In machines for folding cloth midway of its width, it has heretofore been the custom to manipulate the mechanism by hand in order to keep the two edges of the cloth exactly even. This operation requires constant care and watchfulness, and, in addition to requiring the unremitting attention of an operative, seldom accomplishes perfect results.

The object of this invention is the effecting of automatic means for thus maintaining accurate adjustment of the fabric being folded; and the invention consists essentially in the provision of electrically controlled shifting means. In carrying my invention into effect, we provide a continuously rotating electric or other motive power adapted to keep two pulleys in constant but opposite rotation, and a carriage shifting means controlled electrically through a friction clutch engaging the pulleys alternately.

In the drawings forming part of this specification, Fig. 1 is an elevation in diagram of a cloth folding machine to which our automatic control is designed to be attached. Fig. 2 is a perspective view of the current controlling contacts. Fig. 3 is a sectional view of one of the friction pulleys. Fig. 4 is a side elevation of much of the folding machine, showing the shifting means applied thereto. Fig. 5 is an elevation on a larger scale of the shifting device alone. Fig. 6 is a perspective view of certain details thereof. Fig. 7 is an elevation of the shifting device at right angles to its showing in Fig. 5. Fig. 8 is a detail view of a certain part. Fig. 9 is a face view of the main frame of the device. Fig. 10 is an edge view of the latter. Fig. 11 is an elevation of another portion of the frame. Fig. 12 is an elevation of the latter at right angles to its former showing. Fig. 13 is a view of the clutch shifting arm. Fig. 14 is another view of the same.

The folding machine consists of two sections, one of which, as 1, carries the roll of cloth awaiting folding, and the other, 2, folds the cloth as received from the section 1. To permit the cloth to be shifted to present together the two edges of the fabric, the section or carriage 1 is provided with wheels 4 running on track rails 3.

As heretofore constructed, the carriage 1 is provided with manually operated means for its shifting, but this we dispense with and in place thereof supply the automatic controlling device forming our invention. This consists of two distinct elements, the first comprising means for enabling the edges of the cloth being folded to direct electric current to the carriage shifting means.

As the unfolded cloth is taken from the roll 5 supported by the carriage 1, as shown in Fig. 1, it passes in a well known manner into the control of the folding mechanism embracing the rods 6, shown in Figs. 2 and 4; passing therefrom to the folded roll 7. An end of each rod 6 is longitudinally slotted, as at 9, for the free action of contact fingers 10 which are lightly pressed against the edges of the cloth being folded. In case one edge reaches farther than the other, the contact fingers 10 thereat is pressed back, and is made to switch current to an associated electromagnet. The switching means is illustrated in Figs. 2 and 4, where it is seen that the fingers 10 are connected by wires 11 to a light arm 12 pivoted by a vertical spindle 13 in a housing 14 attached to the upper end of an arm 15. Within the housing is a resilient leaf contact 13 which is respectively wired to the two electromagnets 16. The arm 15 is pivoted supported at its lower end and resiliently pressed in the direction to keep the fingers 10 against the edges of the cloth. The spring 18 by which it is thus pressed is attached to an adjustable arm 19 to enable the pull of the spring to remain substantially the same for cloth of different widths.

To enable the energizing of an electromagnet 16 to effect the carriage 1, each is provided with an armature 19 which swings upon a shaft 20, as shown in Figs. 7 and 8. Normally engaging the upper ends of these armatures are the stepped ends of a rocking dog 21 loose upon the shaft 22. Also loose upon this shaft is a yoke 23 controlling a thimble 24 slideable upon a shaft 24; and at each end of the thimble is a grooved pulley 25 loose upon the shaft 24, but adapted to be pressed into frictional engagement with the leather surface 26 attached to a shoulder 27 which is fixed on the shaft 24.

Upon this shaft is a pinion 27 meshing with a gear 29 mounted upon a drive screw 30 which turns in an internally threaded
arm 31 rigid with the carriage 1, whereby the latter can be shifted in either direction by turning the screw accordingly.

An electric motor 32 having a grooved pulley 33 is designed to be kept in uniform motion. About this pulley passes a round belt 34 down about the two pulleys 25, and thence up and around a grooved pulley 33, whereby the two pulleys 25 are kept in constant but opposite rotation. Hence, by clutching either pulley 25 to the shaft 24, the carriage 1 is shifted thereby in a corresponding direction.

For the accomplishment of this clutching, the pulley 35 is provided with a pinion 36 meshing with a spur gear 37, which likewise has a pinion 39 meshing in its turn with a gear 40. The latter has a crank pin 41 joined by a connecting rod 42 with the stud 42a of an arm 42b loose upon the shaft 21a and having resilient connection with the arm 43 which is fixed upon the shaft 21a. This connection consists of a helical spring 44 whose ends engage studs 45 and 45a projecting respectively from the arm 43 and arm 42b; whereby the parts 42 and 42b can continue to oscillate even when the shaft 21a is held stationary.

Fixed upon the other end of the shaft 21a is a dog 21b resiliently connected with the yoke 22, through a similar arrangement of helical spring 45a whose ends engage a stud 45a projecting from the dog 21a and a rib 46 of the yoke 22; the latter being loose on the shaft 21a.

