Oct. 19, 1937. C. H. COOLIDGE 2,096,087

CLOTH SPREADING AND GUIDING DEVICE

Filed Feb. 3, 1936 2 Sheets-Sheet 1

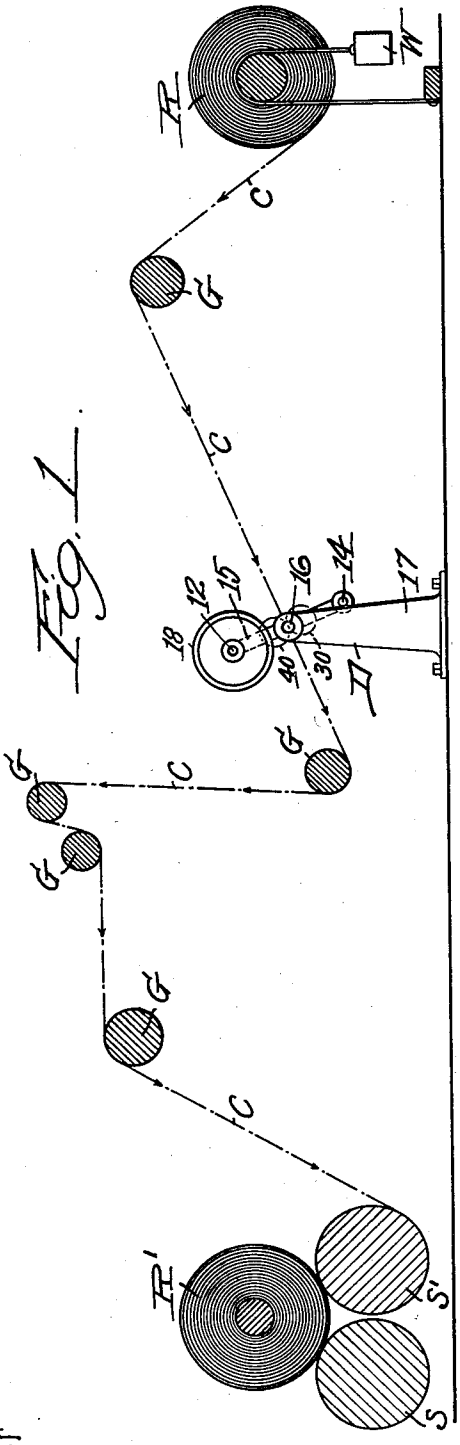


Fig. 1.

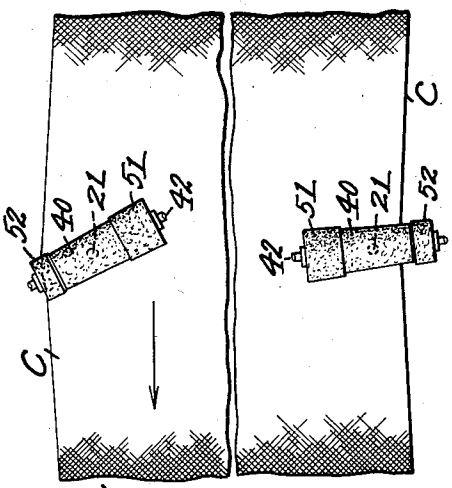


Fig. 3.

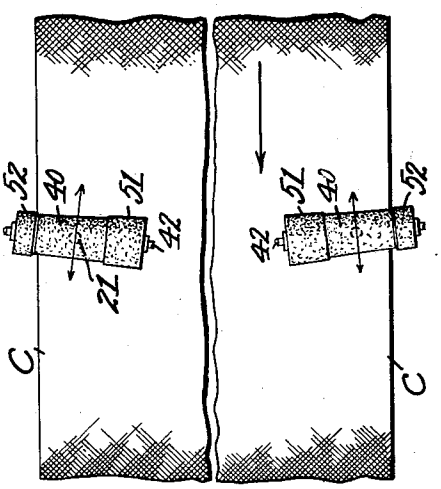


Fig. 2.

