C. F. PFLANZE.

SAFETY DEVICE FOR PAPER CUTTING MACHINES.

APPLICATION FILED JAN. 16, 1917.

1,332,856.

Patented Mar. 2, 1920.

2 SHEETS—SHEET 1.

FIG. I.

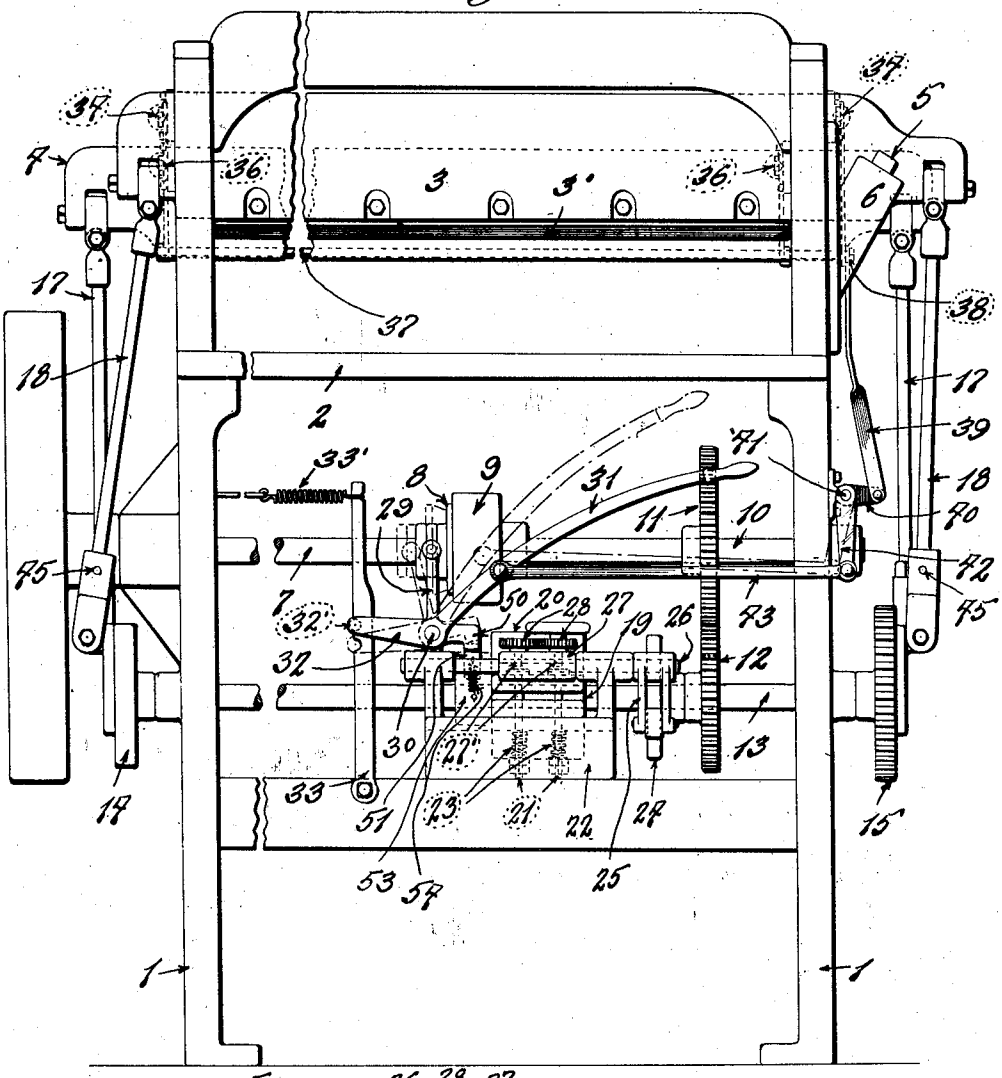


FIG. IV.

