Sheet material feeding and cutting device including feed roll for material driven by a motor through clutch and brake, for feeding sheet material such as paper from a roll. A knife is provided with driving means for operating the same in response to an electrical signal. The extent of movement of the feed roll is measured to thereby measure the amount of material fed. This may be provided by a shaft encoder which produces pulses for increments of movement of the feed roll, and a counter coupled to the encoder for counting the pulses. The counter can be manually preset to a particular number of pulses corresponding to a particular length of material, to operate a control circuit in response to the preset number of pulses. The control circuit operates the electrically operated clutch and brake to disengage the drive and to stop the movement of the feed roll. The control circuit also applies a signal to the drive for the knife to operate the same. Alternatively, a mechanical device coupled to the feed roll can move therewith and cooperate with a switch which is adjustably positioned in accordance with a preset length of sheet material. The switch operates the control circuit to actuate the clutch and brake, and the drive for the knife, in the same manner as when the shaft encoder and counter are used.

12 Claims, 10 Drawing Figures
SHEET MATERIAL FEEDING AND CUTTING APPARATUS AND CONTROL SYSTEM THEREFOR

BACKGROUND OF THE INVENTION

Reference is made to U.S. Pat. No. 2,668,705 issued Feb. 9, 1954 to Harry Rosenthal, which describes a sheet material feeding and cutting apparatus on which the present invention is an improvement.

Although prior sheet material feeding and cutting devices have been available, these devices have been relatively complex and expensive and have not been entirely suitable for use in many applications. The apparatus of the above referred to patent has been found to be highly useful in many applications, particularly where limited numbers of different lengths of sheet material are desired. However, to change the setting of the feeding mechanism to cut a different length of material than any of the preset lengths is a relatively complicated operation which cannot generally be performed by the operator of the device. Also, prior devices have not operated with the speed desired, and have not cut sheets with the desired accuracy.

It is also desired in certain applications to automatically cut a number of sheets of material to the same length. With prior equipment, it is necessary for the operator to control a switch after each sheet is cut to initiate the next operation. It may also be desired to continuously feed a length of sheet material as long as the control is operated, rather than set the device to cut a previously preset length. Separate controls of the feeding and cutting are desired in some applications.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved sheet material feeding and cutting device which is highly flexible in its mode of operation.

Another object of the invention is to provide a sheet material feeding and cutting device including a control for presetting the length of material to be fed which can be easily reset to any desired length.

A further object of the invention is to provide a sheet material feeding and cutting device including a shaft encoder for producing pulses indicating incremental movement of the feed roll which is electrically coupled to a counter, which is manually set to a predetermined number of pulses, to actuate the control system for stopping the feeding of the material and for cutting the same.

Still another object of the invention is to provide a mechanical device coupled to the feed roll and having a part moving in relation to the sheet material fed to engage a mechanical element which is preset to a particular position associated with a length of material to operate a switch to actuate the control circuit.

A still further object of the invention is to provide an automatic sheet feeding and cutting device having a control system controlling the feeding and cutting operations which can provide separate control of the feeding and cutting operations and which can provide automatic operation to repeatedly feed and cut any desired number of sheets.

In practicing the invention, a sheet material feeding and cutting device is provided for feeding sheets from a roll of material, including a control system providing flexible operation of the device in various modes. An automatic length determining arrangement is provided which can be preset by the operator of the device to various desired lengths for automatic feeding and cutting of sheets to such length. The device can be operated to cut a single sheet, or to repeatedly cut sheets of the preset length. The device can also be operated to continually feed material until the desired length has been fed and the cutting operation can be operated when desired.

