May 1, 1945. F. R. THRESH 2,374,846

TIME DELAY MECHANISM

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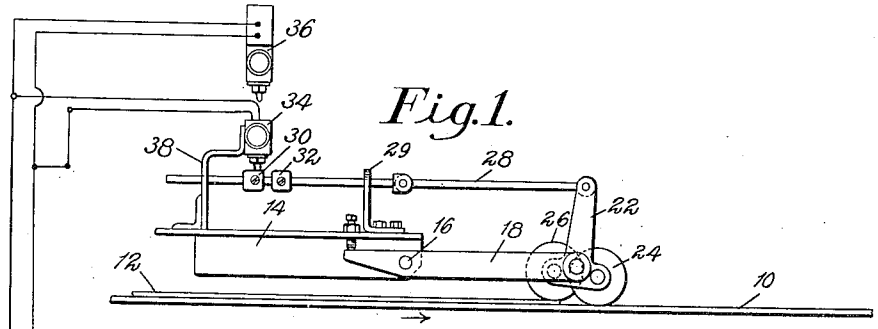


Fig.1.

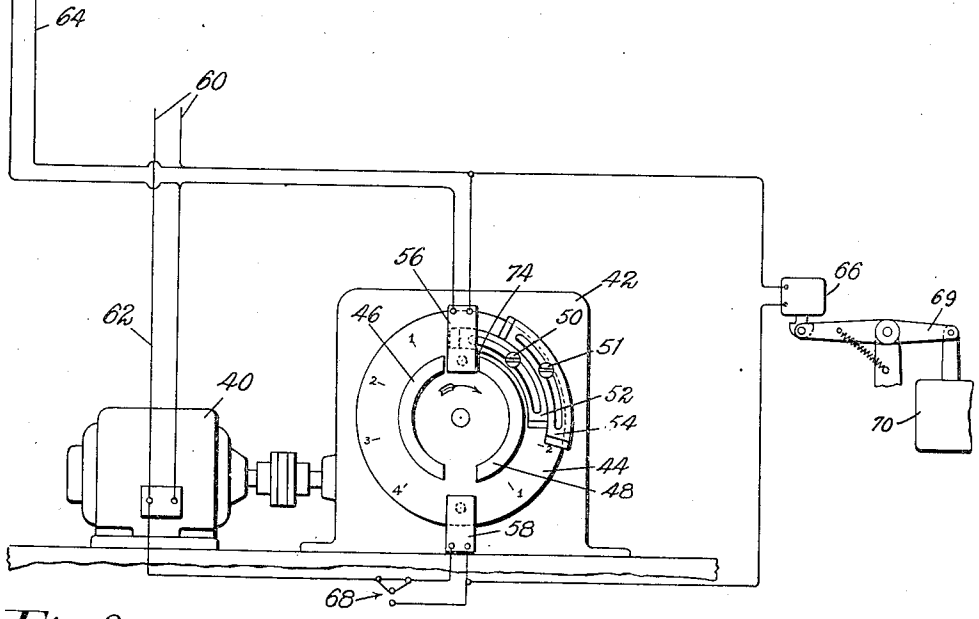


Fig.2.

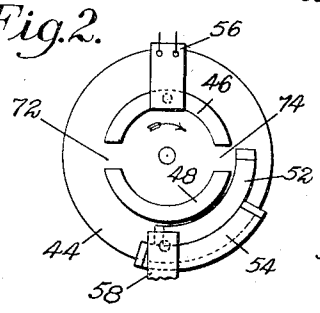
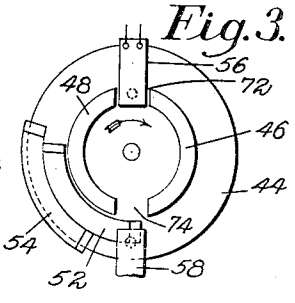


Fig.3.



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TIME DELAY MECHANISM

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Fig. 4.