To permit the armatures 19, 19a to be freely withdrawn from beneath the ends of the dog 21, the parts are so arranged that when the arm 29 is at the limit of its stroke up or down, pressure on one of the armatures is removed, and it is free to be withdrawn by its electromagnet if energized. When an electromagnet, as 16, has thus withdrawn its armature 19, the reverse stroke permits this unsupported end of the dog to descend and its other end to swing up. Instantly the helical spring 54 on the slender rod 52 draws the armature 19a in beneath a second step of the dog 21, and holds it thereat so long as the electromagnet 16 remains energized. This position of the dog 21 causes the yoke 22 to press one of the pulleys 25 into clutch with the shaft 24, and the latter through the pinion 27, gear 29 and drive screw 31, to correspondingly shift the carriage 1. An energization of the electromagnet 16 similarly but oppositely shifts the carriage.

As shown in Fig. 3, we prefer to provide the pulleys 25 with a recess 40 within which ball bearings can be introduced to permit easy rotation upon the reduced ends of the thimble 23.

The yoke 22 is shown in detail in Figs. 13 and 14. The bracket 47 forms a support for the motor and is shown in Fig. 10. The base plate 49 to which most of the mechanism is attached is shown in Fig. 9 and the frame portion 50 shown in Fig. 11 is adapted to be bolted to the lower end of plate 49.

To increase the length of pull by each electromagnet 16 upon its armature 19, the latter is given a conical hole 51 coacting with the conical end of the pole-piece 17, as shown in Fig. 8. As shown in Fig. 7, the wire 52 has shoulders 53 for holding the armatures from being drawn toward each other too far by the helical spring 54; and the armatures are kept down in their seats 20 by means of slender springs 55 suitably connected with their lower ends; the spring 54 being supported by a stud 56 projecting from a frame-leg 57.

If it is desired at any time to disconnect the automatic control, I provide a switch arm 60 and a cut out switch 61, as shown in Fig. 4. By turning the switch 61 to the contact 62, the control of the two electromagnets 16, 16a is manually effected through the proper manipulation of the switch arm 60.

What we claim as our invention is:

1. The combination in a cloth folding and winding machine having means for folding and winding cloth, of electrically controlled means for automatically guiding the cloth before it enters into contact with the folding means to maintain the accurate superposition of the two edges of the cloth while being folded.

2. The combination in a machine having means for folding and winding cloth of control means for guiding the cloth, including: two slotted rods about which the cloth passes to be folded, each formed with a longitudinal slot, having fingers slidable in said slots, and circuit making and breaking means controlled by said fingers.

3. The combination in a machine having means for folding and winding cloth, control means for guiding the cloth, including: two rods about which the cloth passes to be folded, each formed with a longitudinal slot, having fingers slidable in said slots, and circuit making and breaking means controlled by said fingers.

4. The combination in a machine having means for folding and winding cloth, of control means for guiding the cloth, including: two slotted rods about which the cloth being folded passes, contact fingers in each slot, resilient means normally holding said fingers equidistant from the fold of the cloth, a vertical shaft having arms connected with said fingers, a resilient contact member radially projecting from said shaft, and two stationary contacts coacting with said resilient contact to open or close a circuit adapted to actuate the control means for guiding the cloth.

5. The combination in a machine having
means for folding and winding cloth, of an electrically controlled means for guiding the cloth embracing, a source of power having a pulley, two pulleys in axial alignment, a fourth pulley having its axis parallel with the first named pulley and between the latter and the said two pulleys, a belt passing about all of said pulleys, electrically controlled means for clutching said two pulleys alternately into operative control of the electrically controlled means for guiding the cloth.

6. The combination in a machine having means for folding and winding cloth; of an electrically controlled means for guiding the cloth being folded embracing a continuously oscillating arm, two oppositely rotating pulleys, a shaft upon which the latter are loosely mounted, friction clutches adapted for alternately clutching said pulleys to said shaft, means actuated by said shaft for moving the electrically controlled means for guiding the cloth, electrically controlled means for permitting the action of said clutches and a resilient connection between said arm and clutches.

7. The combination in a machine having means for folding and winding cloth; of an electrically controlled means for guiding cloth being folded embracing, a continuously oscillating arm, two continuously, but oppositely rotating pulleys, a shaft upon which the said pulleys are loosely mounted, clutching means for clutching each of said pulleys separately to said shaft, means whereby the rotation of said shaft actuates the electrically controlled means for guiding the cloth, a resilient connection between said arm and clutching means, a swinging dog coacting with the clutching means, two armatures normally engaging the ends of said dog and restraining it and the clutching means from yielding to said resilient connection and an electromagnet controlling each armature and adapted when energized to withdraw its armature from engagement with the end of said dog.

8. In a cloth folding and winding machine having an electrically controlled means for guiding the cloth being folded; the combination of a source of electricity, means for actuating the electrically controlled means for guiding the cloth including, fingers in contact with the edges of the cloth and means for causing said fingers to follow the edges of the cloth should the cloth vary in width.

In testimony that we claim the foregoing invention, we have hereunto set our hands this 30th day of December, 1927.

WILLIS E. HARMON.

JOHN E. WINDLE.