The length can be determined by a shaft encoder coupled to the feed roll for the sheet material and a counter which receives the pulses from the shaft encoder and which is preset to a predetermined number of pulses. The counter produces a signal when the preset number of pulses is received to actuate the control system to stop the feed and actuate the cutting mechanism. Alternatively, a mechanical device coupled to the feed roll can move in accordance with the movement of the feed roll, and cooperates with a switch which is adjustably positioned in accordance with the length of material to be fed. The positioning of the switch, like the setting of the counter, can be performed by the operator of the device so that it is not necessary to have a maintenance man set the length. The switch is operated when a preset length has been fed to stop the feed and operate the cutting mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the feeding and cutting device of the invention;

FIG. 2 is a schematic drawing illustrating the device;

FIG. 3 is a block diagram of the system of FIG. 1;

FIG. 4 is a circuit diagram of the control circuit of the system of FIG. 3;

FIGS. 5, 6 and 7 show the cutting mechanism of the feeding and cutting device; and

FIGS. 8, 9 and 10 illustrate a second embodiment of the length control mechanism.

DETAILED DESCRIPTION

In FIGS. 1 and 2 there is illustrated generally the sheet feeding and cutting device of the invention. FIG. 1 is a perspective view showing the housing 10 with a roll cover 12 having a slot 13 from which the sheet 14 is fed. A control unit 15 is provided at one side of the housing for controlling the operation of the device.

FIG. 2 is a schematic showing of the mechanism of the paper feeding and cutting device. A roll of sheet material such as paper 16 is provided within the bottom of the housing 10 from which paper is fed to feed roll 18. A strap 17 having a weight on the end may engage the roll of paper 16 to provide a drag thereon. A pressure roller 19 holds the paper against the feed roll 18, which may have a rubber surface to provide the required traction. The paper is fed out under fixed knife 20 and over movable knife blade 21, and out through the slot 13 in the cover 12. It may be desired to provide a table 24 in front of the housing 10 onto which the cut sheet material is stacked. Provision can be made for applying a stream of air through slot 22 in the top wall of the housing 10 (FIG. 1) so that the cut sheets float on a layer of air.

In some cases it may be desired to use a larger roll of sheet material than can be placed within the housing. In such case a frame 26 can be provided back of the housing 10 on which a larger roll 28 of material is positioned. A strap 29 having a weight at one end can be placed over the paper roll 28 to provide drag thereon.
The paper is fed from the frame 26 to the feed roll 18, as indicated by the dotted line.

In FIG. 1 there is shown by dotted lines the approximate position within the housing of the mechanism for operating the feed roll 18 and the movable knife blade 21. This includes a feed motor 30 which has a shaft coupled to the clutch and brake mechanism 32 which in turn drives the feed roll drive 34, which may include gears for reducing the speed and providing a right angle drive. At a lower level within the housing is a second motor 36, which is designated the cut motor, which operates through clutch 38 to power the knife drive 39, which includes gears and arms for operating the blade 21, as will be described.

FIG. 3 is a further schematic showing of the device, with a block diagram of the system. The sheet material feed roll 18 is rotated by feed roll drive 34. The drive 34 is selectively rotated by motor 30 through the clutch-brake unit 32. The motor may be continuously operating, with the drive applied to the feed roll drive by engagement of clutch 32, which is electrically operated. When it is desired to terminate the drive, the clutch will be disengaged and the brake part of the unit 32 operated to stop the feed roll drive 34. For cutting the paper, the motor 36 operates through clutch 38 to operate the knife drive 39, which will be further described.

For indicating when the desired length of sheet material is fed, a shaft encoder 40 is provided having a drive wheel 42 which engages the feed roll 18. As previously stated, the feed roll 18 may have a rubber surface so that it will provide the required friction with the sheet material, and this will also be effective to drive the wheel 42. The shaft encoder may be of known construction which produces a pulse in response to each increment of movement of the drive wheel 42. A shaft encoder identified as Model No. 86, manufactured by Disc Instruments, Inc., Santa Ana, Calif. can be used in this application. This is representative of other commercially available shaft encoders. The shaft encoder may provide 1,000 pulses for each complete rotation of the wheel 42, and the wheel may have a circumference of 10 inches. Accordingly, for each inch of movement of the wheel 42, which corresponds to an inch of movement of feed roller 18 and to the feeding on an inch of the sheet material, 100 pulses will be produced. That is, a pulse will be produced for each one hundredth of an inch of sheet material fed.

