

June 8, 1937.

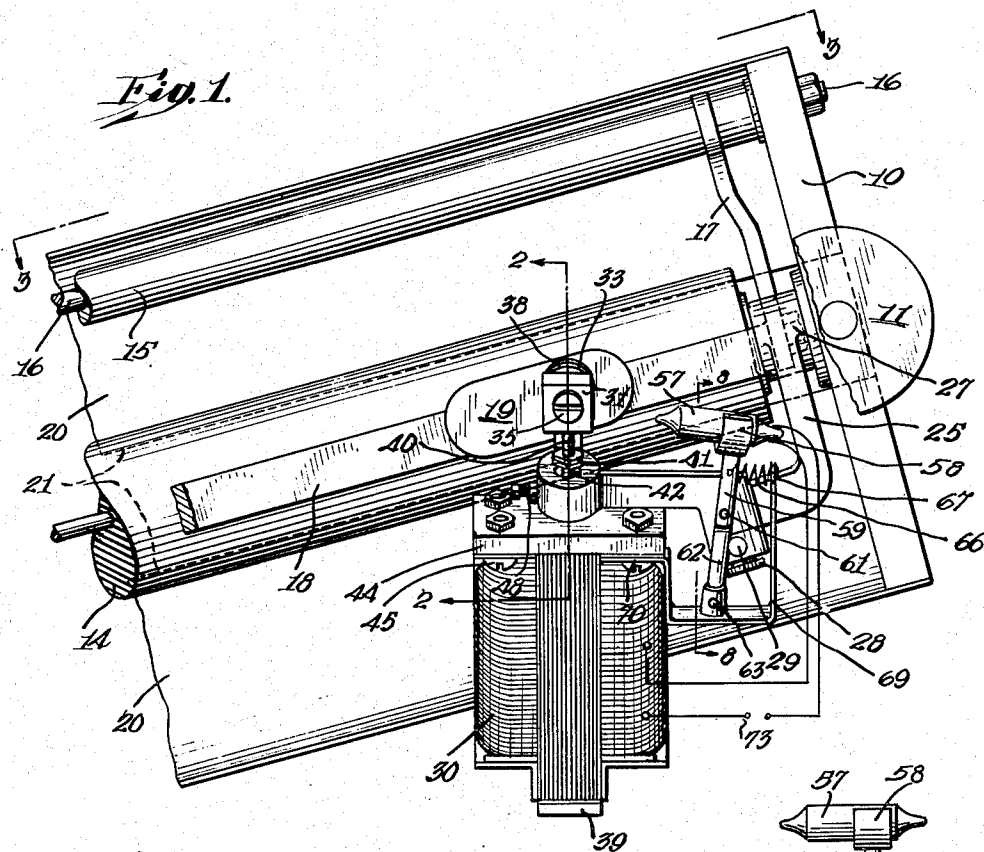
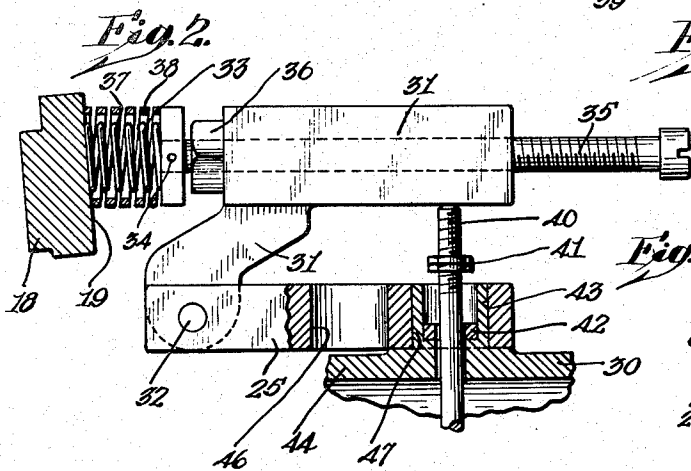
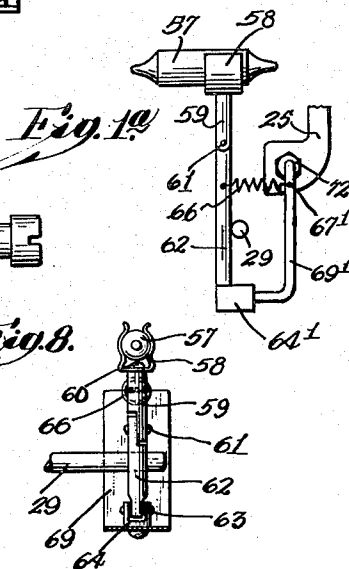
R. HETHERINGTON

