

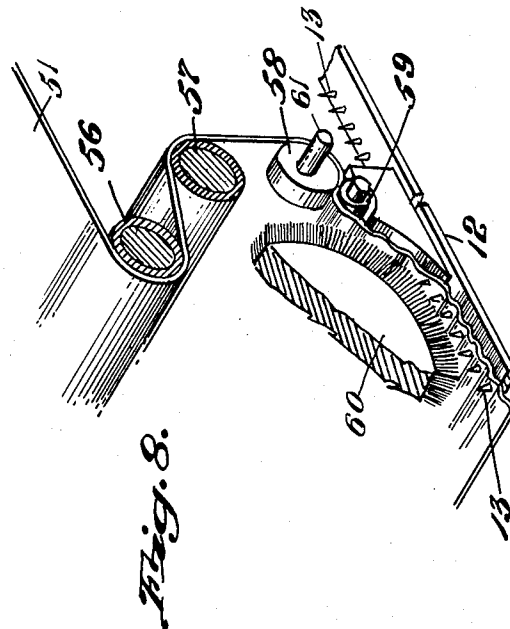
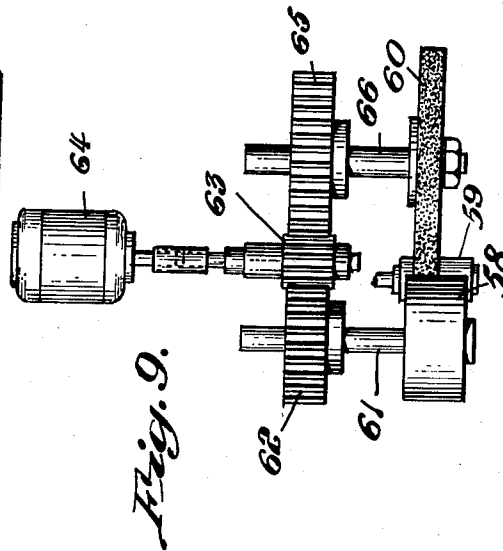
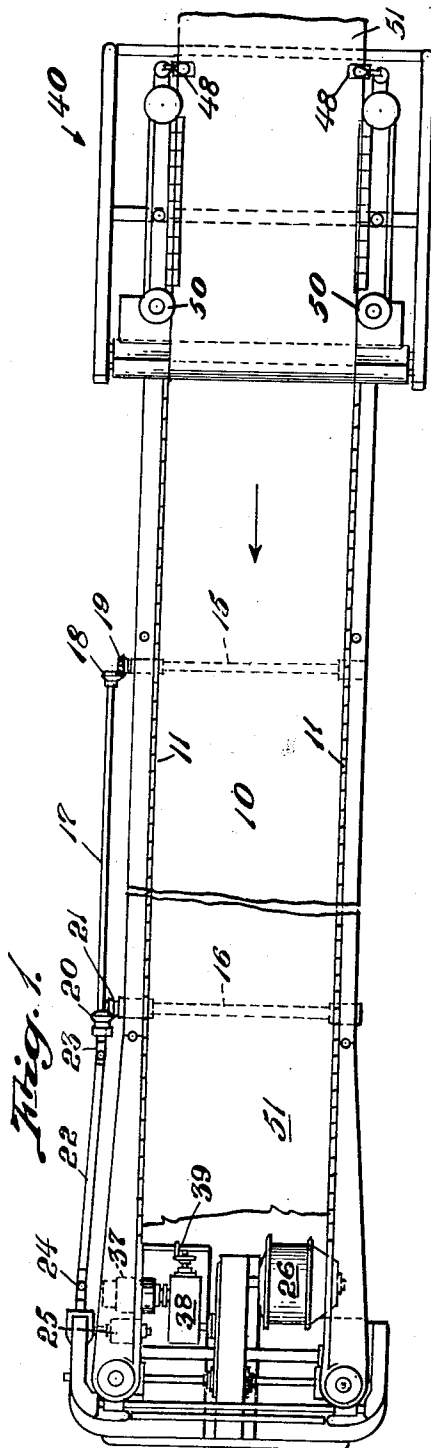
March 30, 1954