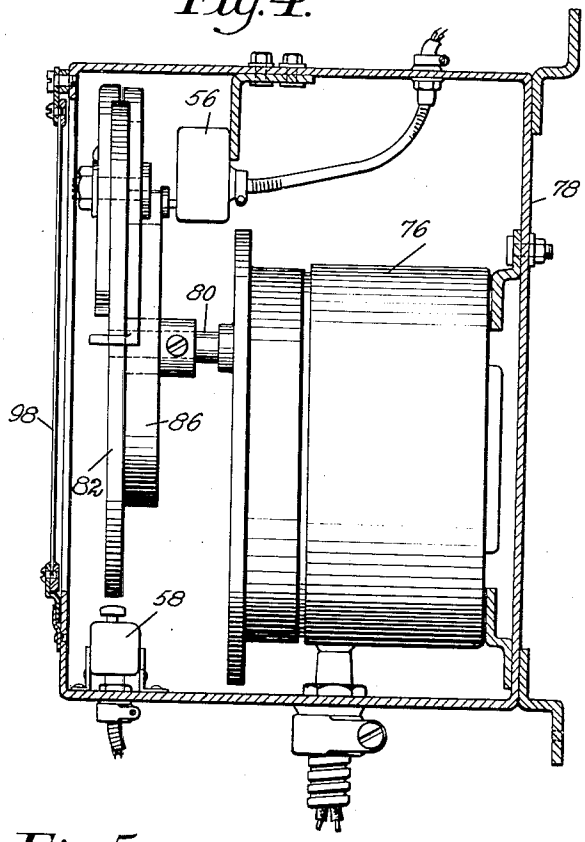

Fig. 5.

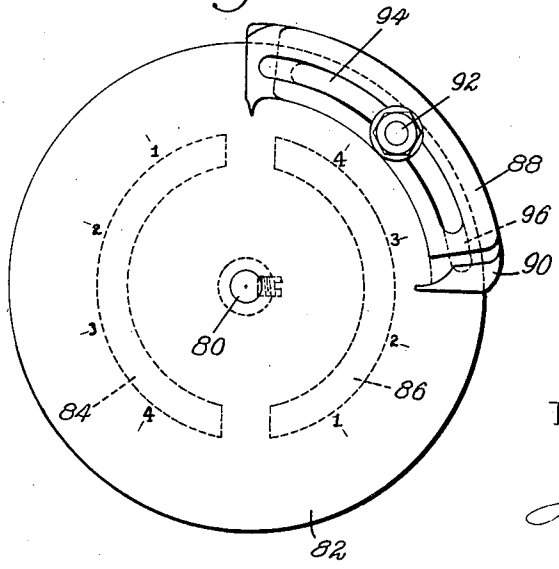

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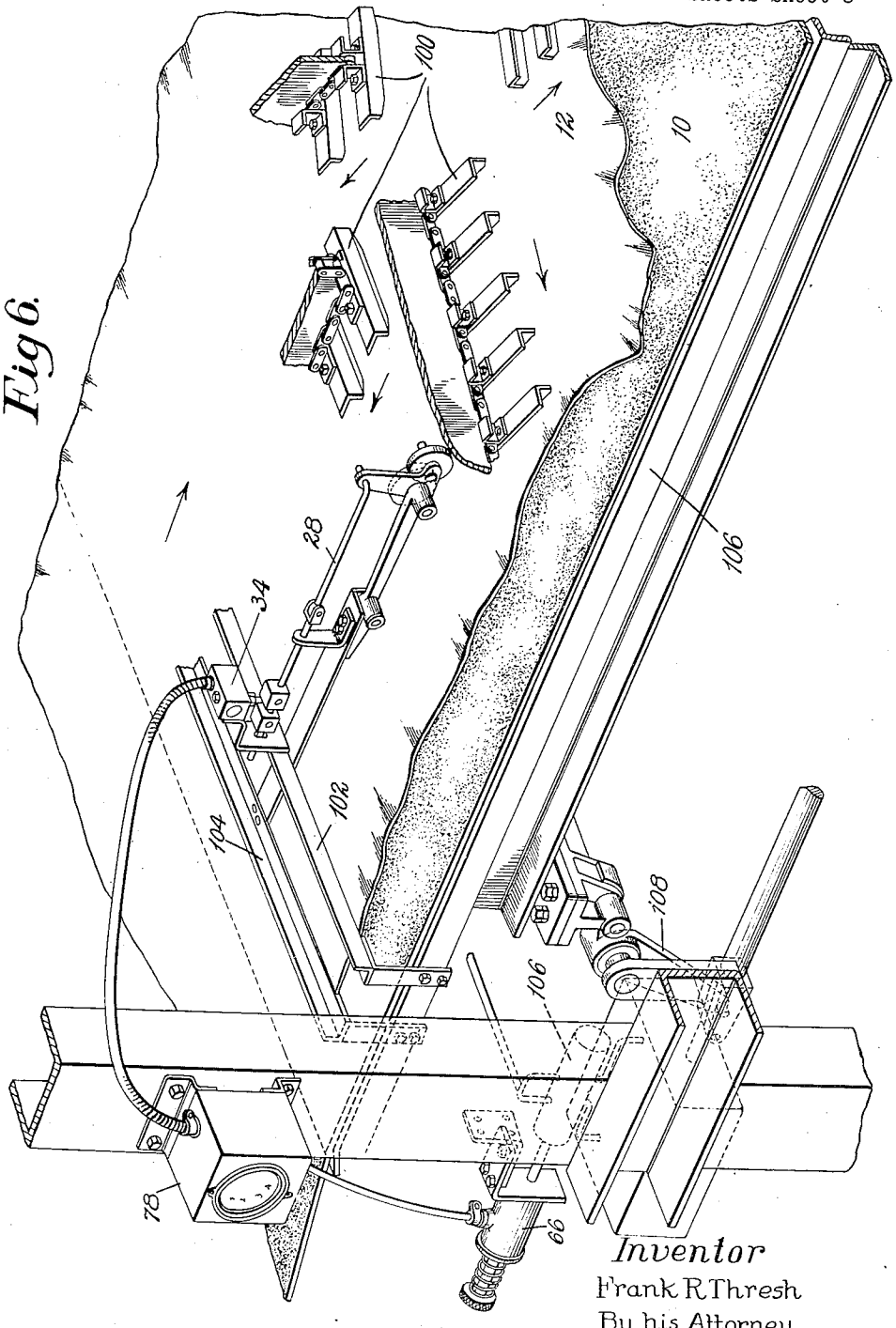
Fig 6.