The shaft encoder 40 is electrically connected to counter 45 which counts the pulses therefrom. The counter may be a standard counter identified as Model CT4140 manufactured by the Eagle Signal Division of Gulf and Western Corporation, Davenport, Iowa. Other known counters can be used. The counter is arranged for four digits and can count up to 9,999 pulses. The counter is capable of being preset, having pushbuttons 46 which set the numbers for the digits of the count. The counter is shown to be set at 1355. Each pushbutton 46 operates a mechanism to rotate an indicator wheel, which indicates the number to which a digit is set. Each pushbutton 46 actuates the presetting mechanism for the digit which is registered directly above the pushbutton. If it is desired to change the units number of the count, it is merely necessary to push the button 46 then until the desired number appears on the indicator. The counter will operate in response to applied pulses to provide a control signal when the number of pulses to which it is set have been received. In the case illustrated, the counter will produce an output when 1,355 pulses have been received. This will correspond to the feeding of 13.55 inches of sheet material.

The output of the counter actuates control circuit 50 which may include a number of manual controls to provide different modes of operation. These switches include a main power on/off switch 51, a two position manual-automatic switch 52, pushbutton length switch 54, pushbutton cut switch 55 and pushbutton feed switch 56. A foot switch 57 can be connected to the control circuit to be operated in parallel with the length switch 54. The counter 45 and switches may be provided in the control unit 15 in FIG. 1, and are indicated thereon by the same numbers. A socket 58 is also provided on the control unit 15 for connection of a foot switch.

When the switch 52 is in the manual position, operation of the length switch 54 will cause the control circuit to provide the feeding and cutting of a sheet of material of the length set into counter 45. The same operation would be provided by operation of the foot switch 57. The feed switch 56 will cause continuous feeding of the sheet materials as long as this pushbutton switch is held operated. This can be used to feed paper until an amount deemed sufficient by visual observation has been fed. The cut switch 55 can be operated to cut the paper which has been fed, since the paper is not automatically cut when the feed switch 56 is released.

When the switch 52 is in the automatic position, it will continuously feed and cut lengths of sheet material as set into counter 45. An additional batch counter may be included in the controls to set the number of such operations which are to be provided. The operation of the control circuit will be described in more detail in connection with the circuit diagram of FIG. 4.

FIG. 4 shows the complete circuit diagram of the control circuit 50 in the system of FIG. 3. Alternating current from a standard supply is applied through on/off switch 60 to the feed motor 30 and the cut motor 36. These motors operate continuously when the switch 60 is turned on. Alternating current power is also applied to the direct current power supply 62, which provides a positive DC potential on line 63 and a negative DC potential on line 64. The energization of the clutch and brake unit 32 for the feed roll 18, and the clutch 38 for the knife drive 39 are controlled by the control circuit which includes three relays, length relay 75, feed relay 65 and cut relay 70. The control switches in FIG. 3 are connected in the circuit of FIG. 4. The shaft encoder 40 may be energized from the DC power supply 62.

Assuming that the manual-automatic switch 52 is in the manual position, which is shown by dotted line, operation of the length switch 54 (or foot switch 57) will apply current to energize the winding 76 of the length relay 75. This circuit is established through the connection from conductor 63 through the normally closed switch 47 in the counter 45 to one side of the winding 76, and through the connection from conductor 64 through normally closed interlock switches 80 and 81, the normally closed contacts 72 of relay 70, the manual-automatic switch 52 connection previously mentioned, and length switch 54 to the other side of winding 76. Operation of length relay 75 closes contacts 77 and 78 thereof, with the contact 77 establishing a hold-
ing circuit, and contact 78 energizing the winding 66 of feed relay 65. The other side of winding 66 is directly connected to conductor 63.