2,082,799

CLOTH GUIDER

Filed Feb. 28, 1935

3 Sheets-Sheet 1



Witnesses:
Edwin M. Blacker
Walter Brown

Inventor
Robert Hetherington
by W. Stett Jackson and Son
Attorneys.

June 8, 1937.

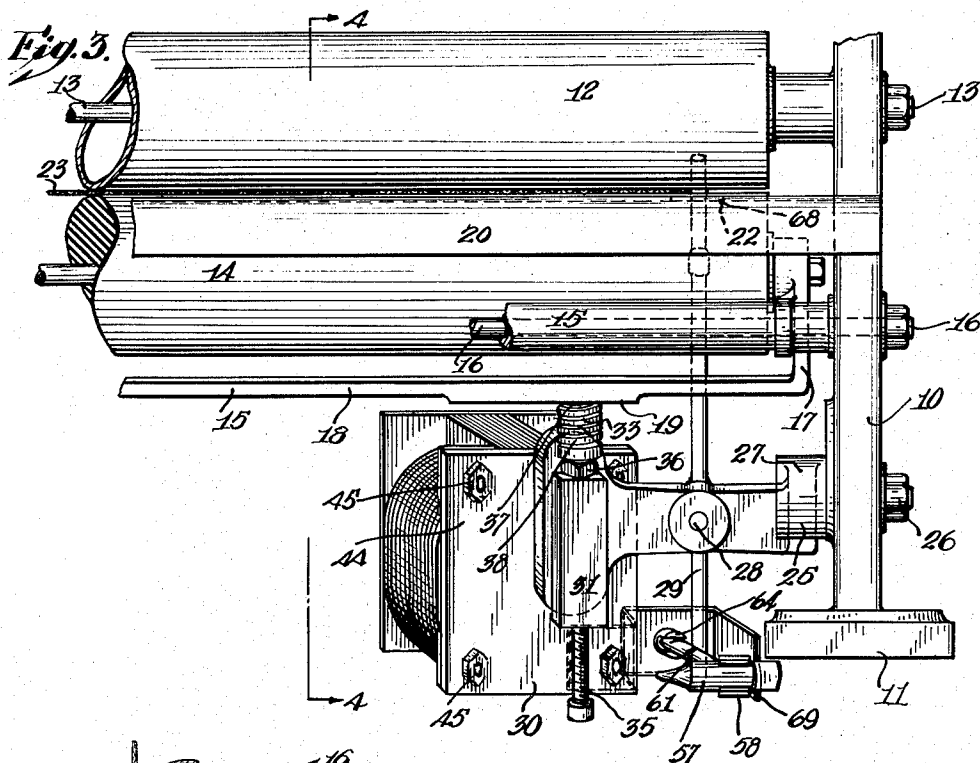
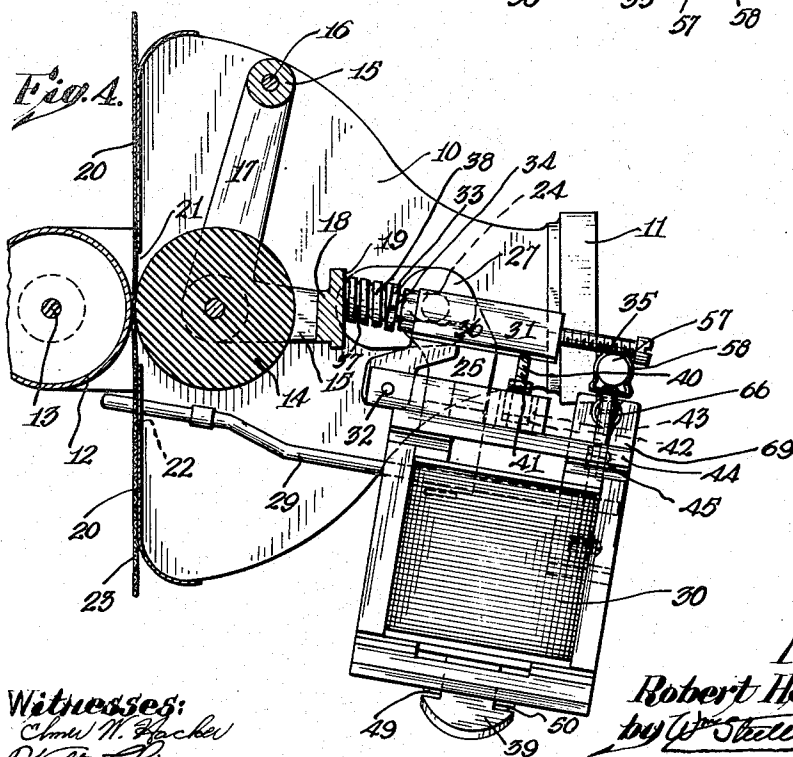
R. HETHERINGTON