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UNITED STATES PATENT OFFICE

2,374,846

TIME DELAY MECHANISM

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Application October 1, 1943, Serial No. 504,579

16 Claims. (Cl. 69—46)

This invention relates to control mechanisms, and more particularly to mechanisms for controlling the operation of treating means upon material after such material has passed through or into a machine by means of a conveyor.

The invention is herein illustrated as embodied in a control mechanism in combination with a leather putting-out machine of the type disclosed in United States application Serial No. 485,001, filed April 29, 1943, in the name of David Edgar, although it is to be understood that in its more general aspects the invention is not limited to use with machines of the type illustrated.

Machines of the type disclosed in the above-mentioned application are provided with work feeding means comprising a conveyor for moving individual work pieces into proximity to work treating tools of the machine and in accordance with one object of the present invention, novel control mechanism is provided which is adapted to be combined with a feeding means or conveyor, said mechanism including a single pivoted means to detect material being conveyed into position to be acted upon in a material treatment zone of appreciable length and breadth by material treating means and means under control of the detector means through suitable electric connections for rendering the treating means effective upon a substantial portion of the material when the material has been moved to said position.

A further object is the provision of a novel mechanism which will detect the leading edge or portion of material passing by means of a conveyor or feeding means toward a material treatment zone and, after a predetermined time delay, will initiate the treatment of the material in that zone. The term "material treatment zone" is used herein to indicate the appreciable length and breadth of that location in a machine in which the treating means can be rendered effective upon a substantial portion of the material.

Still another object is to provide a mechanism operated by the forward and after portions of the work which will control the treating means to make its action effective upon a substantial portion of the material for a period of time beginning when a predetermined amount of material is entirely within the treatment zone and corresponding to the entire amount of continuous material or length of material to be treated in a given operation.

Another object is to provide a unitary control mechanism which is adapted to be operated by some form of a single pivoted detector arranged to be displaced by material to be treated and which will, after a given time delay, initiate a treating operation control by maintaining a single independent electric circuit in accordance with the amount of material to be treated. In accordance with another feature of the invention, there is provided means by which the time delay is made adjustable. Still another feature is provided by means for adjusting the control mechanism to suit the various lengths or amounts of material to be treated.

A further object is the provision of novel control mechanism in combination with a machine for treating sheet materials, said machine having a conveyor to feed in the sheet material to a table and treating tools proximate the table, said control mechanism including a means to detect a piece of material being conveyed, and means under the control of the detector means for causing relative movement of the table and treating tools and consequent effective treatment of the piece after the piece has been conveyed to the table. Still a further feature is provided by means to predetermine the length of time of the effective treatment on the table dependent upon the amount or length of sheet material to be treated.