Operation of feed relay 65 closes contacts 67 thereof to provide a connection from conductor 63 through rheostat 82 to terminal 83 of the clutch-brake unit 32.

The common terminal 84 of the clutch-brake unit 68 is connected to conductor 64 through the interlock switches 80 and 81. The application of the positive potential to terminal 83 energizes the clutch of the unit 32 so that the motor 30 will actuate the feed roll drive 34 to operate the feed roll 18.

The drive of the feed roll 18 will continue until the number of pulses to which the counter 45 is set is applied thereto from encoder 40. At that time, the counter 45 will open contacts 47 to de-energize the length relay 75. The contacts 78 of relay 75 will open to release the feed relay 65. Release of relay 65 will open contacts 67 thereof to remove the connection through rheostat 82 to terminal 83 of the clutch-brake unit 32. This will release the clutch to disconnect the motor 30 from the feed roll 18. Release of relay 65 will also cause movable contact 68 to engage its normally closed contact to complete a circuit from conductor 63 through the normally closed contact of feed switch 56 and rheostat 85, to terminal 86 of the clutch-brake unit 32. This will energize the brake of the clutch-brake unit 32 to rapidly stop the feed roll 18.

The cut relay 70 is energized when the feed relay 65 pulls in, with the connection being established to one side of the winding 71 thereof from conductor 63 through interlock switches 80 and 81 and the knife cycle switch 88, which is normally closed. A connection is completed to the other side of winding 71 from conductor 63 through closed contacts 68 and 69 of relay 65. This opens the contacts 72 of relay 70, so that another length cycle cannot be initiated. Movable contact 73 moves to engage its normally open contact to provide a holding circuit for the relay 71. Contact 74 also moves to its normally open contact to establish a circuit through rheostat 89 to the clutch 38 for operating the knife drive 39. However, movable contact 74 is not opened by action of the cut relay 70, and normally closed feed switch 56, and contact 68 of relay 65 is open, since the feed relay 65 is energized.

When the feed relay is released, as by operation of the switch 47 and the relay 75, contact 68 establishes a connection from conductor 63 which is completed through feed switch 56 to the movable contact 74 of the cut relay 70. This energizes the cut clutch 38 to actuate the knife drive 39. The knife drive is coupled to the knife cycle switch 88 to open the same after the knife has operated. When this switch 88 opens, the connection to the clutch 38 is opened to disengage the clutch, and the connection to winding 71 of cut relay 70 is broken, to de-energize this relay.

When the switch 52 is set on automatic, the batch counter 90 will close a switch in parallel with the length switch 54, and this circuit will be held closed until the counter 90 counts to the number of sheets which has been set. The batch counter 90 may be of the type manufactured by Hecon Corporation, Eatontown, N.J.

In the event that it is desired to feed sheet material without cutting the same, the switch 56 is operated and held operated as long as it is desired to feed material. This switch opens its upper normally closed contacts, and closes its lower normally open contacts. The lower contacts apply the positive potential derived from conductor 63 through normally closed contacts 73 of cut relay 70 through rheostat 82 to the terminal 83 of clutch-brake unit 32. When the switch 56 is released, the positive potential from conductor 63 is applied through normally closed contacts 68 of feed relay 65, and the upper normally closed contacts of switch 56, and through rheostat 85, to terminal 86 of the clutch-brake unit 32 to operate the brake to stop the feed roll.

The cut switch 55 has two normally open contacts which when closed connect the two sides of winding 71 of the cut relay 70 to conductors 63 and 64 of the direct current power supply. This causes the relay 70 to operate and move contact 74 to apply potential through rheostat 89 to the clutch 38 for operating the knife drive. This circuit is completed through normally closed contacts 68 of feed relay 65, so that it cannot energize the clutch 38 when the feed roll 18 is being driven. As previously stated, the knife cycle switch 88 will open when the knife has completed its operation to de-energize the clutch 38.