2,082,799

CLOTH GUIDE.

Filed Feb. 28, 1935

3 Sheets-Sheet 2



Witnesses:
Chas. W. Becker
Walter E. Hunt

Inventor
Robert Hetherington
by W. Steele Jackson and Son
Attorneys.

June 8, 1937.

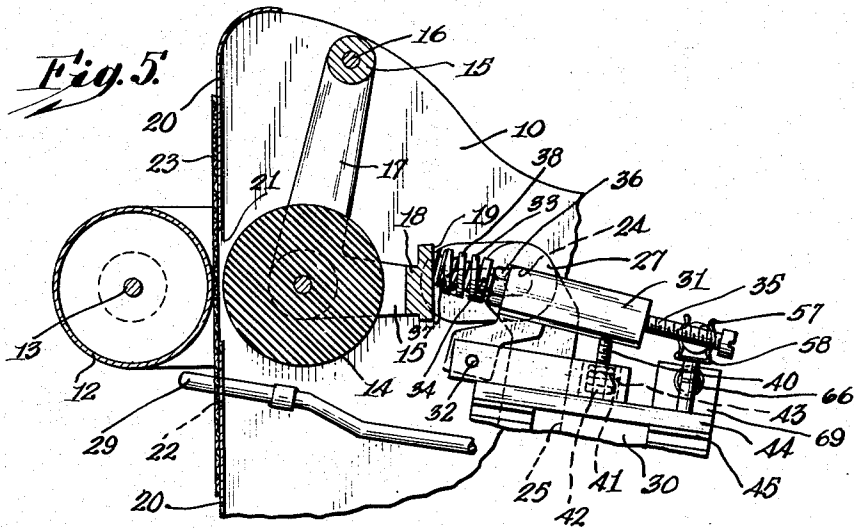
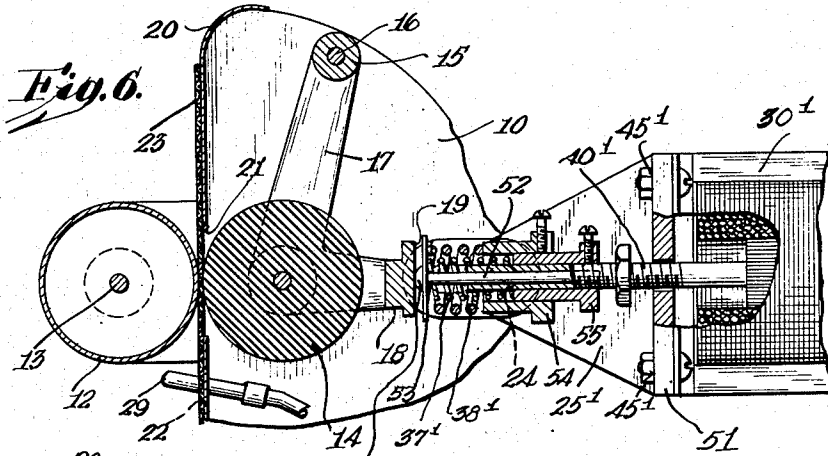
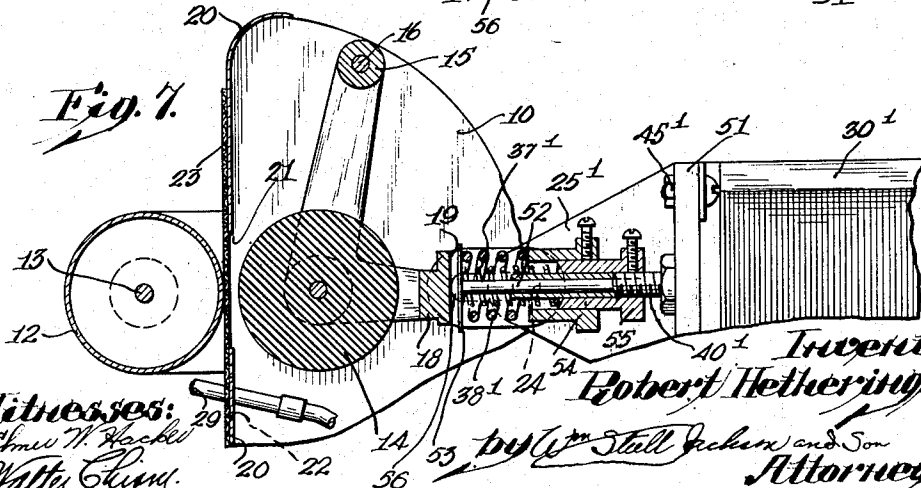
R. HETHERINGTON