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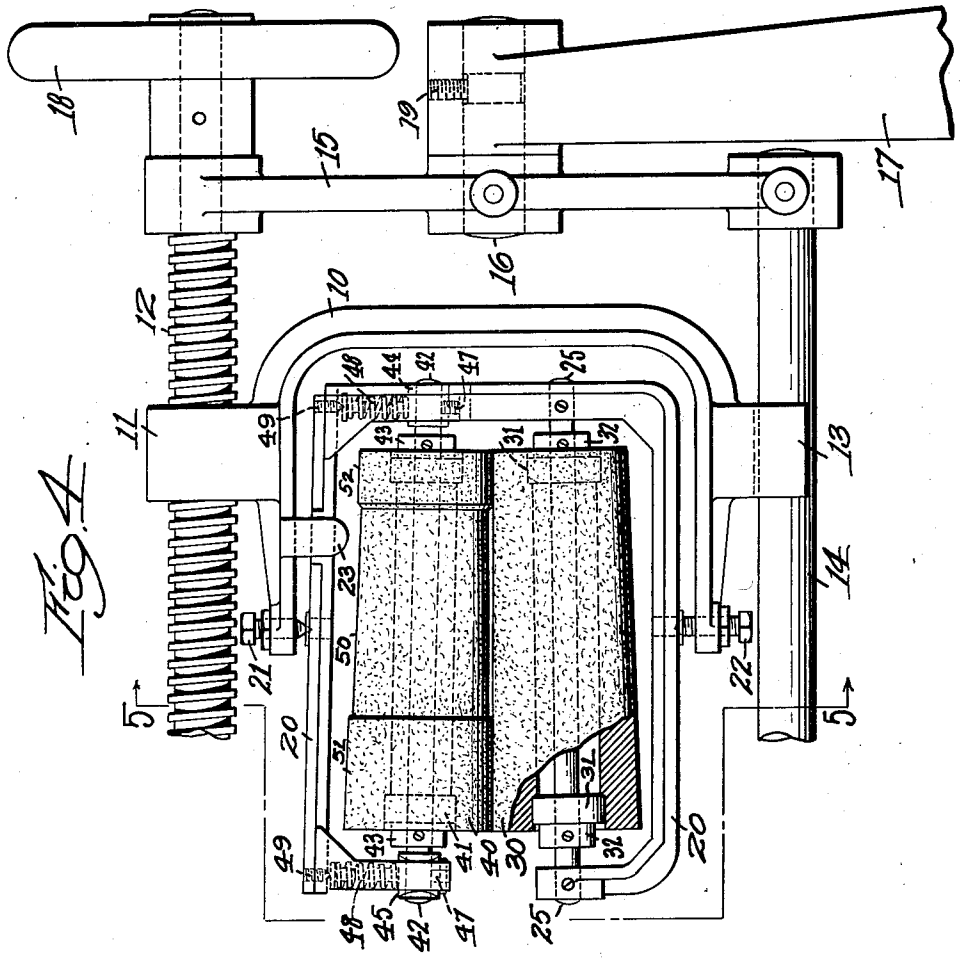


Fig. 4

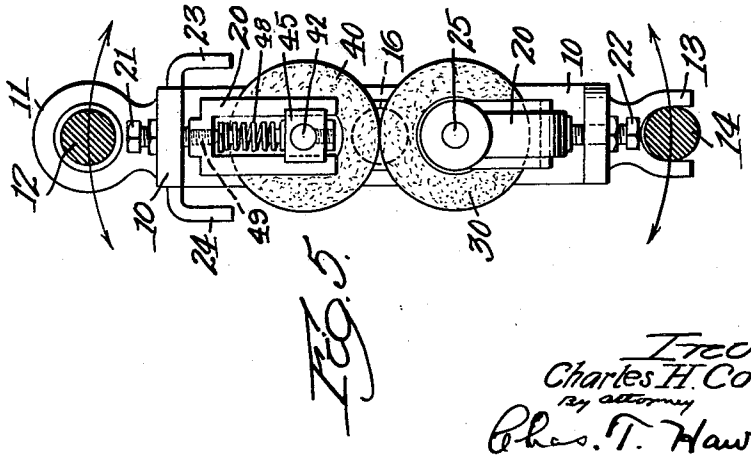


Fig. 5

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CLOTH SPREADING AND GUIDING DEVICE

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Application February 3, 1936, Serial No. 62,038

15 Claims. (Cl. 26—67)

This invention relates to cloth finishing machines such as shears, brushes, winders and inspecting machines, and relates more particularly to devices for guiding the cloth in its advance movement in such machines and for simultaneously spreading the cloth transversely and removing wrinkles therefrom.