The above and other features of the invention, including novel details of construction and combinations of parts, will now be more particularly described in connection with the accompanying drawings and pointed out in the claims.

In the drawings,

Fig. 1 is a diagrammatic view of a time delay mechanism in which the invention is embodied, the mechanism being shown as applied to a leather putting-out machine;

Fig. 2 is a diagrammatic representation of the position of a timing disk relative to the necessary switches when work treatment is initiated;

Fig. 3 is a diagrammatic showing of the position of the timing disk relative to the switches just before treatment of a work piece is terminated;

Fig. 4 is a sectional elevation of a modification of a portion of the time delay mechanism;

Fig. 5 is a front view of the timing disk shown in side elevation in Fig. 4; and

Fig. 6 is a perspective view of a portion of a putting-out machine with the time delay mechanism modification of Fig. 4 attached thereto.

In Fig. 1 a portion of a conveyor belt 10 of a putting-out machine is shown. This belt has for its purpose the carrying or conveying of individual pieces of leather over a table and into or through a putting-out machine. Upon the belt 10 is shown a piece of work 12 to be treated. Above the belt 10 at a fixed distance is suitably mounted a detector framework 14 upon which is pivoted at 16 a bar 18 engageable at one end with an adjustable stop, illustrated as a screw 20 carried by the frame 14. At the opposite end of the bar 18 is pivoted a T-shaped element 22 having wheels 24 and 26 rotatably mounted thereon. These wheels may bear lightly against the belt 10 or have a slight clearance therefrom.

At the upper end of element 22 is pivoted a two-section rod or switch bar 28 which is slidably guided in a bracket 29 mounted on the framework 14. Near the opposite end of the rod or switch bar 28 are adjustably mounted stops 30 and 32 by means of which a switch 34 may be operated. A second switch 36 with a second detector arrangement may be utilized, if desired, as will be explained hereafter. Both switches 34 and 36 are mounted on suitable brackets, such as bracket 38 which bracket also slidably supports the end of rod 28. The framework 14 is mounted on the frame (not shown in Fig. 1) of the machine of which the conveyor 10 is a part. At some convenient location near the material treating machine is mounted a small motor 40 suitably coupled with a gear box 42 which in turn is arranged to drive or rotate, in a clockwise direction, as shown by the arrow, a timing disk 44. The disk 44 has two annular spaced segments 46 and 48 on its face, as shown. Near the periphery of the disk 44 are mounted by means of bolts 50 and 51 two relatively adjustable plates 52 and 54, these plates having beveled ends as shown. The outer plate 54 has a flange engaging the edge of disk 44 to aid in holding both plates 52 and 54 firmly in position. An electric connection or microswitch 56 is so mounted on a fixed support (not shown) in such a way that its button or plunger is depressed to close the switch by contact with the two annular ridges or segments 46 and 48, when the segments are rotated. A second microswitch 58 is stationarily mounted in a position such that its button or plunger is depressed to close the switch by contact with the combined length of the two plates 52 and 54, when they are rotated. A source of current 60 is provided in which one line 62 leads directly to the motor 40 and the other line leads through line 64 to one or both of the switches 34 and 36 and thence to the motor. Microswitch 56 is connected in parallel with the switches 34, 36 and microswitch 58 is connected in series with a solenoid 66 across the line 60 and an emergency switch 68 may be provided. In Fig. 1 the solenoid 66 is shown as operatively connected to a lever 69 which in turn is adapted to operate a hydraulic valve 70. These elements 66, 69 and 70 do not form a part of the present invention but merely represent the means by which a material treating operation is controlled by means of this invention. In actual operation the hydraulic valve 70 serves as a means to lift the belt 10 and a piece of work thereon up against treating tools in a treating zone located to the right of the wheels 24 and 26, as those wheels are viewed in Fig. 1.