The jam up switch 80 is positioned adjacent the feed roll 18 and the fixed knife blade 20, and is arranged so that sheet material jammed up at this point will operate the switch 80 to open the circuit and de-energize the control circuit. This is illustrated in Fig. 6, and will be described in more detail. Similarly, the roll cover switch 81 is positioned adjacent the cover 12 at the top of the housing, and will open when the cover is open to disable the control circuit.

In Fig. 4, there is shown a second switch 92 which may be controlled by the counter 45. The counter operates to close this switch at a point shortly before the end of the count; that is, in response to a number of pulses somewhat less than the number at which contacts 47 open. This will apply potential to an auxiliary brake unit 95 which may be connected to the feed roll 18 at the end thereof opposite to the drive 34. This can be a slow acting brake which will provide initial braking of the feed roll 18 so that it slows down, and at the time the desired amount of material is fed and switch 47 opens, the feed roll 18 can be stopped more accurately by the braking through rheostat 85. The cut of clutch-brake unit 32 can also be released by the operation of switch 92, so that power to the drive 34 is removed when the brake 95 is applied.

Figs. 5, 6 and 7 show in more detail the construction of the knife mechanism, which is represented generally by the fixed knife blade 20 and movable knife blade 21 in Fig. 2. As shown in Fig. 5, the movable blade 21 has a slanting top surface so that the point 21a first cuts the sheet material, and the remainder of the blade follows in the manner of shears. Fig. 6 shows the fixed blade 20 mounted on the frame structure 98 of the housing 10. A plate 99 supports the sheet material fed from roll 18 to a position under the fixed blade 20. The movable blade 21 is supported on a pivotal mount 100 which is pivoted at point 101 to hinged arm 102. As shown in Fig. 5, arms 102 are provided at both ends of the mount 100. Each arm 102 is hinged at point 103 to the frame of the housing. A spring 104 biases the blade mount 100 so that the movable blade 21 will bear resiliently against the fixed blade 20. The arm 102 is driven by a link 105 secured to an eccentric 106 which operates on shaft 107, which is driven by the knife drive unit 39 (Fig. 5). When the drive unit is energized, the shaft 107 will rotate to move the links 105 by action of ec-
centrics 106 so that the arms 102 are pivoted upwardly and move the blade 21 upwardly. This acts to shear the material which is positioned between the movable blade 21 and the fixed blade 20, as indicated in FIG. 2.

In order to control the position of the movable blade 21 so that it bears properly against the fixed blade 20, an eccentric cam 110 is provided at one end of the fixed blade 20, as shown in FIGS. 5 and 7. The top edge of the end 21a of the movable blade 21 bears against the cam 110, and by rotating the cam thereof the edge of the movable blade 21 can be positioned so that the end 21a is properly positioned with respect to the fixed blade 20.

FIG. 6 shows the pivotal support 108 for the pressure roll 19, which is pivotally mounted on frame 98. Under this support, and also pivotally mounted on frame 98 is a plate 109 under which the sheet material fed passes.

In the event that the sheet material jams up between the feed roll 18 and the knife blades, it will force the hinged plate 109 upward. The jam up switch 80 has an actuator engaging the plate 109, and when the plate 109 moves up, the switch 80 will open to disable the control circuit. This prevents further feeding of sheet material until the condition is cleared and switch 80 is again closed.

FIGS. 8, 9 and 10 show an alternate construction for measuring the length of material fed to operate the control circuit to terminate the feed and operate the cutting mechanism. In this structure, a clutch 112 is secured to the feed roll drive 34 and may rotate at the speed of the feed roll 18 or at a slower speed, as may be desired in a particular application. The feed roll drive mechanism 34 will include gears to change the speed of the roll with respect to the speed of the motor, and this may also include gears to drive the clutch 112 at a desired speed with respect to the feed roll 18. The clutch 112 when energized moves a disc 114 therewith, which has a finger 115 on its outside face. The finger 115 is shown in FIG. 9 at its normal position engaging stop 117, preceding an operation. The disc 114 is returned to this normal position by a spring 116 which surrounds the disc.