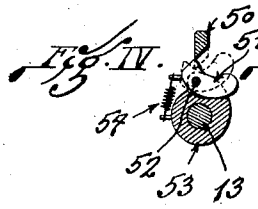
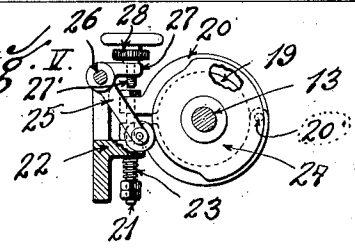


FIG. V.



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2 SHEETS—SHEET 2.

FIG. II.

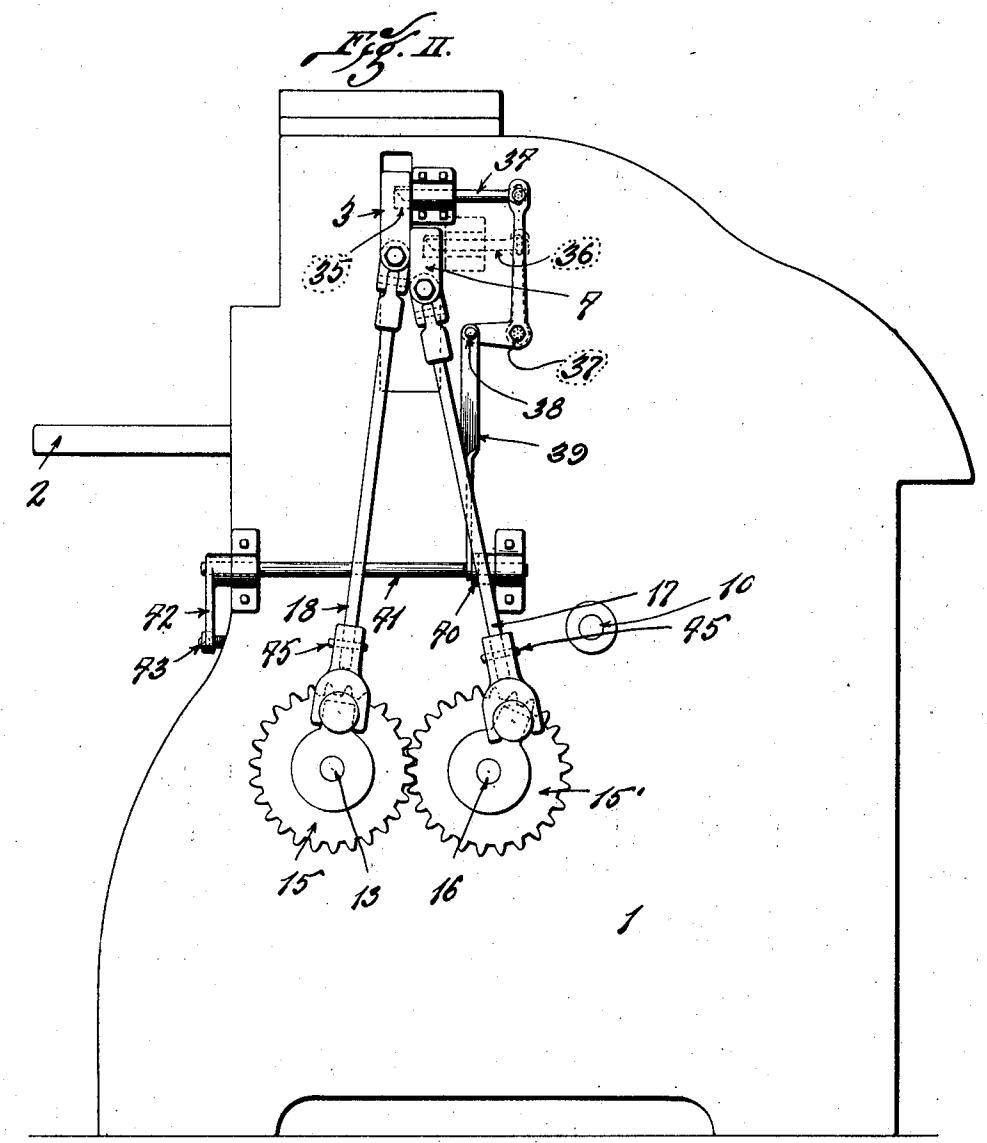
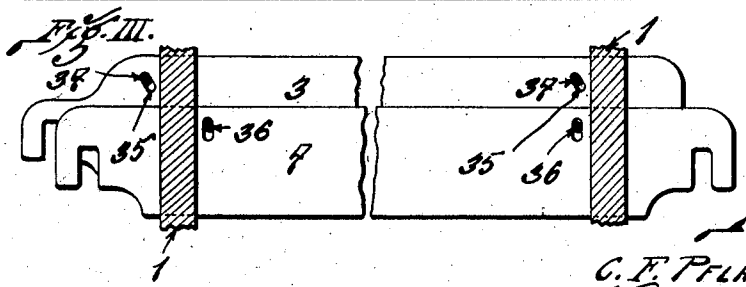