For a clear understanding of the invention Figs. 1, 2 and 3 should be considered together. As stated above, one switch 34 and one detector may be all that is necessary to detect the oncoming work pieces or be displaced by them. However, where highly irregular shaped sheet material, such as hides, is to be treated it may be well to use one switch with its detector and appropriate rolls 24 and 26 at one side of the top of belt 10 and another switch 36 and its corresponding detector on the other side of the top of belt 10. As conveyor belt 10 moves to the right at a constant speed by power means (not shown) the hide 12 is carried therewith and lifts the wheel 26, causing the top end of element 22 to move to the right, as shown in Fig. 1. Stop 30 thereby closes the switch 34 causing the motor 40 to rotate and as a result the timing disk 44 begins to turn in a clockwise direction, as shown by the arrow. As the timing disk starts to turn, the ridge 46 causes the switch 56 to close, the hide continues to travel forward and under both detector rolls 24 and 26, causing the switch lever 28 to return to neutral position and open the switch 34. However, the momentary tilting of element 22 has caused the motor 40 to start and when switch 34 is subsequently opened, current to the motor is maintained through the switch 56 by means of the ridge 46. The timing disk 44 continues to rotate in a clockwise direction for a predetermined time delay after which the plates 52 and 54 cause the switch 58 to close, thereby initiating treatment of the work by sending current through solenoid 66. This time delay permits travel of the work piece from its place of detection to the required place in the treatment zone i. e., it permits the measuring off from the leading edge of the work piece a predetermined amount of material before treatment of that work piece is initiated. The position of the disk at this time (beginning of treatment of a work piece) is shown in Fig. 2. The motor and timing disk continues to turn until the neutral space 72 between ridges 46 and 48 comes under the switch 56, as shown in Fig. 3. This breaks contact and stops rotation of the motor and timing disk. The time delay plates 52 and 54 remain in position pushing the plunger of switch 58, which switch is thereby in contact and causes current to continue to pass through the solenoid 66, i. e. to continue treatment of the work piece. As the hide 12 moves forward on the conveyor belt 10 and its trailing edge comes from beneath the detector roll 26 it causes switch lever 28 to swing to the left, operating switch 34 or 36 or both, as the case may be, and starting the motor and timing disk again. Ridge 48 then operates the switch 56 and keeps the motor 40 rotating after both detector rolls 24 and 26 are away from the hide and rod or rods 28 are in neutral position. As the timing disk rotates away from its position shown in Fig. 3, switch 58 is open as plates 52 and 54 release the switch plunger (after a predetermined time determined by the adjustment of bolts 50 and 51 and plates 52 and 54) and cuts off current through the solenoid 66, terminating a continuous treating operation on a given piece of work. The motor and timing disk continue to rotate as switch 56 is contacted by ridge 48, and such rotation continues until neutral space 74 has come back to its starting position under switch 56, as shown in Fig. 1. In such position, contact is broken, the motor 40 stops its rotation and the detector is ready to detect the next sheet of material or hide to be treated.

A modification of the disk and motor drive is shown in Fig. 4. Instead of having a separate motor and gear box as shown in Fig. 1, a combined motor and gear box 76, which is a commercial product now on the market, is mounted within a compact and unitary casing 78. This casing 78 can be easily mounted in any place convenient on or near the machine to which the invention is to be applied. The motor gear drives a shaft 80 to which is fixed a timing disk 82 having spaced ridges 84 and 86 thereon similar to the ridges 46 and 48 on the disk 44 of Fig. 1. Arcuate plates 88 and 90 are adjustably mounted by means of bolt 92 and slots 94 and 96 upon the periphery of the disk 82. One end of plate 88 is rounded and one end of plate 90 is rounded, permitting smooth axial contact with the button

of the microswitch **58**. The disk of Figs. 4 and 5 may be calibrated, as shown, to give units of time. Such calibration is also shown on the disk **44** of Fig. 1. A glass window **98** may be placed in the casing **78** to enable the operator to read the setting.