2,082,799

CLOTH GUIDER

Filed Feb. 28, 1935

3 Sheets-Sheet 3



Witnesses:

Chas. W. Hackler
Walter Chum.

Inventor
Robert Hetherington
by Wm. Stall Jackson and Son
Attorneys.

UNITED STATES PATENT OFFICE

2,082,799

CLOTH GUIDER

Robert Hetherington, Sharon Hill, Pa., assignor
to H. W. Butterworth & Sons Company, Phila-
delphia, Pa., a corporation of Pennsylvania

Application February 28, 1935, Serial No. 8,609

10 Claims. (Cl. 26—66)

The invention relates to devices for guiding and stretching travelling cloth, fabric, or other web material herein conventionally called web.

The main purpose of my invention is to secure the advantage of electromagnetic movement of one of two preferably diagonal grinding and stretching rolls at either side of the travelling web without objectionable features previously associated with electromagnetic movement.

A further purpose is to interpose relatively weak and strong springs between the movable roll of a pair of guiding and stretching rolls and the operating member of electromagnetic mechanism, projecting the weaker spring beyond the stronger spring during roll release.

A further purpose is initially to soften the blows of electromagnetic operating means when applied to a movable roll of a pair of guiding and stretching rolls.

A further purpose is to interpose a spring to take up play between electromagnetic mechanism, preferably the armature of a solenoid, and the movable roll of a pair of guiding and stretching rolls, using the spring to press the rolls together and the electromagnetic means to position the spring at the end thereof away from the movable roll.

A further purpose is to limit the normal separation of the movable roll from the stationary roll of a pair of guiding and stretching rolls by a spring, preferably a weak spring, to reduce the requisite separation of the rolls during periods of release and thereby reduce the blows between the rolls as the movable roll goes to its engagement position. The weak spring permits such easy increase in the spacing between the rolls to accommodate abnormal unevennesses of the web as to render safe the reduction of the normal separation of the rolls during release periods to a minimum.

A further purpose is to provide electromagnetic operating mechanism of the movable roll of a pair of guiding and stretching rolls with novel circuit make-and-break mechanism permitting easy accommodation of a mercury type switch to operate on different positions of the guiding and stretching mechanism.

A further purpose is to provide an electromagnetic replacement operating mechanism which can be used in connection with existing guiding and stretching rolls to convert them from fluid operated to electromagnetically operated rolls.

A further purpose is to utilize all of an existing fluid operated guiding and stretching roll pair and the supports thereof except for the bracket-

mounted operating mechanism for one of the rolls and to apply instead an electromagnetic operating mechanism having a buffer in the train between the electromagnet and the roll to be operated.

