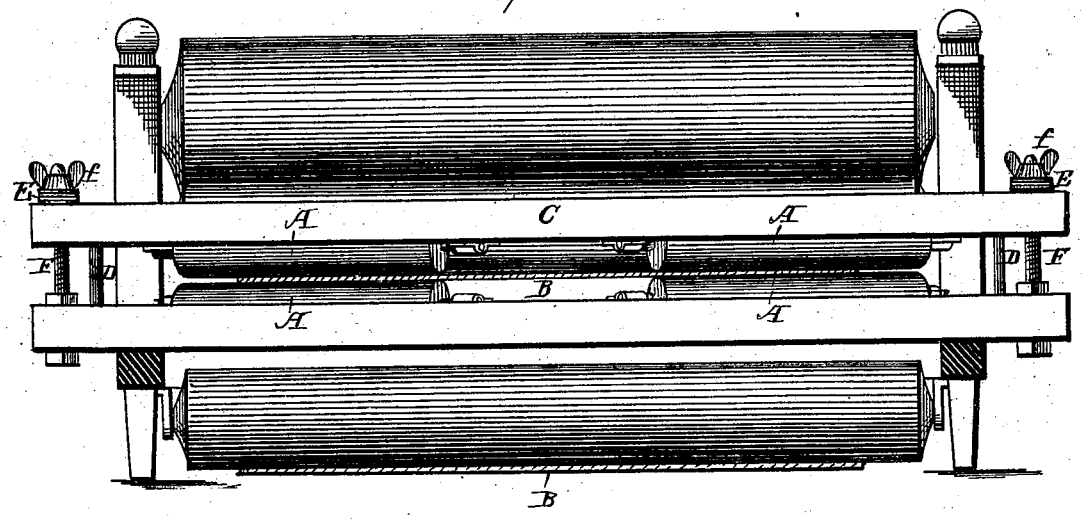


Fig. 2.



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2 Sheets—Sheet 2.

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Felt-Stretchers for Paper-Machines.

No. 210,097. **Patented Nov. 19, 1878.**

Fig. 3.

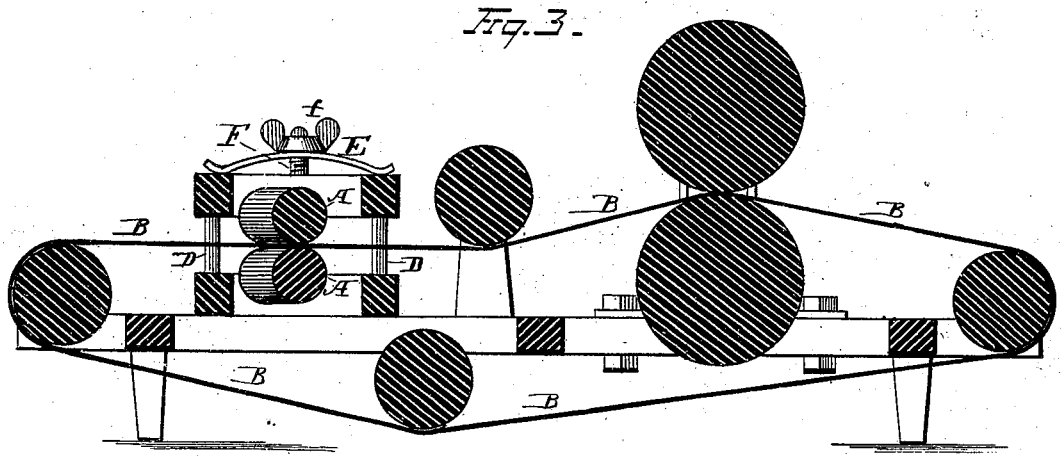
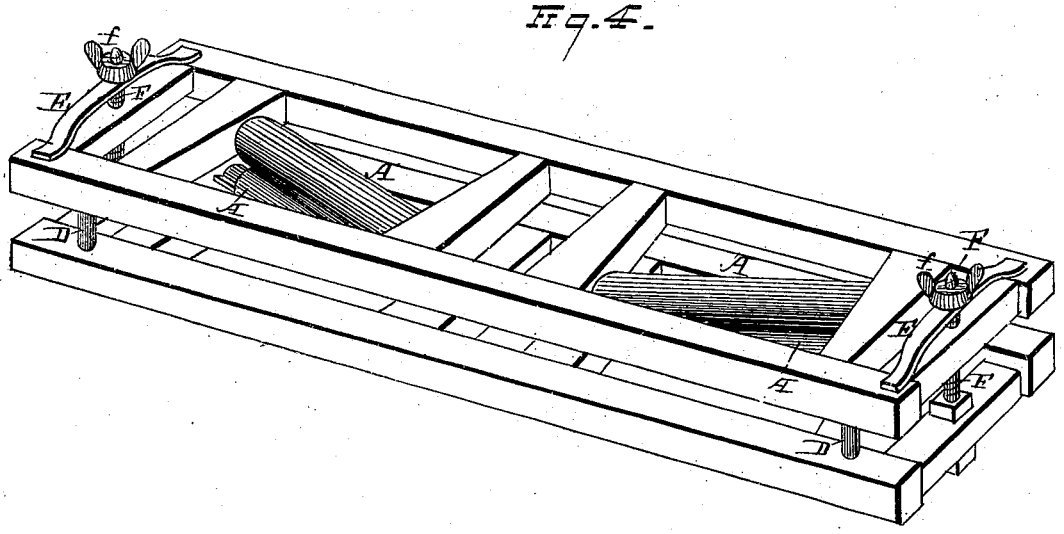


Fig. 4.