Guiding devices for this general purpose are shown in my prior Patent No. 1,919,291, granted to me July 25, 1933, and it is the object of my present invention to provide important improvements over the construction therein shown, by which lateral deviations in cloth travel may be more effectively and satisfactorily controlled.

To the attainment of this object I provide pairs of cone-shaped tensioning rolls so disposed that the smaller ends of the rolls are outward and the larger ends inward with respect to the center line of cloth travel.

A further feature of my invention is to provide pairs of cone-shaped rolls, one or both of each pair having a surface of relatively hard vulcanized fibre composition, and further to provide the conical surface of one roll in each pair with a recessed intermediate portion and with a cloth-engaging portion at the larger end which is preferably of substantially greater axial length than the corresponding cloth-engaging portion at the smaller end.

An important advantage of my invention resides in the capability of the device to operate with equal efficiency and satisfaction with the cloth traveling through the device in either direction.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention is shown in the drawings, in which

Fig. 1 is a diagrammatic sectional side elevation of a winding machine having my improved guiding devices embodied therein;

Fig. 2 is a plan view illustrating the normal operation of my invention;

Fig. 3 is a similar view illustrating the corrective action of my invention on the occurrence of cloth deviation;

Fig. 4 is a side elevation of one of my improved cloth-guiding devices, with one of the rolls partly in section, and

Fig. 5 is a sectional end elevation, taken along the line 5—5 in Fig. 4.

Referring to Figs. 4 and 5, each of my improved cloth-guiding devices comprises a U-shaped supporting frame 10 having an upwardly projecting portion 11 threaded to receive a cross screw 12 by which the supporting frame may be adjusted transversely of the machine and toward or away from the edge of the cloth.

The frame 10 is also provided with a lower recessed lug or projection 13 adapted to receive a cross rod 14 along which the lug 13 slides as the frame is adjusted transversely.

The cross screw 12 is mounted to rotate in a bearing at the upper end of a cross arm 15, which in turn is mounted on a stud 16 pivoted in a bearing in the upper end of a fixed supporting arm or stand 17.

A hand wheel 18 is fixed to the end of the cross screw 12 and constitutes means by which the cloth-guiding devices may be manually adjusted transversely of the cloth, such adjustment being necessary to adapt the device to operate with different widths of cloth.

The cross rod 14 is secured in the lower end of the cross arm 15 and the entire structure may be swung about the axis of the stud 16 to position the cloth-guiding device in a plane perpendicular to the plane of cloth travel. A binding screw 19 in the top of the stand 17 may be utilized to hold the cross arm 15 in angularly adjusted position.

It will be understood that the cross screw 12 and cross rod 14 extend to the opposite side of the machine where a similar cross arm 15, pivot stud 16 and stand 17 are provided. It may further be stated that the cross screw 12 is commonly provided with threads of right-hand pitch at one end and left-hand pitch at the other, so that manual rotation of the cross screw will cause the two supporting frames 10 to move simultaneously toward or away from the adjacent edges of the cloth passing through the machine.

Each cloth guiding device further comprises a second U-shaped frame 20 mounted to swing freely in its frame 10 on upper and lower pivot studs 21 and 22. The swinging movement of each frame 20 is limited, however, by stops 23 and 24 extending outward and downward from the top portion of the associated frame 10.

A shaft 25 is secured in openings in the lower portion of the U-shaped frame 20, and a lower roll 30 is rotatably mounted on the shaft 25. The roll 30 is preferably provided with bearing sleeves or bushings 31 at each end thereof, seated in axial recesses in the roll 30 and freely rotatable on the shaft 25 between collars 32.

The roll 30 is conical in shape, with the larger

end disposed toward the center line of cloth travel. The shaft **25** is disposed at such an angle in the U-shaped frame **20** that the cloth-engaging portion of the roll **30** will be substantially parallel to the plane of the cloth at the line of contact.

The second or upper roll **40** of each pair is similarly provided with bearing sleeves or bushings **41**, rotatable on a shaft **42** between collars **43**, substantially as previously described. The ends of the shaft **42** are mounted in bearing blocks **44** and **45** which are vertically slidable in slotted portions of the frame **20**, as clearly shown in Fig. 5.

The shaft **42** may be secured in the blocks **44** and **45** by binding screws **47**, and the blocks **44** and **45** are yieldingly pressed downward by coil springs **48** which may be varied as to tension by adjusting screws **49** threaded in the frame **20**.