Further purposes appear in the specification and in the claims.

I have preferred to illustrate my invention by one main form only, with slight variations, adapted to use for replacement or as a new device, showing a preferred mechanism to embody the invention and selecting the form because it is practical, effective, rugged and readily repaired, but primarily because of its excellence in illustrating the invention.

Figure 1 is a fragmentary elevation illustrating guiding and stretching roll mechanism indicated as guiding and stretching a vertically travelling web, the mechanism including a desirable embodiment of my roll control device.

Figure 1a is a modified detail of Figure 1.

Figure 2 is an enlarged fragmentary vertical section on the line 2—2 of Figure 1.

Figure 3 is an inclined plan of Figure 1, along the line 3—3 thereof.

Figure 4 is a section upon the line 4—4 of Figure 3.

Figure 5 is a view corresponding to Figure 4, but with the rolls separated.

Figures 6 and 7 are views corresponding generally to Figures 4 and 5, but showing a somewhat different form.

Figure 8 is a detail section taken upon the line 8—8 of Figure 1 and showing contact mechanism.

Like numerals refer to like parts in all figures. Describing in illustration and not in limitation and referring to the drawings:

It will be understood that the web governing mechanism to which my device is intended to be applied normally functions to laterally stretch and guide travelling widths of cloth, fabric or other web material, and that such devices include relatively adjustable pairs of selvage rollers, which pairs angularly overlap the travelling web at opposite edges thereof, stretching and guiding the web at these edges as the web is pulled between the rolls, the rolls of each pair presenting their engagement surfaces normally substantially in the plane of the travelling web but facing diagonally outward from the line of travel. The selvage rolls stretch the web laterally outward at the selvage as long as the rolls of the pair press together upon the intermediate web and cease to act when the pressure between

the rolls is relieved. The travelling web, at the selvages thereof, governs the repeated engagements and separations of the rolls of the respective pairs by means of feelers across the opposite edges of the web, spaced from one another according to the desired width of web. The present invention relates to means governed by the feelers for controlling the bite and release operations of the rolls.

10 The roll units at opposite edges of the web are counterparts, so that a description of one unit is intended to apply to both units.

A bracket 10 is adapted to be removably fastened at a flange 11 to the cooperating structure 15 of a tentering machine or the like, not shown, and carries a roll 12 rotatably mounted upon a fixed spindle 13 and a roll 14 in a cradle 15 having pivot support upon a fixed spindle 16 of the bracket.

20 The cradle includes a tubular hub pivoted on the spindle 16, depending arms 17 journaling the roll 14 and a cross bar 18 that suitably presents a pad 19 to motor mechanism for pressing the swinging roll 14 upon the axially stationary roll 12.

Suitable guide plates 20, fastened to the bracket 10 in any suitable way, serve to guide the web material between the rolls and to shield it from tangling engagement with the operating mechanism, openings at 21 and 22 respectively permitting engagement of the rolls and the passage of feeler rod against the edge of the travelling web 23.

As thus far described the mechanism corresponds to well known structure of the prior art, in which structure fluid pressure motor mechanism has been mounted on a motor bracket carried upon the main bracket 10 at a slot 24 thereof. An optional object of the present invention is to apply electromagnetic motor mechanism to replace the motor structure of the prior art. A unit made in accordance with my invention and avoiding the need for fluid pressure and preferably mounted at the slot 24 of the main bracket 10 may be used.

The illustrated electromagnetic motor unit of my device is suitably mounted upon an auxiliary bracket 25, held to the main bracket 10 at the slot 24 by a bolt 26 into a threaded boss 27 of the auxiliary bracket.

50 The bracket 25 pivotally supports at 28 a feeler rod 29, optionally exactly as in the prior art. Beyond the feeler rod the bracket 25 is suitably formed to carry a solenoid 30 with contact mechanism governed by the feeler rod and mechanical connections adapting the solenoid, when energized, to apply suitably heavy spring pressure to the swinging roll at the pad 19, a pressure automatically released when the solenoid de-energizes. In Figures 1 to 5, inclusive, the mechanical connection between the solenoid and pad 19 of the swinging roll include a bell crank lever 31 pivoted at 32 between spaced ears of the bracket 25, the lever 31 in its advanced position presenting a preferably adjustable spring head 33 to the pad of the swinging roll.

