Sept. 1, 1931. A. SCHUBERT 1,821,583

PAPER MAKING MACHINE

Filed June 20, 1929

FIG. 1.

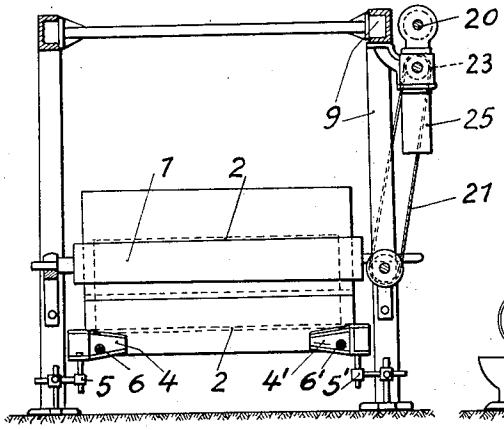
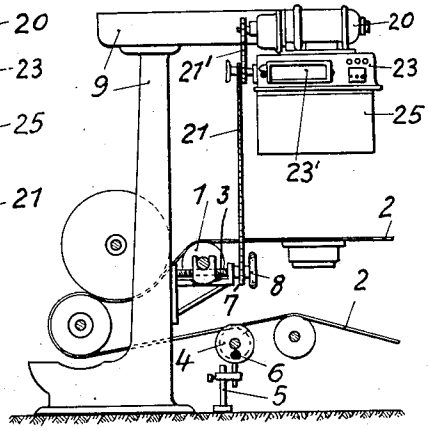


FIG. 2.



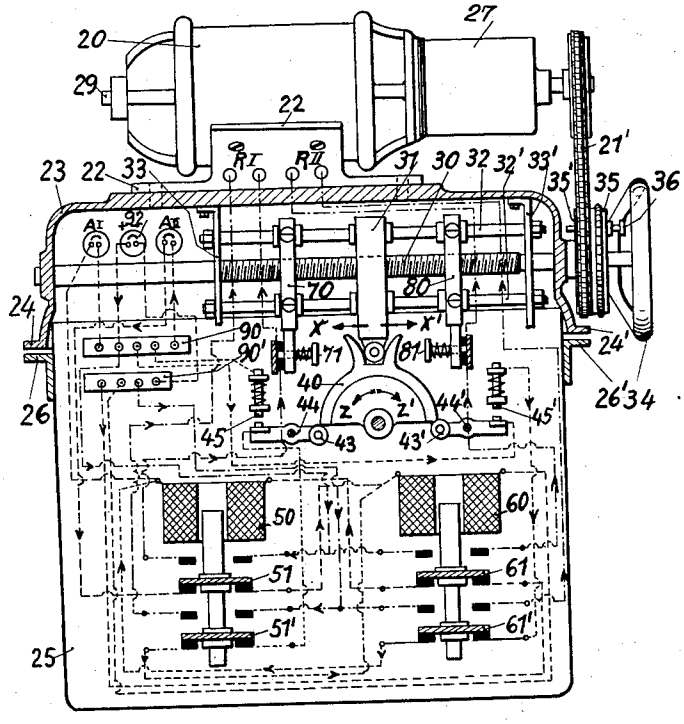


FIG. 4.

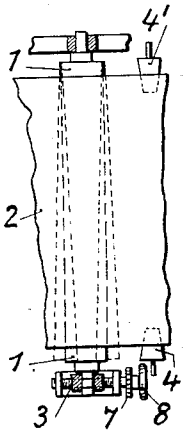


FIG. 3.

Inventor:

ARTHUR SCHUBERT

by Karl Viertel

Atty.

Patented Sept. 1, 1931 1,821,583

UNITED STATES PATENT OFFICE

ARTHUR SCHUBERT, OF ROSSLAU, GERMANY

PAPER MAKING MACHINE

Application filed June 20, 1929, Serial No. 372,348, and in Germany February 3, 1928.

My invention relates to electrically operated automatic apparatus for controlling the path of travel of the endless sieves of wire-cloth or felt of paper making machines—and more particularly to improvements in apparatus of the type described in my German Patent 383,861, comprising a rotary guide roller over which the endless sieve runs and electrically operated automatic means for temporarily displacing angularly said guide roller from its neutral position in cases when the endless sieve deviates laterally from its proper straight-forward path of travel.

One of the objects of my invention is to provide an improved controlling apparatus for the purpose set forth, the electrically operated switching gear of which can be fixed as a unit at any convenient place outside the paper machine proper, preferably above the latter where they do not obstruct the supervision of the machine and are safer against destructive attacks through moisture, noxious vapors, short-circuiting, etc.