When the feed roll 18 operates to feed the sheet material, the clutch 112 is energized so that the disc 114 will rotate therewith in the direction shown by the arrow. When the finger 115 engages the actuator of normally closed switch 118, this switch will open to operate the control circuit 50 to stop the feeding of the material, as has been described. The clutch 112 will release, and the disc 114 will be returned to its normal position, with finger 115 in engagement with fixed stop 117, which is supported on the frame.

Although the measuring system of FIGS. 8, 9 and 10 which includes clutch 112 is an alternate to that shown in FIG. 3 which includes the shaft encoder 40 and counter 45, and both systems will not be used at the same time, the connection of the clutch 112 is shown in dotted lines in the circuit diagram of FIG. 4. During the feeding operation, the clutch 112 is energized from conductor 63 through contacts 67 of feed relay 65, and from conductor 64 through interlock switches 80 and 81. This circuit remains energized until the switch 118 is operated by finger 115. The switch 118, which operates when the desired length of material has been fed in the system of FIGS. 8, 9 and 10, can be used as the switch 47 shown in the control circuit of FIG. 4.

To permit setting of the length of material which is to be fed, the switch 118 is mounted on a drum 120 (FIG. 9), which is mounted for rotary movement about the axis of the disc 114. This movement may be accomplished by the provision of a chain drive wheel 121 on the end of the drum 120, which is driven by a chain 122 from a second drive wheel 123. The drive wheel 123 is secured to a larger gear 124 having a top edge which extends through an opening in the top wall of the housing 10 (FIG. 10). The edge of gear 124 forms a thumbwheel for engagement by the operator to move the position of drum 120. A vernier drive can be provided by a second thumbwheel 125 which is secured to a small gear 129 which meshes with the gear 124. The thumbwheel 125 also extends through the top wall of the housing for access by the operator. A brake 127 can be provided to lock the wheels 124 and 125 so they will not move from the position set.

The drum 120 can have a scale 126 on its outside periphery which is viewed through an opening 128 in the top wall of the housing (FIG. 10). Accordingly, the length of material that the machine is set to feed and cut is readily observed as the thumbwheels 124 or 125 is operated to set the length.

It will be apparent that the length determining mechanism including the thumbwheels 124 or 125, and the drum 120 with the scale 126, can be at a position remote from the drive roll 18 by the use of gears or a belt, chain or cable drive, as may be desired.

The feeding and cutting device of the invention has been found to be highly effective to rapidly cut accurately measured lengths of sheet material. The device is quite flexible in operation and can be used in various different manners. The apparatus for controlling the length of material fed can be easily adjusted for any desired length. This applies both to the shaft encoder-counter arrangement described, and to the mechanical finger operated switch mechanism wherein the switch can be readily moved to change the length setting.

We claim:

1. Apparatus for feeding and cutting measured amounts of sheet material, including in combination, feeding means for the sheet material including a feed roll, first drive means coupled to said feed roll, second drive means coupled to said cutting means, said cutting means including a fixed blade and a movable blade, means for supporting said movable blade including arm means coupled to said second drive means, and a mounting for said movable blade pivotally coupled to said arm means and including spring means for biasing said movable blade against said fixed blade, measuring means coupled to said feed roll and operating to provide an indication representing the movement of said feed roll, operating means coupled to said measuring means and responsive to said indication therefrom, said operating means including manually operated means for presetting the same to a predetermined length and operating to produce a control operation in response to said measuring means producing an indication of said predetermined length, and control means for controlling the operation of said first and second drive means and including switch means operative to initiate operation of said first drive means, said control means being coupled to
said operating means and being operative to render said first drive means inoperative and to render said second drive means operative in response to said control operation of said operating means.