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UNITED STATES PATENT OFFICE.

ORSON W. CLARK, OF APPLETON, WISCONSIN.

IMPROVEMENT IN FELT-STRETCHERS FOR PAPER-MACHINES.

Specification forming part of Letters Patent No. **210,097**, dated November 19, 1878; application filed August 10, 1878.

To all whom it may concern:

Be it known that I, ORSON WILLIAMS CLARK, of Appleton, in the county of Outagamie and State of Wisconsin, have invented certain new and useful Improvements in Paper-Making Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates more particularly to that class of devices in paper-making machines designed to transversely spread or widen the felt that takes up the pulp which forms the sheet of paper.

The well-known difficulty experienced by manufacturers of paper which is caused by the contracting or shrinkage in width of the felt has heretofore been sought to be obviated in different ways. One form of device quite early used was to provide a vertically-arched rod, curved also in a horizontal plane, with its central body projecting forwardly in the general line of direction of the moving felt apron, said rod being provided with rollers loosely axled thereon in longitudinal line, and partaking of the general form of said rod. The endless felt apron, which conveyed the paper from the wire-cloth apron to the usual pressure and heating cylinders, passes over this rod, and as the latter was adapted to press vertically upward against the under side of the felt, the tendency was to cause the material in said felt to be drawn outward toward the respective side edges of the same; but a material objection to this device was found in the fact that the said upward pressure against the felt weakened it and tended to make it more liable to wear, while it maintained it constantly subjected to strain, and caused its line of direction to be vertically changed.

The form of device now generally in use is what is known as the "elbow-roll," and consists of two distinct rolls of equal length, arranged transversely to the felt and in horizontal angular inclination to its width. The outer extremities of the two rolls are in rear of their respective inner extremities, which latter project forwardly and centrally in the direction of the moving felt, so as to place each of the rolls inclined about fifteen degrees to a straight line passing across the felt parallel with its width. These rolls are journaled in a suitable frame beneath the felt, and are adapted to press vertically upward against the under side of the same. The degree of result produced in widening the felt depends exclusively upon the degree of this upward pressure, and varies correspondingly with the same. This elbow-roll, however, is very damaging in its effect upon the felt, and is in reality only used as a last resort, when the felt must either be discarded from use entirely or widened. The reason of this objection is that the pressure of the elbow-roll against the felt produces an angle, over which the center of the felt passes, and soon develops a sag in the same, which causes the felt to be worn out in a short time.

My invention is designed to provide a spreading device which will be free from the objectionable features attending the use of the several forms employed previously to the same; and consists, first, in two pairs of rolls, one or both rolls of each pair being journaled in yielding bearings, which are provided with means for regulating the tension on the rolls, said rolls having their axial lengths inclined about ten degrees (more or less) to the line of width of the felt, and adapted to cause the latter to pass between said rolls subjected to their pressure action. This prevents any strain from being borne by the felt, such as would be caused if there were but a single roll pressing up against the felt. According to my device, a combined upper and lower pressure in vertical line is brought to bear upon the felt, and since the two pressures are equal in degree there is no resulting injurious effect to the felt, as the one pressure counterbalances the other, and the felt is simply compressed between the two.

The invention consists, secondly, in two pairs of rolls, one or both rolls of each pair being journaled in yielding bearings, which are provided with means for regulating the tension on the rolls, the latter located angularly to the width of the felt, and adapted to receive the latter in compression between them in a plane corresponding to its general movement, and with-

out vertically changing the same or making a raised angular formation therein. By thus causing the felt to enter between the rolls and pass out therefrom in one and the same plane in which it is located, respectively, in front and rear of said rolls, no vertical tension is imposed upon it, and it is thereby enabled to last the longer in good serviceable condition.

The invention consists, thirdly, in two pairs of rolls, one or both rolls of each pair being journaled in yielding bearings, which are provided with means for regulating the tension on the rolls, the latter located angularly to the width of the felt, which passes through between the same, said rolls having adjustable elastic compression relative to each other. The advantage of this adjustment of the rolls under spring-pressure to and from each other is that thereby any degree of yielding compression may be put upon the felt as may be required, to suitably spread out the felt when the latter is in different conditions or degrees of shrinkage.