A further object of my invention is to design an automatic electric controlling device for the purpose described which is fool-proof, the current carrying joints being protected by a cover, and which can be safely manipulated by hand whenever required in cases of emergency—not entailing danger, accruing from high voltage currents to the life and health of the attendants of the paper machines.

The invention also aims at providing means at the controlling device by which the travelling endless sieve of paper machines will have imparted thereto deliberate lateral oscillatory movements within certain adjustable limits, in order to reduce wear and tear of the sieve and its cooperative parts of the paper machine such as suction boxes, pulp-feeding regulators etc., viz. by spreading out the points of mutual contact over larger surfaces.

Further objects of my invention will incidentally appear hereinafter:

The nature and scope of my invention is briefly outlined in the appended claims and will be more fully understood from the following specification taken together with accompanying drawings in which

Fig. 1 is a diagrammatic front elevation of a paper machine furnished with an electric sieve controlling device according to this invention, shown by way of an example,

Fig. 2 is a side elevation of the paper machine and the controlling device attached thereto,

Fig. 3 is a plan view indicating in dotted lines the different positions into which the guide roller for mechanically controlling the course of travel of the sieve may be angularly displaced by a screw drive,

Fig. 4 drawn in a larger scale shows the electric switching and actuating mechanism cooperating with the guide roller shown in Fig. 3.

Extensive experiments have been made by the inventor with electric controlling devices for the purpose concerned, the electric motor of which for angularly displacing the guide roller and the whole number of its accessorial elements, starting and switching means, sliding bars, contact fingers etc., carrying high-voltage current, were arranged at the frame proper of the paper machine close to said guide roller, where they were exposed to the risk of being damaged by short circuiting and corrosion through moisture, noxious gases etc., issuing from the machine and the web under formation; and where they obstructed the supervision of the machine and caused danger to the attendants.

The said drawbacks have been eventually eliminated in and by the improved automatic controlling device described hereinafter:

Referring to Figs. 1–3 two conically shaped contact rollers 4, 4′ are rotatably mounted on adjustable stands 5, 5′, the latter being arranged underneath the endless sieve 2 of the paper machine, one at each side of the latter; the edges of the sieve 2 will come into frictional contact with one of said rollers 4 or 4′ in cases when the sieve deviates from its normal path of travel, viz. going astray to one side; and through the said frictional contact the respective roller 4 or 4′ is swung around its axis, thus operating an electric

switch, (not shown) and closing an electric auxiliary circuit.

Counter-weights, indicated at 6, 6′, are eccentrically arranged within the said rollers by which the latter are automatically swung back into their inoperative position after the sieve 2 has gone out of contact with the respective roller.

The path of travel of the sieve 2 is controlled by a guide roller 1, known per se in the art, over which the sieve runs and which is adapted to be angularly displaced from its neutral position by means of a screw and nut gear 3 and a chain pulley 7; a hand wheel 8 being also attached to the screw spindle concerned for attendance by the machine operators in cases of emergency.

In contradistinction to the arrangements made by the inventor in his early experiments the electric actuating mechanism for automatically controlling the position of the guide roller 1 and in turn the path of travel of the endless sieve 2 is arranged outside the paper machine proper: In the embodiment of the invention shown by way of an example the electric motor 20, and the switches and switching gears attached to it are mounted above the paper machine on an auxiliary frame 9, and they are cooperatively connected with the screw and nut gear 3 of the guide roller 1 through chains 21, 21′ (Figs. 1 and 2).

The complete set of electric switching apparatus, their joints and accessorial elements carrying high voltage current, diagrammatically shown in Fig. 4, are mounted on a frame (not shown) the latter being attached to and depending from a protecting hood 23, which is fixed to the bottom plate 22 of the electric motor 20. Flanges 24, 24′ are provided at the lower end of the hood 23 from which a tank 25 containing oil and having corresponding flanges 26, 26′ is detachably suspended by clamping means such as screw bolts, hooks, etc. (not shown); thus the electric switching gear, being constantly immersed in an oil bath is effectively insulated and protected against short circuiting and corroding attacks through moisture, vapors, etc.

A threaded spindle 30, engaging a threaded cross head 31, is rotatably mounted within the hood 23 and is adapted to shift the cross head 31 to and fro, as indicated by the arrows x, x' said cross head 31 being slidably arranged on guide bars 32, 32′, which are fixed on brackets 33, 33′. At the outer end of the spindle 30 there is a hand wheel 34 snugly fitted, having a chain pulley 35 attached to it. A detachable pin clutch 36 is provided for cooperatively interconnecting the said chain pulley 35 with another chain pulley 35′ which is rigidly mounted on the spindle 30 and is rotated by chain 21′.