T. C. ROBERTS
TENTERING MACHINE

2,673,384

Filed Dec. 21, 1951

4 Sheets-Sheet 1



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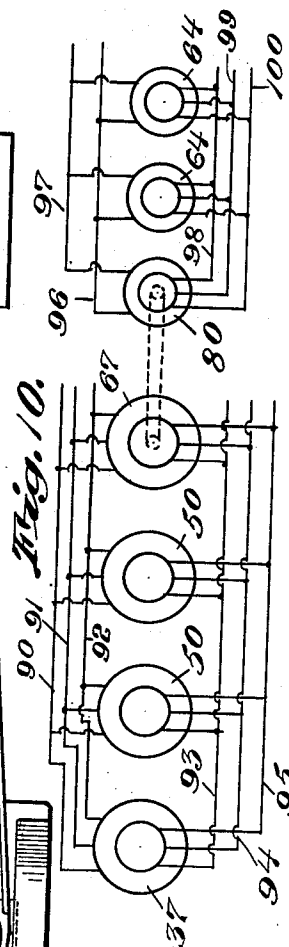
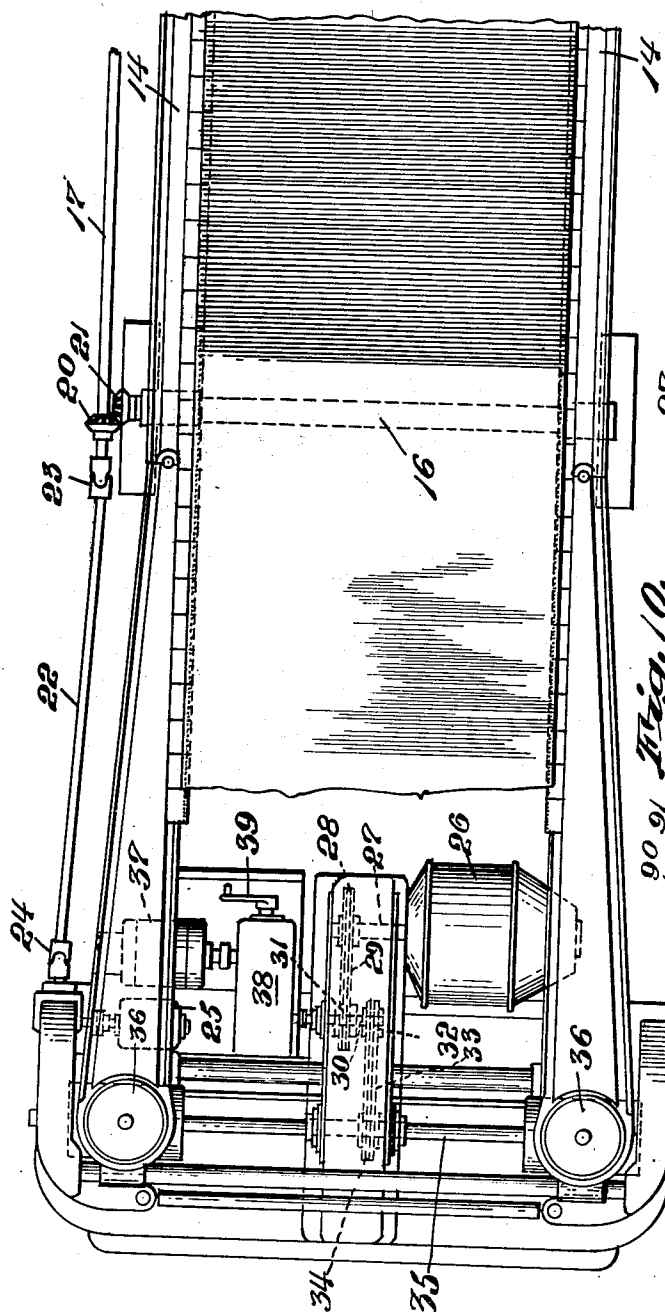
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Fig. 2.