The invention consists, fourthly, in the combination of two pairs of short angle-rolls, one or both rolls of each pair being journaled in yielding bearings, which are provided with means for regulating the tension on the rolls, the latter adapted by their location to cause the side portions of the felt to pass between the upper and lower rolls, respectively, of the same, said pairs of rolls being inclined at any desired angle to the width of the felt, with their inner extremities projecting forwardly toward the line of direction of said moving felt. This construction causes the material of the felt to be drawn from the longitudinal central body of the same, and, together with the side portions, to be distended transversely, so as to widen the felt from its center out on both sides thereof simultaneously and equally.

The invention further consists in such detail mechanical forms as I prefer to employ in carrying out the main principles of my invention, as above set forth.

Referring to the drawings, Figure 1 is a view, in perspective, of a part of a paper-making machine provided with my invention, and which sufficiently illustrates the use of the same. Fig. 2 is a view, in vertical sectional elevation, in a plane passing through *x y* of Fig. 1. Fig. 3 is a longitudinal vertical sectional view in a plane passing through one of the pairs of angle-rolls. Fig. 4 is a perspective view of said angle-rolls mounted in a suitable frame, and shown detached from any machine.

The invention is applicable to any paper-making machine, and the form of the latter herein shown is simply given as an example of its use.

Two pairs of rolls, A, are journaled in suitable manner, so that they may be horizontally inclined in any desired angular degree relative to the line of width of the felt B, upon which they are to act.

The inner extremities of each pair of rolls respectively project forwardly in inclination tending toward the line of direction of the moving felt, as indicated by the arrow. Preferably this inclination is about ten degrees (more or less) from a straight line passing squarely across the width of the felt, though the same may be changed to any other suitable degree of inclination. Preferably they are also made of length proportioned to the width of the felt, substantially as represented in the drawings, as the same form a very practicable form of device; but, instead thereof, said rolls might be made shorter, or they could be extended forwardly toward the longitudinal central body of the felt. They are located so as to cause the felt to pass in between the upper and lower rolls of the respective pairs, and also to pass out therefrom in one and the same plane in which it is placed, both before reaching said rolls and also after leaving the same. Thus the general longitudinal line of direction of the felt is not changed by passage through these angle-rolls, though the material of the same is transversely drawn out and the felt widened. Hence, if the felt were moving in a horizontal plane, as is usually the case, then there would be no vertical change or alteration of the same by reason of its subjection to the action of my rolls. Instead, however, of placing said rolls in such location relative to the remaining parts of the paper-machine as is here represented in the drawings, I may locate them in any desired place.

The upper and lower rolls of each respective pair are adapted to be adjusted relative to each other, and to be maintained in juxtaposition under elastic compression, so that they may be capable of acting upon different felts, or upon the same felt in different conditions of use and shrinkage correspondingly with the degree of pressure necessary to spread the same. I preferably mount them in a suitable frame, consisting of an upper and lower section, to which, respectively, the corresponding rolls of the two pairs are journaled. Said upper section, C, is vertically adjustable in sliding movement upon guide-rods D, and provides bearing for the semi-elliptical springs E, which are likewise adjustable upon the upper extremities of the bolt-shafts F. Suitable fastening devices, such as are represented by the hand clamping-nuts *f*, adjust the tension of said springs, and cause the upper frame-section to bear its rolls downward with a greater or less pressure upon the lower rolls of each pair, which are journaled in the stationary frame-section.

It is evident that many changes of construction could be made as regards the frame-work. Thus rubber or other resilient agent could be substituted for the metallic springs, and generally the detail apparatus can be altered as desired.

It is also apparent that the peculiar device for spreading the felt is applicable to other and analogous purposes outside of paper-making machines; and hence the invention is not restricted in use to the latter, but includes all

applications in accomplishing results to which it may be adapted in any branch of industrial art.

The yielding rollers mounted in bearings the opposite ends of which are governed by independent adjusting mechanism provides for a result in addition to that ordinarily effected by yielding tension-rollers, which is as follows: Should the bearings of the yielding roller of each pair wear unevenly, or from other cause the tension on the roll of one pair exceed that of the roll of the opposite pair, the felt would be fed unevenly, and would run off the side of the rolls. This difficulty is obviated by providing independent means for adjusting the tension on the rolls; and by regulating the tension on the rolls of each pair the felt may be guided with the greatest accuracy.

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

1. In a felt spreading or widening device for paper-making machines, two pairs of rolls arranged in an inclination to the width of the felt, one roll of each pair being journaled in yielding bearings, and means for regulating the tension on the adjustable bearing-frames, substantially as set forth.

2. In a felt-spreading device for paper-making machines, a roll-supporting frame consisting in the combination of an upper and lower horizontal section, said upper section being adjustable under elastic spring-pressure relative to the lower section, and both said sections having longitudinally-inclined rolls journaled therein, substantially as set forth.

3. The combination, with the two frame-sections in which the upper and lower angle-rolls are respectively journaled, of vertical guide-rods connecting the same, and bolt-shafts provided with spring mechanism and clamping devices, adapted to adjust said sections relative to each other, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 5th day of August, 1878.

ORSON WILLIAMS CLARK.

Witnesses:
JOHN MORRIS,
THEO. JOHNSON.