FIG. III.



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UNITED STATES PATENT OFFICE.

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SAFETY DEVICE FOR PAPER-CUTTING MACHINES.

1,332,856. Specification of Letters Patent. Patented Mar. 2, 1920.

Application filed January 16, 1917. Serial No. 142,598.

To all whom it may concern:

Be it known that I, CHARLES F. PFLANZE, a citizen of the United States of America, a resident of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Safety Devices for Paper-Cutting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to a safety device adapted to stop the knife or pressure bar of a paper cutting machine, but it is to be understood that the invention is not limited to such use. It may be used as a stop for the driven members of various different kinds of machines.

Prior to this invention, paper cutting machines have been provided with automatic stopping devices including an automatic clutch shifter for releasing the driven mechanism from the source of power, and an automatic brake for stopping the driven mechanism; the object being to stop the reciprocatory cutting elements in an elevated position after each cutting operation. The cutting elements usually include a large, heavy knife carrier and a heavy clamping bar or pressure bar which reciprocate in response to the rotary movements of cranks; and since accidental movements of these elements are liable to seriously injure the operator, great care has been exercised in designing the automatic stopping device. In actual practice, however, the brake and the clutch are not absolutely positive in the performance of their functions. They are liable to slip, especially after long continued service, and as a consequence, the operator is exposed to the danger of unreliable safety devices.

In accordance with the preferred form of my invention, the machine may be provided with the usual automatic stopping devices, and to compensate for the uncertain action of such devices, the new structure includes a safety device adapted to stop the cutting elements when the first mentioned devices fail to perform their functions. Briefly stated, the safety device hereinafter described is normally ineffective, but if the other stopping devices fail to stop the cutting elements, the safety device will then perform its function by serving as an absolutely positive stop for said cutting elements.

With the foregoing and other objects in view the invention comprises the novel construction, combination and arrangements of parts hereinafter more specifically described and illustrated in the accompanying drawings wherein is shown the preferred embodiment of the invention; however it is to be understood that the invention comprehends changes, variations and modifications which come within the scope of the claims hereunto appended.

Figure I is a semi-diagrammatical view of a paper cutting machine equipped with a safety device constructed in accordance with my invention.

Fig. II is a side elevation of the machine.

Fig. III is a fragmentary vertical section showing the knife carrier, the pressure bar and the stop pins which form part of the safety device.

Fig. IV is a fragmentary section illustrating the tripping device whereby the clutch shifter is actuated to release the clutch.

Fig. V is a fragmentary section illustrating the automatic brake.