As shown the spring head is pinned at 34 to the end of a screw 35 longitudinally threading the long arm of the bell crank, adapted to be set in any desired adjusted position by a lock-nut 36.

75 The spring head carries preferably heavy and light springs 37 and 38 respectively, the light spring in retracted position of the lever projecting a small distance beyond the heavy spring,

offering a preferably adjustable resilient stop to the pad, permitting minimum normal separation of the rolls when the solenoid is de-energized, while on the other hand yielding freely outwardly to accommodate abnormal unevennesses. The springs may be fastened to the head by any suitable means, for example by soldering.

The solenoid is preferably of the heavy duty type with an armature 39 presenting a push rod 40 against the rearward (lower) side of the lever 31. As shown, the push rod, through an axial bore of the magnetic core of the solenoid, is rigidly fastened to (threaded into) the inner end of the armature, and carries nuts 41 to adjustably limit the downward retraction of the armature when the solenoid de-energizes, the lower nut 41 then seating upon a fibre washer 42 at the bottom of a counterbore in an upwardly extending boss 43 of a plate 44 to which the solenoid is fastened at 45.

The auxiliary bracket 25 is shown with a plurality of bores 46 and 47 at different distances from the pivot 32 of the bell crank lever 31, thereby adapting the solenoid to operate on selectively different lengths of lever arm, with resultant selective change in the requisite strength for the solenoid, or/and of the stroke of the solenoid, or/and of the stroke of the lever and thereby of the effective pressures presented by the spring head to the movable roll.

The plate 44 mounting the solenoid may be fastened in any suitable way to the bracket 25, as indicated conventionally in Figure 1, by a set screw 48.

The impacts between the armature and core portions of the solenoid may be deadened by suitable cushioning, as indicated at 49, Figure 4, between the step portions 50 of the armature and the body of the solenoid.

I illustrate in Figures 6 and 7 that the spring head presented to the pad 19 of the movable roll may be mounted on the push rod of the solenoid without the intermediate lever 31 of Figures 2 and 3.

45 In Figures 6 and 7 the solenoid 30', axially aligned toward the pad 19, is fastened at 45' to a vertical plate portion 51 of the bracket 25' and presents a tubular push-rod 40' toward the pad 19 of the movable roll. Heavy and light springs are indicated at 37' and 38' and are kept to place by a pin and washer 52 and 53, the body of the pin freely sliding in the bore of the push rod, whereby the springs rearwardly supported by the adjustable collars 54 and 55 of the push rod engage the washer when the solenoid is energized (Figure 6) to press the head 56 of the pin upon the pad of the movable roll.

When the solenoid de-energizes, the springs with or without a small bodily movement of the movable roll retract the armature of the solenoid, as indicated in Figure 7, the head 56 of the pin maintaining contact with the pad, and the light spring adjustably limiting the degree of normal separation of the rolls while permitting ready additional separations of the rolls from any abnormal unevennesses of thickness of the travelling web.

It will be understood that part of the benefit of the invention will be obtained by a single spring, the heavy spring being however particularly desirable.

I may use any suitable electrical connections to adapt the traveling web 23 to govern the energizing and de-energizing of the solenoid and

thereby the pressure between the rolls but find the mercury type of make and break device particularly well suited to the fairly heavy currents usually desirable for the solenoid operation. I accordingly illustrate an advantageous mounting of this type of switch.

I mount my mercury contact member 57 in a usual clamp 58 on the top of a rod 59 by screw 60 and at 61 angularly adjustably fasten the rod 59 to a rocker rod 62.

The rod 62 is pivoted at 63 in a suitable stationary bearing 64 and is resiliently pulled into continual resilient engagement at 65 with an outer portion of the feeler rod 29 by a suitable spring 66, whereby the feeler rod except as deflected by the travelling web against the retraction of the spring 66 is pulled by the spring 66, anchored at 67, against a suitable stop 68, illustrated as an edge of one of the guide plates at the opening 22 thereof.