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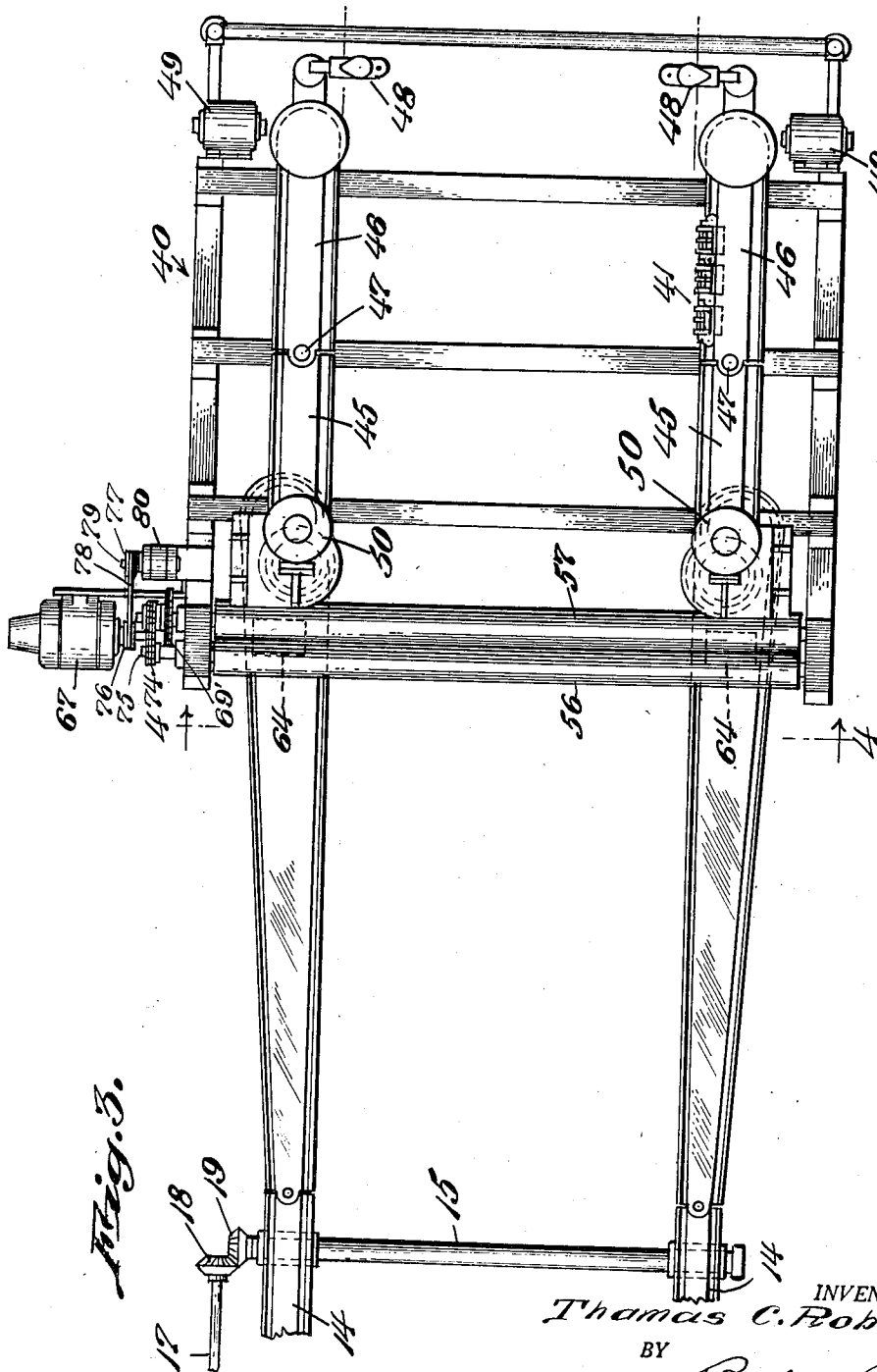
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Fig. 4.