In Fig. 6 is shown a portion of the conveyor belt and other parts of a putting-out machine as disclosed in the application No. 485,001. The figure also shows the application of a detector, such as shown in the present Fig. 1, and a unitary timing disk box **78** is shown in Fig. 4. A few of the putting-out tools **100** of the Edgar machine are shown to represent the treating zone. Such tools move in the direction shown by the arrows. The detector device with its switch rod **28** is suitably mounted on transverse bars **102** and **104** rigidly connected with sides of a table **106**. In the Edgar machine the tools **100** are mounted for operation in a fixed or stationary horizontal plane. The conveyor belt **10** and its backing-up table **106** are normally below the said plane. To make the action of the treating tools **100** effective on a hide, the table **106** is caused to move upwardly to press the hide **12** against the moving tools **100**. This upward movement has no effect on the action of the detector as the detector moves with the table. As the conveyor continues to move, the entire hide is treated by the tools. As the treating zone in such a machine is highly congested with treating tools, it is impractical to space the detector device in that zone. Also, as hides and skins vary in size and are irregular in shape, it is clear that the time of application of the tools to various hides must vary. The tools **100** pull outwardly on the hide in six directions and if the table **106** is lifted too early or kept up for too long a period some of the tools may cause the hide to be whipped one way or another and damaged. It is essential in such a machine that the tools all pull evenly in the various directions on the hide until the entire hide is treated and as the hide is moving in the machine. It is also essential that the table **106** be promptly lowered when it is apparent that further movement of the hide through the machine will give some tools an undue pull on the hide. With the hide **12** in position, as shown in Fig. 6, switch **34** is open and the timing disk in box **78** is in a position such as shown in Fig. 2 or Fig. 3. Current is flowing through the solenoid **66** with the result that the hydraulic mechanism **106**, not herein described in detail since it is fully shown and described in the previously mentioned Edgar application Serial No. 485,001, has caused the lever **108** to swing to the right to lift and hold the table **106** in its uppermost or treating position which renders the tools **100** effective. The hide **12** is thoroughly treated after which the detector rolls detect the trailing edge of the hide while the timing disk is in the position shown in Fig. 3. After a predetermined length of time the plates **88** and **90** come from under switch **58** and the table **106** drops, terminating the treating operation before the tools have opportunity to scratch and damage the hide.

It is to be recognized that applicant's time delay mechanism can be useful in many types of installations, as stated earlier in the specification. It gives automatic control of non-instantaneous treatment of individual work pieces. The detector need not be located within the treating zone which zone may be of appreciable size, and the work pieces need not be fed at a regular rate. To suit a given installation, the lengths of the ridges **46** and **48** or **84** and **86** and the arcuate plates **52** and **54** or **88** and **90** can be varied. The diameter and rate of rotation of the timing disks also can be changed to give the desired timing.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a machine having a material treating zone of appreciable length and breadth, means for conveying material into the said zone, a single pivoted detector in combination with said conveying means adapted to be displaced by the forward and after portions of material about to enter said zone, material treating means in said zone, and means under control of the detector to render the said treating means effective upon a substantial portion of the material when a predetermined amount of the said material has entered the said zone.

2. In a machine having a material treating zone of appreciable length and breadth, means for conveying material at a uniform rate to the said zone, a single pivoted detector arranged to detect the leading edge of said material on the conveying means and about to enter the said zone, material treating means associated with said zone, and means under the control of the detector to measure off from the leading edge a predetermined amount of material and to make the said treating means effective upon a substantial part of the material in the zone when the said predetermined amount of material has entered the said zone.

3. In a machine having a material treating zone of appreciable length and breadth, means for conveying material to the said zone, a single pivoted detector arranged to detect the forward and after portions of said material on the conveying means and about to enter the said zone, material treating means associated with said zone, and means under the control of the detector to measure off from the forward portion a predetermined amount of material and to make the said treating means effective upon a substantial part of the material in the zone when the said predetermined amount of material is within the said zone and then upon the remainder of the material for a period of time determined by the detector and corresponding to the amount of material to be treated.

4. A time delay mechanism for use with a material treating machine, said machine having a conveyor adapted to convey material to a treating zone, said mechanism including a single pivoted detector adapted to be located in position to be displaced by the forward and after portions of material on the conveyor, and timing means associated with the detector and under control of the detector, said means being adapted to control treatment in the treating zone to make it effective upon the material when a predetermined amount is entirely within the zone and then for a period of time corresponding to the entire amount of continuous material to be treated.

5. A time delay mechanism for use with a material treating machine, said machine having a conveyor for conveying material to a treating zone, said mechanism including a detector adapted to be so located as to detect an amount of material on the conveyor, and time delay means associated with the detector and under the control of the detector, said means being adapted to control treatment in the treatment zone to make it effective upon the material when a predetermined amount of the material has fully

entered the zone and then in accordance with the entire amount of the continuous material to be treated.