The machine I have shown to illustrate the invention comprises side walls or frames 1 connected by a horizontal table 2 adapted to support the paper or other material below a knife carrier 3 and pressure bar 4. A knife 3′ is secured to the lower margin of the knife carrier. The pressure bar and knife carrier are adapted to reciprocate in the side walls or frames 1, as is well understood in this art, the pressure bar moving downwardly to clamp the paper (not shown) during the cutting operation. The knife carrier 3 has an inclined guide lug 5 (Fig. I) fitted to an inclined guide 6, so as to guide the knife in the usual manner.

The power mechanism (Fig. I) includes a power shaft 7 provided with a clutch member 8 movable toward and away from a driven clutch member 9. The driven mechanism comprises a shaft section 10 fixed to the clutch member 9, a gear wheel 11 fixed to said shaft section, a gear wheel 12 meshing with said wheel 11, a shaft 13 to which the

wheel 12 is fixed, and crank wheels 14 and 15 fixed to the respective ends of shaft 13. A shaft 16 (Fig. II) parallel with the shaft 13, is provided at its ends with crank wheels 15′ which are connected to the pressure bar 4 by means of connecting rods 17. The crank wheel 15′, at one end of shaft 16, is provided with teeth which mesh with teeth on the crank wheel 15. 18 designates rods connecting the crank wheels 14 and 15 to the knife carrier 3.

When the clutch member 8 on the power shaft engages the driven clutch member 9, power will be transmitted to the crank wheels at the ends of the shafts 13 and 16, and the pressure bar and knife carrier will reciprocate in response to the rotary movements of these crank wheels. I do not deem it necessary to show the means for allowing the shaft 16 to move independently of the pressure bar 4, such details being immaterial in so far as the present invention is concerned.

The automatic brake (Figs. I and V) comprises a brake drum 19 fixed to the shaft 13, a contractible friction band 20 surrounding said drum, said contractible band consisting of two semi-circular sections pivotally connected together at 20′, as shown in Fig. V. 21 designates bolts passing through lugs which extend from the semi-circular brake band sections, and also through a lug 22 formed on a stationary part of the machine. Light springs 23 (Fig. V), surrounding the respective bolts 21 at points below the lug 22, tend to force the brake band sections onto the friction drum 19. The springs 23 merely maintain the contractible brake band 20 in engagement with the friction drum 19; they do not cause any substantial braking action. The means for contracting the brake band 20 includes a cam 24 fixed to the shaft 13, a cam actuated arm 25 having a roller which engages the cam 24, a rock shaft 26 to which said arm 25 is rigidly secured, a relatively short arm or plate 27 fixed to the rock shaft 26, and a pair of abutment screws 27′ fitted to said arm or plate 27. A pair of gear wheels 28, secured to the abutment screws 27′, mesh with each other, as shown most clearly in Fig. I, so as to allow the abutment screws to be adjusted simultaneously. Referring to Fig. V, it will be observed that the cam 24 on the shaft 13, is adapted to actuate the elements 25, 26, 27 and 27′, so as to contract the brake band 20. This brake has two functions; (1) it prevents the heavy cutting elements from dropping very rapidly, by gravity, during the operation of the machine, and (2) it serves as a brake for stopping the cutting elements when the clutch member 8 is released from the clutch member 9.

The means for actuating the clutch comprises an ordinary clutch shifting arm 29 (Fig. I) fitted to the clutch member 8, and rigidly secured, at its lower end, to a shaft 30. A starting handle 31 (Fig. I), fixed to the shaft 30, may be actuated by hand for the purpose of engaging the clutch member 8 with the clutch member 9, thereby starting the machine. 32 designates a detent arm rigidly secured to the shaft 30 (Fig. I) and provided with a pin or roller 32′ adapted to enter notches in a retaining bar 33. This retaining bar is pivotally supported at its lower end. 33′ designates a spring connected to the upper end of the retaining bar 33, so as to yieldingly force said bar into engagement with the pin or roller 32′ which extends from the detent arm 32. When the clutch and clutch shifter occupy the positions shown by full lines in Fig. I, the pin or roller 32′ lies in the upper notch in the retaining bar 33, thereby yieldingly holding the clutch member 8 in engagement with the clutch member 9. When the clutch is released the clutch member 8 and the clutch shifter occupy the positions shown by dotted lines in Fig. I, and the pin or roller 32′ then lies in the lower notch in the retaining bar 33.