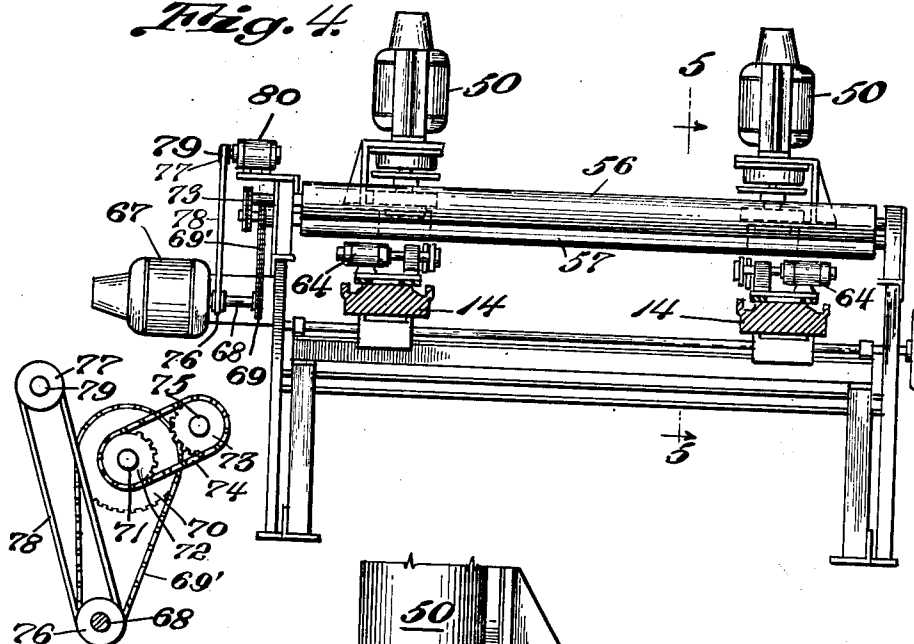


Fig. 6.

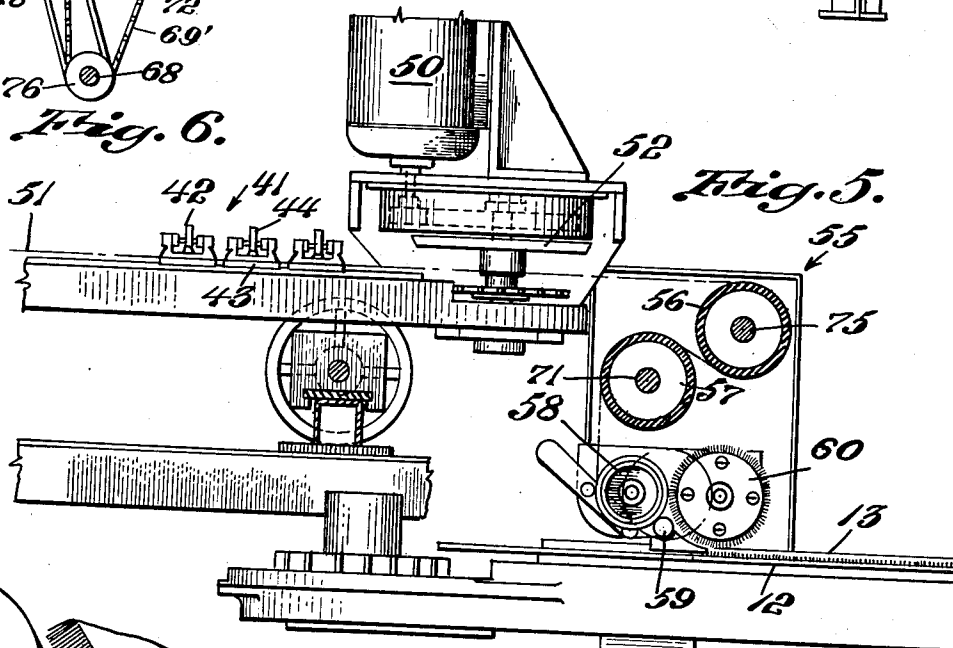


Fig. 5.

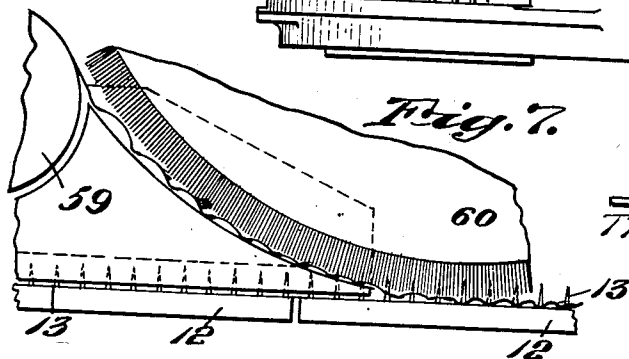


Fig. 7.