6. A time delay mechanism for use with a material treating machine, said machine having a conveyor for conveying material to a treating zone, said mechanism including a detector adapted to be so located as to detect the forward portion of an amount of material on the conveyor and thereby close and open a first electric circuit, said detector also being adapted to detect the after portion of the said amount of material and thereby again close the first electric circuit, said mechanism also including a motor driven disk having spaced annular contact ridges and an arcuate plate thereon, an electric connection arranged to be operated by the said ridges, the motor being in the first circuit, the motor and said electric connection being in a second circuit, and a third electric circuit controlled by the arcuate plate and in turn adapted to control treatment of the material in the treatment zone.

7. A time delay mechanism for use with a sheet material treating machine, said machine having a belt conveyor for conveying sheet material to a treating zone, said mechanism including a detector adapted to be so located as to detect the leading edge of a piece of sheet material on the conveyor and thereby close and open a first electric circuit, said detector also being adapted to detect the trailing edge of the piece of sheet material and thereby again close the first circuit, said mechanism also including a motor driven disk having spaced annular contact ridges and an arcuate plate thereon, an electric connection arranged to be operated by the said ridges, the motor being in the first circuit, the motor and said electric connection being in a second circuit, and a third electric circuit controlled by the arcuate plate and in turn adapted to control treatment of the sheet material in the treatment zone.

8. A time delay mechanism as recited in claim 6, the arcuate plate being adjustable in length.

9. A time delay mechanism as recited in claim 6, the contact ridges and the arcuate plate controlling the circuits through switches by cam action.

10. A time delay mechanism for use with a material treating machine, said machine having a conveyor adapted to convey material to a treating zone, said mechanism including a detector adapted to be located in position to detect material on the conveyor, a unitary time delay means having a geared motor drive arranged to drive a timing disk, spaced cam surfaces on the said disk and switches of said unitary means adapted to be operated by the cam surfaces, one switch to operate the motor, one switch to control an electric circuit for operating the treatment in the treatment zone, and wiring to provide an electric circuit through the motor adapted to be opened and closed by the detector.

11. A time delay mechanism such as recited in claim 6 in which the motor and disk are included in a compact and unitary casing.

12. A time delay mechanism for use with a material treating machine, said machine having a conveyor adapted to convey material to a treating zone, said mechanism including a detector adapted to be located in position to detect material on the conveyor, said detector comprising a pivotally mounted element having rotatably mounted wheels on opposite sides of the pivot adapted to contact the material conveyed, a switch means arranged for operation by the pivotally mounted element, said mechanism also including a motor driven time delay means the motor being in circuit with the said switch means, said time delay means having an electrical circuit and contacts independent of the detector for driving the motor, and said time delay means having another circuit and contacts to control treatment in the treatment zone.

13. A time delay mechanism for use with a material treating machine, said machine having a conveyor adapted to convey material to a treating zone, said mechanism including a detector adapted to be located in position to detect material on the conveyor, a switch arranged for operation by the detector, said mechanism also including a motor driven time delay means, the motor being in circuit with the detector switch, said time delay means having an electrical circuit and contacts independent of the detector for driving the motor, and said time delay means having another circuit and contacts to control treatment in the treatment zone.

14. In a machine having sheet material treating means, a belt conveyor for conveying sheet material into position to be acted upon by said treating means, a detector arranged to detect sheet material on said conveyor during its movement into said position, a table to support the sheet material while in said position, and means under the control of the detector for causing relative movement of the table and said treating means to start the treating operation only after the sheet material has been moved into said position and then to terminate the treating operation after a lapse of time dependent upon the length of the material under treatment.

15. In a machine having sheet material treating means, a belt conveyor for conveying sheet material into position to be acted upon by said treating means, a detector arranged to detect sheet material on said conveyor during its movement into said position, a table to support the sheet material on said conveyor while in said position, means under control of the detector for causing relative movement of the table and said treating means and consequent treatment of the sheet material by the treating means after the sheet material has been moved into said position, said means under the control of the detector having a time delay means comprising a motor driven timing disk, spaced contact surfaces on the said disk, switches arranged to be operated by the contact surfaces, one to operate the motor and one to control an electric circuit for operating the relative motion of the table and treating tools and wiring to provide an electric circuit through the motor and arranged to be opened and closed by the detector.

16. A time delay mechanism for use with a material treating machine, said machine having a means for feeding material to a treating zone, said mechanism including a single detector adapted to be located in position to detect the forward and after portions of material being fed, electric connections under the control of the detector to operate the time delay mechanism, and a single independent electric circuit maintained by the said mechanism to control treatment in the treatment zone in accordance with the amount of material being fed to the machine.

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