2. Apparatus in accordance with claim 1 wherein said first drive means includes a motor, a feed roll drive, and a clutch and brake unit coupling said motor to said feed roll drive, and wherein said motor is normally operative and said control means actuates the clutch of said clutch and brake unit to initiate operation of said first drive means and de-energizes said clutch and energizes the brake of said clutch and brake unit to render said first drive means inoperative.

3. Apparatus in accordance with claim 2 wherein said operating means produces a preliminary operation in response to said measuring means producing an indication of a length less than said predetermined length and including further brake means coupled to said feed roll and means coupling said operating means to said further brake means to actuate said further brake means in response to said preliminary operation of said operating means.

4. Apparatus in accordance with claim 1 wherein said measuring means includes a shaft encoder having a drive wheel engaging said feed roll, said shaft encoder producing pulses in response to incremental movement of said feed roll, and wherein said operating means includes a counter responsive to said pulses and switch means controlled by said counter and connected to said control means for actuating the same to render said first drive means inoperative and to render said second drive means operative.

5. Apparatus in accordance with claim 1 wherein said control means includes further means for causing operation of said first drive means independent of said operating means.

6. Apparatus in accordance with claim 1 wherein said control means includes further means for causing operation of said second drive means independent of operation of said operating means.

7. Apparatus in accordance with claim 1 wherein said control means includes a hinged member adjacent the passage for sheet material between said feeding means and said cutting means and adapted to be moved by sheet material becoming jammed in said passage, and switch means coupled to said hinged member for disabling the control means in response to movement of said hinged member.

8. Apparatus in accordance with claim 1 wherein said cutting means includes eccentric positioning means in engagement with said movable blade for positioning the same with respect to said fixed blade.

9. Apparatus for feeding and cutting measured amounts of sheet material, including in combination, feeding means for the sheet material including a feed roll, first drive means coupled to said feed roll, cutting means for cutting off the sheet material fed, second drive means coupled to said cutting means, said cutting means including a fixed blade and a movable blade, means for supporting said movable blade including arm means coupled to said second drive means, and a mounting for said movable blade pivotally coupled to said arm means and including spring means for biasing said movable blade against said fixed blade, measuring means coupled to said feed roll and operating to provide an indication representing the movement of said feed roll, operating means coupled to said measuring means and responsive to said indication therefrom to produce a control operation in response to said measuring means producing an indication of said predetermined length, and control means for controlling the operation of said first and second drive means, said control means being coupled to said operating means and being operative to render said first drive means inoperative and to render said second drive means operative in response to said control operation of said operating means.

* * * * *
REEXAMINATION CERTIFICATE (774th)
United States Patent [19]

[54] SHEET MATERIAL FEEDING AND CUTTING APPARATUS AND CONTROL SYSTEM THEREFOR

[75] Inventors: Ben J. Rosenthal, Skokie; Earl Matsouka, Park Ridge, both of Ill.


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83/522; 83/624; 83/628; 83/699

[58] Field of Search .................. 83/63, 64, 208, 210,
83/241, 264, 522, 528, 624, 628, 699, 416, 583,
584, 640, 204, 205