It should be noted that while the screw and nut gear 3 is normally operated by power viz. by the electric motor 20 through chains 21, 21′, it may be operated independently of the motor by hand, viz. through either handwheel 34 or 8 after clutch pin 36 having been withdrawn,—whenever it may be necessary to readjust or to change the operative position of the guide roller 1 relatively to the cross head 31 for special purposes explained hereinafter.

As a matter of fact the movements of the cross head 31 which is cooperatively interconnected through chain 21 with the screw and nut gear 3 of the guide roller 1 exactly correspond with the movements of the latter: viz. the cross head 31 representing a repetition in a reduced scale of the nut carrying with it the guide roller 1.

A disc 40 having horn shaped extensions is pivotally mounted underneath the cross head 31 and is adapted to be swung around its pivot in the direction of arrows z, z'. Said disc 40 cooperated with electric switches comprising contact levers 43, 43′, fulcrumed at 44, 44′, and contact members 45, 45′, the latter being preferably yieldingly supported by springs or like resilient supports.

Electromagnetic switch gears 50, 60 operate two sets of switches 51, 51′, 61, 61′ and are electrically interlocked in the manner described hereinafter.

Arms 70, 80 are slidably mounted and adjustably fixed on the guide bars 32, 32′ by means of clamping screws, said arms having attached at their lower ends circuit breakers 71, 81, acting as safety devices and interrupting the motor current whenever the cross head 31 approaches one of its extreme outward positions.

The electric motor 20 is of a reversible type, known per se, diagrammatically indicated by its respective terminals R I, R II, the rotor being mounted on a spindle 29 and being adapted to rotate the said spindle in clockwise or anticlockwise direction.

The rotary movements of the spindle 29 are geared down and transmitted to the chain 21′ through a ratio change gear (not shown), enclosed in gear box 27.

The operation of the automatic sieve controlling device, described above, is as follows:

The endless sieve of the paper machine on deviating from the normal path of travel and eventually touching one of the contact rollers 4, 4′ closes an electric circuit preferably carrying low voltage current and thereby operates one of the switches A I, A II (Fig. 4) by which a high voltage circuit, exciting the electromagnet 50 or 60 is closed.

The respective exciting circuits are indicated by dash lines, interconnecting the switches A I and A II with terminal boards 90, 90′ and with the electromagnets 50, 60.

As soon as one of said electromagnets has

been excited—say electromagnet 50—the switches 51, 51′ are drawn into their upper position in which a motor circuit, indicated in dot-and-dash lines, is closed for the time being.

The rotating threaded spindle 30 causes the cross head 31 to move in the direction of arrow x and simultaneously causes the screw and nut gear 3 to angularly displace the guide roller 1 with the result that the sieve 2 begins to move backward to its normal path of travel and looses its contact with the contact roller 4.

Hence the dash-line circuit A I, exciting electromagnet 50, is interrupted and the switches 51, 51′ are dropped, thus breaking the motor circuit R I.

Meanwhile the disc 40, having been swung in the direction of arrow x by the cross head 31, has turned the contact lever 43 into its operative position in which an auxiliary dash-line circuit, flowing through contact member 45 and exciting the other electromagnet 60, is closed.

As soon as the electromagnet 60 has been excited the switches 61, 61′ are drawn into their upper position in which another dot-and-dash line motor circuit, R II reversing the revolution of motor 20 is closed.

Thereupon the spindle 30 will be rotated so as to move cross head 31 and disc 40 in the direction of arrows x' and z' respectively, returning same into their central position. Meanwhile contact lever 43 will drop into its inoperatve position; concurrently the auxliary dash-line circuit, exciting electromagnet 60, and the dot-and-dash line motor circuit R II are broken so that the motor 20 will now stop for good viz. after having returned also the guide roller 1 into its neutral position.

Electrical and mechanical switching operations, corresponding substantially to those described above with regard to contact roller 4 and switch A I are brought about by the sieve 2 on touching the contact roller 4′ at the opposite side of the machine.

The contact terminals 90, 90′ are connected with the main conductors of the electric supply system through a switch indicated at 92.

Attention is drawn to an important functional modification for which the improved sieve controlling device may be used to advantage and which consists in deliberately imparting to the endless sieve of the paper machine oscillatory movements within certain predetermined limits.