I show two only of many different mounts for supporting the stationary bearing 64 of the rocker rod and the anchor 67 of the spring, in Figure 1 showing the bearing 64 and spring anchor 67 on a plate 69 fastened at 70 to the solenoid, and in Figure 1a showing the bearing 64' and spring anchor 67' on a rod 69' which threads at 71 into the bracket 25 with a suitable lock nut 72 normally preventing angular movement of the rod 69', yet permitting angular adjustment when desired.

Obviously the spring may stretch from its anchor to the rod 59, as in Figure 1 or to the rocker rod 62 as in Figure 1a.

It will be understood that the mercury contact device, intended to be illustrated conventionally as any suitable mercury contact device of the type indicated, operates by a sudden flow of mercury from one end to the other of the sealed barrel, flooding and electrically connecting spaced contacts when in the retracted position of Figure 1 and leaving the spaced contacts electrically open when the barrel is rocked to the left with respect to the position of Figure 1 sufficiently far for the mercury to flow to the left end of the barrel.

Suitable electrical connections are shown in Figure 1, the energizing circuit being indicated as from a suitable source 73 to one contact within the closed barrel of the switch 57, through the mercury of the tilted switch to the other contact, thence to the solenoid, and thence back to the source.

In the operation of my device, the two rolls of each pair are normally resiliently urged together to maintain pressure upon the web. Under this condition, the solenoid is energized, so that the push rod of the solenoid presses against the lower surface of the bell crank lever and the bell crank lever comprises the spring connection, which applies pressure to the pad of the movable roll cradle, in the form of Figures 1 to 5 inclusive. In the form of Figures 6 and 7 the push rod of the solenoid passes directly against the springs, compressing them and causing them to apply pressure to the pad of the removable roll cradle.

When the lateral edge or selvage of the web moves too far toward the side at which a given pair of rolls are placed, the feeler arm is displaced by the selvage and rocks sufficiently far to change the mercury switch from the closed to the open position. The solenoid is now de-energized, and ceases to press with its push rod against the bell crank lever (Figures 1 to 5 in-

clusive), or directly with its push rod (Figures 6 and 7) against the springs to compress the springs and exert pressure against the pad of the movable roll cradle. Release of pressure on the movable roll cradle releases pressure upon the web and permits the rolls to separate to a position as shown in Figures 5 or 7. If pressure continues to be applied to the pair of rolls in the opposite selvage, the web is drawn by the rolls at the opposite selvage laterally toward them, until the web is substantially restored to its normal position equally spaced between the two sets of rolls. The feeler rod then is restored to its normal position under the action of the feeler rod spring, and the mercury switch closes the circuit, re-energizing the solenoid and again applying pressure to the pair of rolls. The condition of equilibrium is then restored, as both sets of rolls on opposite sides are being pressed firmly against the web and the selvage at either side has a tendency to displace the corresponding feeler arm.

Should an unusually thick portion of the web pass between the rolls, the springs pressing against the movable roll cradle pad are compressed, and the rolls move slightly apart. The springs perform the additional important function of relieving against delivery of a hammer blow by the solenoid.

The adjustment of the springs is preferably such that the heavy spring is not under pressure when the solenoid is de-energized, but the light spring still tends to press lightly against the cradle pad of the swingable roll.

It will be evident that the mounting of the mercury switch to cooperate with the feeler arm in close proximity to one another is very desirable as there is no danger of improper transmission of motion from the feeler arm to the electric switch when the switch and the feeler arm are coordinated.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art to obtain all or part of the benefit of my invention without copying the structure shown and I therefore claim all such in so far as they fall within the reasonable spirit and scope of my invention.

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

1. In a device of the character indicated for guiding web material, a pair of guide rolls, one movable to and from the other, an electromagnet having a member movable with respect to the one roll, contact mechanism engaging the web and governing the energizing of the magnet, a lost motion connection between the said member and the one guide roll and means including relatively light and relatively heavy springs offering resistance to the initial and subsequent portions of the lost motion movement, providing heavy spring pressure of one roll to the other during energization of the magnet and light spring pressure only in periods of magnet de-energization.