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TENTERING MACHINE

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Application December 21, 1951, Serial No. 262,858

8 Claims. (Cl. 26—57)

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This invention relates to handling material in web form and is concerned particularly with a tentering machine of the type in which the opposite edges or selvages of a piece of web fabric are engaged by pins piercing the fabric.

In the use of a machine of this character, it is common to feed a web fabric into the tentering machine at a rate faster than the fabric is carried through the machine so that there may be a shrinking of the fabric in a predetermined ratio. A problem which is encountered in such feeding is the accurate guiding of the fabric web into such a pin tentering machine.

One of the objects of this invention is to provide a means by which the web fabric may be accurately guided into the machine.

Another object of the invention is to provide a preliminary tentering frame which will serve to accurately guide the fabric into the pin tentering frame, and more specifically an object of the invention is to use a clip type preliminary tenter for guiding the web fabric to the pin type tenter.

Another object of the invention is to drive the opposite sides of the machine together without connecting shafting which may interfere with the travel of the work.

Another object of the invention is to provide an electric drive for the main tenter and through an electrical pacing motor which is electrically locked to the drive for the preliminary tenter, control the drive of the preliminary tenter so that it will maintain a paced relation with reference to the drive of the main tenter frame.

Another object of the invention is to provide an electrical drive for the main tenter frame which drive operates a pacing motor which may be varied with reference to the drive of the main tenter frame and which pacing motor will control a feeding means to the main tenter frame and also the feeding means to the preliminary tenter for guiding the web to the feeding means.

A still further object of the invention is to provide a metering roll which will nip the fabric and govern the rate at which it will be placed upon the pins of the main tenter frame and to provide an individual adjustment for the metering roll or rolls with reference to the pacing motor which locks all of the electric motors in a predetermined speed ratio.

Another object of the invention is to provide an arrangement so that the relative feed of the main tenter frame to that of the feed and preliminary tenter frame guide may be varied by a single adjustment of the pacing motor.

Another object of the invention is to provide

individual drives on the chains which engage the fabric and electrically tie all of these drives together.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a plan view of the web-treating apparatus;

Figure 2 is a plan view illustrating one end of the apparatus on a larger scale than Figure 1;

Figure 3 is a plan view illustrating the other end of the apparatus on a larger scale than shown in Figure 1;

Figure 4 is a sectional view on line 4—4 of Figure 3;

Figure 5 is a sectional view on line 5—5 of Figure 4;

Figure 6 is a diagrammatic view showing the drive of the feed rolls and control motors for the metering roll;

Figure 7 is an enlarged sectional view showing the metering roll and the brush for placing the fabric on the pins of the main tentering frame;

Figure 8 is a perspective view, largely diagrammatic, and in section and somewhat fragmentary showing the relation of the feeding rolls, the metering roll, and the brush, the latter two of which are partly shown in Figure 7;

Figure 9 is a top-plan view showing the drive for the metering roll and the brush which is hidden in Figure 3; and

Figure 10 is a diagrammatic view of the electric wiring for the motors.

In proceeding with this invention, I have provided a main tenter frame in a somewhat usual form. Instead of utilizing a variation in the lines of traveling retaining elements for the web at the entering end of the frame, I maintain these stationary after once adjusted as to width. A feeding means is provided for the web at the entering end of the frame, and in order to properly position the web with reference to the main frame and its feeding means, I position a preliminary tenter of short extent which has adjustable rails carrying the lines of web retaining elements so that the fabric is accurately aligned prior to entering the feeding means and the main pin tenter frame for engaging and retaining the opposite selvages of the fabric.

A main electric motor serves to mechanically drive the main frame and also serves to drive a pacing motor through which individual electric motors for the chains of the preliminary tenter

are driven and through which a motor for the feed rolls is driven, all of which are electrically locked so as to operate in synchronism or at a definitely fixed speed ratio. Additionally there are metering motors for each edge of the fabric which are controlled by an additional pacing motor driven from the drive of the feed rolls in a manner which may be varied so that the metering roll motor may be varied as to its speed ratio with reference to the other motors of the machine.