This procedure may be adopted as a precautionary measure in special cases in as much as the points of contact of the endless sieve with cooperating machine elements, such as feed regulators, controlling the pulp supply, suction boxes etc. are spread out over a broader surface: In this way excessive wear, entailing e. g. grinding of grooves, which may occur at the suction boxes, and being detrimental to the sieve, is eliminated.

In order to impart the said oscillatory movements to the travelling sieve 2 the lower pulley 35′ over which chain 21′ runs, must be first disconnected from the chain pulley 35 by withdrawing the clutch pin 36; whereupon, by turning hand wheel 34 or hand wheel 8 the guide roller 1 is angularly displaced and moved from its neutral position, (shown in the drawings) into an abnormal position. It will be noted that while guide roller 1 is displaced cross head 31 remains in its central position shown in Fig. 4.

Once the guide roller 1 has been angularly displaced it will do its duty by laterally shifting the travelling sieve 2 until the latter comes into contact with the respective contact roller 4 or 4′, which thereupon will cause the guide roller 1 and sieve 2 to be shifted backward in the manner described at length hereinbefore.

However by reason of the staggered position of the guide roller 1 relatively to cross head 31 and the electric switches responsive to the latter the guide roller 1 will not reach its neutral but its abnormal position, referred above. This results in the sieve 2 being constantly shifted laterally to and fro, performing those oscillatory movements referred to above.

Various changes and modifications in the design of automatic sieve controlling devices and in the assemblage and cooperation of their component parts may suggest themselves to those skilled in the art, without departing from the spirit and the salient ideas of my invention.

E. g. instead of electrical gear mechanical means, such as a lever or balance may be provided for interlocking the electromagnets 50, 60 and the switches 51, 51′, 61, 61′ associated with the latter, so that only one set of said switches can be operated at a time.

The oil tank 25 may be detachably connected with the hood 23 through chains or like flexible members by which the tank may be suspended, after having been lowered into an inoperative position so as to render accessible for supervision and repair the electric switching gear which normally is immersed in the oil.

A window 23′ and electric incandescent lamps may be provided in the hood 23 so as to render visible spindle 30 and the cross head 31 for the attendants and keep the latter constantly informed about the proper functioning of the electric sleeve controlling device.

What I claim is:

1. In an electrically operated apparatus for controlling the path of travel of the endless sieve of paper making machines the combination with an angularly displaceable guide roller over which the endless sieve of the paper machine runs, of a primary screw

and nut gear adapted to positively control the position of said guide roller, a reversible electric motor cooperatively associated with said screw and nut gear and with an electric switching device, the latter being responsive to lateral deviations of the sieve, an intermediate screw and nut gear being attached to said electric switching device and having a cross-head, the latter being cooperatively associated with adjustably mounted circuit breakers, a clutch interconnecting the electric motor and both said screw and nut gears, means for throwing said clutch into and out of operation and means for displacing by hand the nut of the primary screw and nut gear independently of the position of the cross-head of the intermediary screw and nut gear.

2. An electrically operated controlling apparatus for the purpose set forth and having the features outlined in claim 1, in which the electric switching device is bodily attached to the electric motor so as to form one unit with the latter, said switching device and electric motor being interconnected with the primary screw and nut gear and the intermediary screw and nut gear through endless chains.

3. An electrically operated controlling apparatus for the purpose set forth and having the features outlined in claim 1, in which the electric switching device is arranged in an oil tank, the latter being covered by a hood in which the intermediary screw and nut gear is mounted.

4. An electrically operated controlling apparatus for the purpose set forth and having the features outlined in claim 1, in which the cross-head of the intermediary screw and nut gear is guided during its reciprocating movements by stationary guide bars, the said circuit breakers being slidably mounted on the latter so as to be capable of being individually adjusted as to their distance from the cross-head.

5. An electrically operated controlling apparatus for the purpose set forth and having the features outlined in claim 1, in which the said clutch and means for throwing the latter into and out of operation comprise a pair of toothed pulleys, coaxially mounted on the main spindle of the intermediary screw and nut gear, one of said pulleys being loosely mounted the other pulley being keyed to said spindle, and means for interlocking said pulleys by hand.

6. An electrically operated controlling apparatus for the purpose set forth and having the features outlined in claim 1, in which the said clutch and means for throwing the latter into and out of operation comprise a pair of toothed pulleys, coaxially mounted on the main spindle of the intermediary screw and nut gear, one of said pulleys being loosely mounted, the other pulley being keyed to said spindle, and means for interlocking said pulleys by hand, said means comprising a detachable locking pin engaging both pulleys in locked position.

In testimony whereof I have signed my name to this specification.

ARTHUR SCHUBERT.