References Cited
U.S. PATENT DOCUMENTS
858,078 5/1907 Knowlton .................. 83/582
1,249,221 12/1917 Skeen .................. 83/208
1,392,546 5/1922 Hawkins .................. 83/582
1,405,472 7/1927 Gueuther .................. 83/592
1,409,007 7/1927 Ohmer .................. 83/582
2,477,295 7/1949 Garwood .................. 83/564
2,527,739 10/1950 Knabusch et al. ........... 83/208
2,629,440 7/1946 Shaw .................. 83/243
2,664,820 1/1955 Levetus .................. 83/624
2,668,705 2/1954 Rosenthal ..............
2,735,055 2/1956 Thomas .................. 83/208
2,866,428 12/1958 Stanfield et al. ........ 83/369 UX
3,029,775 4/1962 Nicholson .................. 83/64 X
3,177,748 4/1965 Rosenthal ..............
3,282,141 11/1966 Gautron .................. 83/640 X
3,299,756 1/1967 Rosenthal ..............
3,371,569 3/1968 Pearson et al. ........... 83/582
3,386,629 6/1968 Rosenthal ..............
3,397,603 8/1968 Griswold .................. 83/264 X
3,481,520 1/1970 Pickering ..............
3,556,368 1/1971 René ..................
3,673,906 7/1972 Cash ..................
3,695,133 10/1972 Finke .................. 83/241 X
3,707,255 12/1972 Ridgeway et al. ....... 83/208 X

FOREIGN PATENT DOCUMENTS

OTHER PUBLICATIONS
"Kolbus Instruction Manual" printed in 1969 or before.

“Knowlton” printed in 1922.
Primary Examiner—Frank T. Yost

[57] ABSTRACT
Sheet material feeding and cutting device including feed roll for material driven by a motor through clutch and brake, for feeding sheet material such as paper from a roll. A knife is provided with driving means for operating the same in response to an electrical signal. The extent of movement of the feed roll is measured to thereby measure the amount of material fed. This may be provided by a shaft encoder which produces pulses for increments of movement of the feed roll, and a counter coupled to the encoder for counting the pulses. The counter can be manually preset to a particular number of pulses corresponding to a particular length of material, to operate a control circuit in response to the preset number of pulses. The control circuit operates the electrically operated clutch and brake to disengage the drive and to stop the movement of the feed roll. The control circuit also applies a signal to the drive for the knife to operate the same. Alternatively, a mechanical device coupled to the feed roll can move therewith and cooperate with a switch which is adjustably positioned in accordance with a preset length of sheet material. The switch operates the control circuit to actuate the clutch and brake, and the drive for the knife, in the same manner as when the shaft encoder and counter are used.
REEXAMINATION CERTIFICATE
ISSUED UNDER 35 U.S.C. 307

THE PATENT IS HEREBY AMENDED AS
INDICATED BELOW.

Matter enclosed in heavy brackets [ ] appeared in the
patent, but has been deleted and is no longer a part of the
patent; matter printed in italics indicates additions made
to the patent.

AS A RESULT OF REEXAMINATION, IT HAS
BEEN DETERMINED THAT:

The patentability of claims 9–10 is confirmed.

Claims 1–8 and 11 are cancelled.

Claim 12 is determined to be patentable as amended.

New claims 13–16 are added and determined to be
patentable.

12. Apparatus for feeding and cutting measured
amounts of sheet material, including in combination,
feeding means for the sheet material including a feed
roll, first drive means [coupled to] for said feed
roll, said drive means including a first slow-acting
brake means and a second brake means,
cutting means for cutting off the sheet material fed,
second drive means coupled to said cutting means,
said cutting means including a fixed blade and a
movable blade, means for supporting said movable
blade including arm means coupled to said second
drive means, and a mounting for said movable
blade pivotally coupled to said arm means and
including spring means for biasing said movable
blade against said fixed blade,
measuring means coupled to said feed roll and operat-
ing to provide an indication representing the move-
ment of said feed roll, operating means coupled to
said measuring means and responsive to said indica-
tion therefrom to produce a preliminary signal and
control operation in response to said measuring
means producing an indication of said predetermined
length, and
cut control means for controlling the operation of said
first and second drive means, said control means
being coupled to said operating means and being
operative to render said first drive means inoper-
ative in response to said preliminary signal to actuate
said first slow-acting brake means for slowing down
said feed roll and to render said second drive means
operative to actuate said second brake means to stop said feed roll and to
activate said cutting means,

13. Apparatus for feeding and cutting measured
amounts of sheet material, including in combination,
feeding means for the sheet material including a feed
roll,