As the invention in this application resides more particularly in the arrangement of the parts than in the detailed structure, the drawings are largely diagrammatic. In Figure 1, I have shown in plan the main tentering frame which I designate 10 and which has lines of traveling retaining elements 11—11 which in this particular instance are links of a chain with the links carrying the pins. These links are shown at 12 in Figures 7 and 8 with pins 13 in spaced relation and upstanding from each of the links 12 when in their uppermost horizontal position. The traveling retaining elements or chains 11 are guided along rails 14—14 which may be adjusted to space them in accordance with the web being treated by shafts 15 and 16 (Figures 2 and 3) driven through a lengthwise extending common shaft 17 and bevelled gears 18 and 19 for a shaft 15 and bevel gears 20 and 21 for the shaft 16. The shaft 17 is driven from the shaft 22 by universal joints 23 and 24 at its opposite ends from a bevel gear arrangement connecting it to the motor 25. The chains or traveling web retaining elements are driven from an electrical main driving motor 26 which operates armature shaft 27, sprocket gear 28, sprocket chain 29, sprocket gear 31 on shaft 30, sprocket gear 32, sprocket chain 33 and sprocket gear 34 fixed on shaft 35 which drives the gears 36—36 to operate the chains carrying the links 12 with pins 13. Suitable framework is provided for supporting these rails in a known manner. A pacing motor 37 is also operated from shaft 30 through a variable speed mechanism 38 which may be adjusted by handle 39 to vary the speed of the pacing motor 37.

At the opposite end of the main tenter frame, I have provided an auxiliary tenter frame 40 (Figure 1). (See also Figure 3.) This auxiliary tenter frame has lines of traveling web retaining elements 41 (see Figure 5) which are in the form of known chain links of clip form 42 having a fixed jaw and also a swinging jaw 43 which is operated by the arm 44 which is engaged by a cam for releasing the jaw from the fabric as the clips come to the end of their line of travel. These traveling web retaining elements 41 also move about rails 45—45 (Figure 3) which may be adjusted widthwise in a manner similar to that described in connection with the adjustment of the rails 14 of the main tenter frame for different widths of web. The rails in this case are also provided with sections 46—46 for aligning of the web, which sections are pivoted as at 47—47 so that these rail sections may be individually swung with reference to the rail sections 45 for alignment of the rails to the web. Guiders 48—48 are also provided which engage the edges of the web and assist in relatively positioning the web with reference to the rail sections 46 so that the web will be fed into the preliminary tenter 40 with its selvage edges parallel and in a straight line. Motors 49—49 will operate the rail sections 46 in response to the guiders 48—48 for relatively shifting the sections 46 in positioning the web in the preliminary tenter. The chains of the prelim-

inary tenter are driven from individual motors 50—50 which motors are electrically locked with the pacing motor 37. By this arrangement of individual motors 50—50, a cross shaft for driving the chains in unison is eliminated, thus leaving an unobstructed path for the movement of the web.

As the fabric work or web designated 51 leaves the preliminary tenter, the drum 52 (Figure 5) releases the clips from the fabric as they pass about the sprocket for returning along the rail to the entering end of the preliminary tenter frame. The fabric then passes through a feeding means designated generally as 55 in which it travels over rolls 56—57 (Figure 8) and thence is guided about metering rolls 58 at either side of the feeding means 55 and thence over guide rolls 59 from whence it is placed on to the pins 13 of the links 12 by the brush 60. The fabric is nipped between the metering roll 58 and the roll 59, and the drive of the metering roll determines the amount of fabric which is placed upon the pins of the links 12. The metering roll causes fabric to be placed on the pin chains at a rate of travel greater than the travel of the chains so that there is some puckering of the fabric as it is engaged by the pin chains, as shown more clearly in Figures 7 and 8.