With the construction described, it will be evident that each upper roll **40** is freely rotatable on its shaft **42** and that each end portion of each roll **40** is pressed yieldingly toward a lower roll **30** by one of the coil springs **48**.

Each upper roll **40** is conical in shape, similar to the lower rolls **30**, but is also provided with a peripheral recess **50**, commonly so disposed that the cloth-engaging portion **51** at the larger end of the roll will have an axial length substantially twice that of the cloth-engaging portion **52** at the smaller end of the roll.

The inner edge of the portion **51** must be nearer the longitudinal center line of the cloth than the pivot screws **21** and **22**.

Each upper conical roll **40** is preferably formed of a relatively hard vulcanized fiber composition and each lower roll **30** is also more commonly formed of the same material. Under some conditions of use, however, the lower rolls may be provided with a somewhat softer rubber surface.

In Fig. 1, I have shown diagrammatically a machine for unwinding cloth C from a roll R and rewinding the same on a roll R'. A weight W provides friction for the roll R, and one or both of the winding cylinders S and S' which support the roll R' will be positively rotated. The cloth speed may be anything desired from very slow up to 100 yards per minute.

The cloth C passes around a plurality of guide-rolls G and is drawn forward through my improved guiding device, indicated generally by the letter D and mounted on stands **17**. It will be noted that the device is positioned at such an angle on the stand **17** that the plane of the arms **15** is perpendicular to the plane in which the cloth travels.

The normal position of the guiding rolls is shown in Fig. 2, with the rolls so spaced apart manually that when the cloth C is centrally positioned transversely, the selvages will just clear the truncated conical surfaces **52** at the smaller ends of the rolls **40**.

Under these conditions, the rolls assume the angular positions indicated in Fig. 2, with the inner or larger ends of the cones slightly in advance and with the cones thus tending to spread the cloth as it is drawn through the machine. In normal operation, the portions **52** of the cones **40** do not engage the cloth C and are inoperative.

As soon, however, as the cloth C starts to deviate from its normal or centralized path of travel, as indicated in Fig. 3, that selvage of the cloth which is being displaced outwardly from its normal position will engage the portion **52** of the associated roll **40**. My improved guiding device will then act immediately to return the cloth to central position.

During this travel-correcting operation, the pair of rolls engaged by the outwardly displaced selvage will be swung substantially to the position shown at the top in Fig. 3, while the rolls at the opposite edge of the fabric, or at the bottom in Fig. 3, will remain substantially in normal position.

In actual test, the effectiveness of my improved guiding device in maintaining centralized cloth travel has been fully demonstrated, and while an exact explanation of the reactions in the travel-correcting operation is somewhat difficult, it is believed that these reactions are substantially as follows:

Under normal conditions, the two pairs of rolls occupy the positions shown in Fig. 2, and the cloth is guided by the roll portions **51** which exert an equalized spreading action, with the cloth out of contact with either roll portion **52**.

Assuming that the cloth deviates and engages the roll portion **52** of one roll **40**, as shown at the top in Fig. 3, a different action of this pair of rolls immediately takes place.

The speed of rotation of the roll **40** is determined by the greater area of contact between the wide portion **51** of the roll and the cloth C, and the roll **40** naturally rotates at such a speed that the wide portion **51** will roll freely and without substantial slip relative to the cloth C, as the cloth is drawn through the rolls.

The selvage of the cloth travels at the same speed as the part engaged by the surface **51**, but the peripheral rate of travel of the roll portion **52** is necessarily less, due to its smaller diameter. Consequently the selvage is pulled under the roll portion **52** with a certain amount of slip, due to this lack of peripheral speed of the portion **52**. This pulling action on the small end **52** of the roll **40** tends to swing this pair of rolls about the pivot screws **21** and **22** to the position shown in Fig. 3, thus destroying the spreading action of the rolls engaged by the selvage and tending to guide the cloth back toward the center line. The spreading action of the rolls at the opposite or inwardly displaced selvage remains normal, and these rolls quickly coact with the displaced rolls to return the cloth to normal centralized position. When the outwardly displaced selvage clears the roll portion **52** engaged thereby, the displaced rolls resume their normal position as shown in Fig. 2.

Whether or not this explanation is technically exact, it has been satisfactorily proved by test that the rolls assume the positions described and that the ensuing corrective action is prompt and reliable.