2. In a device of the character indicated for guiding web material, a pair of guide rolls, one movable to and from the other, an electromagnet having a member movable with respect to the one roll, contact mechanism engaging the web and governing the energizing of the magnet, a lost motion connection between the said member

and the one guide roll and heavy and light springs in the lost motion connection, mounted to present the light spring only in resistance to an initial portion of the lost motion movement and both
 5 springs in resistance to a subsequent portion of the lost motion, providing heavy spring pressure of one roll to the other during the energization of the magnet and light spring pressure only in periods of de-energization of the magnet.

10 3. In a device of the character indicated for governing travelling web material, a pair of guide rolls, a mount for one of the rolls movable toward and away from the other roll, an electro-
 15 magnet having a member movable toward the mount by the energization of the magnet, means for energization of the magnet, engaging the web, a heavy spring and a light spring both presented toward the mount by the said member, permit-
 20 ting roll separation against the pressure of the light spring only when the magnet is de-energized and against the pressure of both springs when the magnet is energized and the said member be-
 25 ing thereby moved to compress both springs against the mount.

4. In a device of the character indicated for governing travelling web material, a pair of guide
 30 rolls, one of the rolls movable to and from the other roll, a light spring limiting normal separation of the rolls, a heavy spring adapted to be moved to press the rolls together, electromag-
 35 netic means for compressing the heavy spring, a feeler engaging the web and contact mechanism operated by the feeler to energize the mag-
 40 net.

5. In a device of the character indicated for governing travelling web material, a pair of guide
 45 rolls, one of the rolls movable to and from the other roll, a light spring limiting normal separation of the rolls, an adjustment thereof, a heavy
 50 spring adapted to be moved to press the rolls together, electromagnetic means for compressing the heavy spring, a feeler engaging the web and contact mechanism operated by the feeler to en-
 45 ergize the electromagnetic means.

6. In a device of the character indicated for governing travelling web material, a pair of guide
 50 rolls, one of the rolls movable to and from the other roll, a light spring limiting normal separation of the rolls, a heavy spring adapted to be moved to press the rolls together, electromagnetic
 means for moving the heavy spring, an adjust-
 ment connection between the heavy spring and
 said means and contact mechanism engaging the

web to govern the energizing of the electromag-
 netic means.

7. In a device of the character indicated for governing travelling web material, a pair of guide
 5 rolls, one of the rolls movable to and from the other roll, a light spring limiting normal separation of the rolls, a heavy spring adapted to be moved to press the rolls together, a common
 10 mount for the springs, electromagnetic means for moving the mount and contact mechanism en-
 15 gaging the web to govern the energizing of the magnetic means.

8. In a device of the character indicated for governing travelling web material, a pair of guide
 15 rolls, one of the rolls movable to and from the other roll, a light spring limiting normal separation of the rolls, a heavy spring adapted to be moved to press the rolls together, a common
 20 mount for the springs, electromagnetic means for moving the mount, an adjustable connection be-
 25 tween the mount and said means and contact mechanism engaging the travelling web to govern the energizing of the magnet.

9. In a device of the character indicated for governing travelling web material, a pair of guide
 25 rolls, one of the rolls movable to and from the other roll, a spring adapted to be moved to press the rolls together, a bell-crank lever mounting the spring, a solenoid, a bracket mounting the
 30 solenoid and pivotally mounting the lever, an armature of the solenoid having an extended stem for moving the lever when the solenoid is energized and contact mechanism engaging the
 35 travelling web to govern the energization of the solenoid.

10. In a device of the character indicated for governing travelling web material, a pair of guide
 40 rolls, one of the rolls movable to and from the other roll, a spring adapted to be moved to press the rolls together, a bell-crank lever mounting the spring, a solenoid, a bracket mounting the sole-
 45 noid and pivotally mounting the lever, an armature of the solenoid having an extended stem for moving the lever when the solenoid is energized, contact mechanism adapting the travelling web
 50 to govern the energization of the solenoid, and including a feeler arm adapted to be engaged by the edge of the travelling web, a stop determining the normal retracted position of the feeler arm, a
 switch lever, a spring urging the switch lever
 50 against the feeler arm toward the retracted position of the feeler arm, and a mercury switch having an angularly adjustable mount on the switch lever.

ROBERT HETHERINGTON.