This metering roll 58 is mounted on shaft 61 on which there is also a gear 62 (Figure 9) which gear is driven from the pinion 63 by an individual motor 64. Pinion 63 also drives gear 65 on shaft 66 upon which the brush 60 is also mounted. This construction is duplicated on each side of the machine, and the individual motors 64 are shown in dotted lines in Figure 3 and in full in Figure 4. An electric motor 67 (Figure 4) operates shaft 68 upon which there is a sprocket 69 which through chain 69' drives sprocket gear 70 (Figure 6) for rotating shaft 71 upon which roll 57 (Figure 5) is mounted. On this shaft 71 there is a sprocket 72 which drives sprocket 73 through sprocket chain 74 to drive shaft 75 upon which the roll 56 is fixed. The shaft 68 also has on it a Reeves drive mechanism comprising pulley 76 and pulley 77 and belt 78 to control the speed of shaft 79 for driving the pacing motor 80. The motors 64 are electrically locked to the motor 80 so as to be operable in a definite rate relation with reference thereto and this may be varied with reference to the other motors of the machine by reason of the Reeves drive indicated at 76, 77, and 78. Motors 50—50 and 67 are electrically locked to the pacing motor 37 so that these will operate in a selected rate with relation to the drive 26 for the main frame through the variable gears 38.

The electrical lock above referred to comprises a connection between the electrical motors as shown in Figure 10. Thus the fields or stators of each of the motors 37, 50, 50, and 67 are connected together as shown by the leads 90, 91, and 92, while the rotors or secondaries of these motors are connected together by the leads 93, 94, and 95, thus insuring that whatever happens in motor 37 as to its speed of rotation will also occur in motors 50, 50 and 67. As above referred to, there is a mechanical connection between electrical motor 67 and the second pacing motor 80 as shown in Figure 4, but here again the motors 80, 64, and 64 have their fields or stators connected together by leads 96, and 97, while their rotors or secondaries are connected together by leads 98, 99, and 100, thus assuring that whatever speed of rotation occurs in pacing motor 80 will also be

5 duplicated in the electrical motors 64, 64 which are connected thereto as indicated in the diagram in Figure 10. This electrical lock thus provides that there will be synchronous operations although as a group they may be varied by varying a pacing motor where desired.

By the alignment indicated above, a very accurate guiding is provided for the entering of the web into a pin tenter frame, and the relative speeds for overdriving of the web with reference to the travel of the pin links is controlled through electrical locks which may be varied so that the relative speeds of the pin links and the delivery of the fabric to the pin links may be adjusted. The electric drives by individual motors eliminates a cross shafting for driving the opposite side of the apparatus in synchronism, thus leaving the space clear and free for the travel of a web through the machine.

I claim:

1. A web treating apparatus comprising a main tenter frame having lines of travelling retaining elements which remain fixed after preset for a web width, means for feeding and attaching a web onto said retaining elements comprising a preliminary tenter frame having lines of travelling retaining elements for guiding the web to the main tenter frame, and web guiding means including at least one guide roll positioned vertically between said preliminary tenter frame and said main tenter frame, said preliminary tenter frame being positioned above the level of the main tenter frame, the retaining elements of said preliminary tenter frame being in over-lapping relation and in line with the retaining elements of said main tenter frame.

2. A web treating apparatus as in claim 1 wherein each of the travelling elements of the preliminary tenter frame are laterally displaceable for guiding the web.

3. A web treating apparatus as in claim 1 wherein the lines of traveling elements of the preliminary tenter frame travel at a faster linear rate than the traveling elements of the main tenter frame.

4. A web treating apparatus comprising a main tenter frame having two lines of traveling re-

taining elements, means feeding a web into said frame comprising a metering roll, a first induction motor mechanically coupled to said roll, a second induction motor mechanically coupled to said traveling retaining elements through a variable speed device, the rotors of said first and second induction motors being electrically connected together to maintain them in synchronism.

5. A web treating apparatus as in claim 4 wherein a separate electric motor is mechanically coupled to said traveling elements for imparting motion thereto.

6. In a web treating apparatus having a main tenter frame with two lines of traveling retaining elements and a preliminary tenter frame with two lines of traveling retaining elements, a first induction motor mechanically coupled to the traveling elements of said main frame, second and third induction motors each mechanically coupled to a separate line of traveling elements on said preliminary frame, the rotors of each of said induction motors being electrically connected together to maintain them in synchronism.

7. An apparatus as in claim 6 wherein a separate electric drive motor is mechanically coupled to the traveling elements of said main frame for imparting motion thereto.

8. An apparatus as in claim 6 wherein said first induction motor is mechanically coupled to the traveling elements of said main frame through a speed changing device.

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