It has furthermore been satisfactorily demonstrated that a reversal of the direction of cloth travel does not in any way effect the action of the guiding device, and that the rolls will immediately adjust themselves to correct guiding position for cloth travel in either direction.

In the preceding description, average positions of the rolls are assumed but in actual operation the frames **10** oscillate on their pivots and the rolls continually swing slightly to alternate sides of their average positions.

It will also be understood that the terms "upper" and "lower" as used herein are merely relative, as the device is operative in any plane.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than

as set forth in the claims, but what I claim is:—

1. In a cloth guiding device of the kind wherein a pair of guiding rolls are rotatably mounted on a support in position to engage opposite faces of a piece of cloth adjacent a selvage thereof, said cloth traveling between said rolls, and wherein said support is mounted to swing about an axis perpendicular to the plane of travel of the cloth, that improvement which comprises providing one cloth guiding roll in each pair which is of greater effective cloth-engaging diameter at one end of the roll than at the other end, said roll having axially separated cloth-engaging portions, and in providing a second roll having a cloth-engaging portion opposing each cloth-engaging portion of said first roll, and positioning said first roll with its end of greater diameter nearer the center line of cloth travel.

2. In a cloth guiding device of the kind wherein a pair of guiding rolls are rotatably mounted on a support in position to engage opposite faces of a piece of cloth adjacent a selvage thereof, said cloth traveling between said rolls, and wherein said support is mounted to swing about an axis perpendicular to the plane of travel of the cloth, that improvement which comprises providing one cloth guiding roll in each pair which is of greater effective cloth-engaging diameter at one end of the roll than at the other end, said roll having axially separated cloth-engaging portions and with the portion of smaller diameter positioned outward with respect to the adjacent cloth selvage, and in providing a second roll having a cloth-engaging portion opposing each cloth-engaging portion of said first roll.

3. In a cloth guiding device of the kind wherein a pair of guiding rolls are rotatably mounted on a support in position to engage opposite faces of a piece of cloth adjacent a selvage thereof, said cloth traveling between said rolls, and wherein said support is mounted to swing about an axis perpendicular to the plane of travel of the cloth, that improvement which comprises providing one cloth guiding roll in each pair which is of greater effective cloth-engaging diameter at one end of the roll than at the other end, said roll having axially separated cloth-engaging portions and with the portion of smaller diameter positioned outward with respect to the adjacent cloth selvage and of substantially less axial length than the portion of larger diameter, and in providing a second roll having a cloth-engaging portion opposing each cloth-engaging portion of said first roll.

4. In a cloth guiding device of the kind wherein a pair of guiding rolls are rotatably mounted on a support in position to engage opposite faces of a piece of cloth adjacent a selvage thereof, said cloth traveling between said rolls, and wherein said support is mounted to swing about an axis perpendicular to the plane of travel of the cloth, that improvement which comprises providing one cloth guiding roll in each pair which is of greater effective cloth-engaging diameter at one end of the roll than at the other end, said roll having axially separated cloth-engaging portions and with the portion of smaller diameter positioned outward with respect to the adjacent cloth selvage and of substantially one-half the axial length of said portion of larger diameter, and in providing a second roll having a cloth-engaging portion opposing each cloth-engaging portion of said first roll.

5. In a cloth guiding device of the kind wherein a pair of guiding rolls are rotatably mounted on a support in position to engage opposite faces of a piece of cloth adjacent a selvage thereof, said cloth traveling between said rolls, and wherein said support is mounted to swing about an axis perpendicular to the plane of travel of the cloth, that improvement which comprises providing two conical cloth-guiding rolls in each pair, one of said rolls having cloth-engaging portions at its ends which are substantially separated axially and the other roll having a cloth-engaging portion opposing each cloth-engaging portion of said first roll, and positioning said conical rolls with their larger ends nearer the center line of cloth travel.

6. In a cloth guiding device of the kind wherein a pair of guiding rolls are rotatably mounted on a support in position to engage opposite faces of a piece of cloth adjacent a selvage thereof, said cloth traveling between said rolls, and wherein said support is mounted to swing about an axis perpendicular to the plane of travel of the cloth, that improvement which comprises providing two conical cloth-guiding rolls in each pair, one of said rolls having cloth-engaging portions at its ends which are substantially separated axially and with the portion of smaller diameter positioned outwardly with respect to the adjacent cloth selvage and of substantially less axial length than the portion of larger diameter, and the other roll having a cloth-engaging portion opposing each cloth-engaging portion of said first roll.

7. A cloth-guiding device comprising two pairs of cloth-guiding rolls, each of greater effective cloth-engaging diameter at one end of the roll than at the other, means to support said rolls for swinging movement about axes substantially perpendicular to the plane of the cloth to be guided, each roll having cloth-engaging portions at each side of the axis about which it swings and having its end of larger diameter nearer the center line of cloth travel, and means to adjust said rolls toward and from the center line of cloth travel.

8. A cloth-guiding device comprising two pairs of cloth-guiding rolls, each of greater effective cloth-engaging diameter at one end of the roll than at the other, means to support said rolls for swinging movement about axes substantially perpendicular to the plane of the cloth to be guided, each roll having cloth-engaging portions at each side of the axis about which it swings and having its end of larger diameter nearer the center line of cloth travel, and means to adjust said rolls toward and from the center line of cloth travel, one roll in each pair having spaced cloth-engaging end portions and a recessed intermediate portion.

9. In a cloth-guiding device, two pairs of guiding rolls, and supporting frames in which said rolls are rotatably mounted, said frames being pivoted on axes in the plane of the roll axes and substantially perpendicular thereto, said rolls being conical in shape and positioned with the smaller end of each roll outward with respect to the center line of cloth travel, and each roll having cloth-engaging portions at each side of the axis on which its frame is pivoted, and said portions being axially spaced apart on one of each pair of rolls.

10. In a cloth-guiding device, two pairs of guiding rolls, and supporting frames in which said rolls are rotatably mounted, said frames being pivoted on axes in the plane of the roll

axes and substantially perpendicular thereto, said rolls being conical in shape and positioned with the smaller end of each roll outward with respect to the center line of cloth travel, the upper roll in each pair having its conical surface recessed in its intermediate portion, and each roll having cloth-engaging portions at each side of the axis on which its frame is pivoted.

11. In a cloth-guiding device, two pairs of guiding rolls, and supporting frames in which said rolls are rotatably mounted, said frames being pivoted on axes in the plane of the roll axes and substantially perpendicular thereto, said rolls being conical in shape and positioned with the smaller end of each roll outward with respect to the center line of cloth travel, the upper roll in each pair having axially spaced cloth-engaging portions, and the lower roll having cloth-engaging portions positioned opposite each of said spaced portions.

12. In a cloth-guiding device, two pairs of guiding rolls, and supporting frames in which said rolls are rotatably mounted, said frames being pivoted on axes in the plane of the roll axes and substantially perpendicular thereto, said rolls being conical in shape and positioned with the smaller end of each roll outward with respect to the center line of cloth travel, and the upper roll in each pair having axially spaced cloth-engaging portions, with the axial length of the portion at the larger end substantially greater than the axial length of the portion at the smaller end.

13. In a cloth-guiding device, two pairs of guiding rolls, supporting frames in which said rolls are rotatably mounted, said frames being pivoted on axes in the plane of the roll axes and substantially perpendicular thereto, said rolls being conical in shape and positioned with the smaller end of each roll outward with respect to the center line of cloth travel, and each roll having cloth-engaging portions at each side of the axis on which its frame is pivoted, and said portions being axially spaced apart on one of each pair of rolls, and means to limit the pivotal movement of said supporting frames.

14. In a cloth-guiding device, two pairs of guiding rolls, and supporting frames in which said rolls are rotatably mounted, said frames being pivoted on axes in the plane of the roll axes and substantially perpendicular thereto, said rolls being conical in shape and positioned with the smaller end of each roll outward with respect to the center line of cloth travel, the upper roll in each pair having axially spaced cloth-engaging portions disposed at opposite sides of the associated frame axis, and the lower roll in each pair having cloth-engaging portions positioned opposite each of said spaced portions.

15. In a cloth-guiding device, two pairs of guiding rolls, and supporting frames in which said rolls are rotatably mounted, said frames being pivoted on axes in the plane of the roll axes and substantially perpendicular thereto, said rolls being conical in shape and positioned with the smaller end of each roll outward with respect to the center line of cloth travel, and the upper roll in each pair having axially spaced cloth-engaging portions disposed at opposite sides of the associated frame axis, said axis being substantially at the center of length of said rolls and nearer the cloth-engaging portion at the larger end of the upper roll.

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