The means for shifting the clutch automatically, to stop the cutting elements in their elevated positions, comprises a finger 50 extending from the shaft 30 (Figs. I and IV) and adapted to be engaged by a tripping dog 51, the latter being pivotally connected at 52 to a collar 53 on the shaft 13. A spring 54 tends to retain the tripping dog 51 in the position shown by dotted lines in Fig. IV. When the cutting elements reach their elevated positions, the tripping dog 51 strikes the finger 50, thereby elevating said finger, as shown in Fig. IV, with the result of turning the shaft 30 to which the clutch shifting arm 29 is secured. This releases the clutch, and ordinarily causes the cutting elements to stop in their elevated positions, the automatic brake being applied immediately before the clutch is released.

In starting the machine, the starting handle is moved by hand to the position shown by full lines, thus forcing the clutch member 8 into engagement with the member 9. The cutting elements then move downwardly in response to the movements of the driving mechanism, thereafter moving upwardly to the starting position where they are stopped by the action of the automatic brake and clutch shifter.

The ordinary automatic stopping device, consisting of an automatic friction brake and an automatic clutch shifter, usually stops the cutting elements in a very satisfactory manner, but such devices are not absolutely reliable. If no additional safety device is used, the operator is exposed to the

risk of injury from the cutting elements when either the brake or clutch shifter fails to perform its function. To avoid this danger or risk, I have devised a safety device whereby the cutting elements are positively stopped when the brake or clutch shifter fails to accomplish the desired result.

The safety device I have shown to illustrate the invention comprises, a pair of horizontal stop pins or bolts 34 slidably mounted in bearings at the sides of the machine and adapted to enter elongated recesses 35 in the knife carrier 3. A second pair of pins or bolts 36 are adapted to enter elongated recesses in the pressure bar 4. A rock shaft 37, extending across the machine, is provided with a series of upright arms having their upper ends connected to the stop pins 34 and 36. The means for transmitting movement from the starting handle 31 to the rock shaft 37, comprises a short arm extending from said rock shaft (Fig. II), a link 39 connecting said arm to an arm 40, a rock shaft 41 to which the arm 40 is secured, an arm 42 fixed to said rock shaft 41, and a link 43 connecting said arm 42 to the starting handle 31. Since the starting handle 31 and the finger 50 (Fig. I) are both secured to the shaft 30, it will be apparent that all of the connections just described will be actuated by the tripping dog 51 when the latter strikes the finger 50. As a consequence, the pins or bolts 34 and 36 are automatically inserted into the cutting elements when the latter reach their elevated positions. When the starting handle 31 is shifted to the position shown by full lines in Fig. I, for the purpose of starting the machine, movement is transmitted from said handle through the link 43, arm 42, shaft 41, etc., to the stop pins 34 and 36, thereby withdrawing said stop pins from the cutting elements. When the automatic brake and clutch perform their functions properly, the stop pins are ineffective; they merely move into and out of the elongated slots in the cutting elements without in any way interfering with the movements of the machine. However, when the cutting elements fail to stop in response to the action of the clutch and brake, the stop pins positively stop the cutting elements and lock them in their elevated positions. In this event, some part of the machine may break, and to avoid the danger and expense of breakage at some uncertain point in the machine I preferably weaken the connections 17 and 18 by the use of relatively weak or frangible pins 45, as shown most clearly in Fig. II.

The stop pins or bolts 34 and 36 are preferably beveled at their inner ends (Fig. II) which lie adjacent to the cutting elements. If, on account of looseness in the connections, or for any other reason, a stop pin happens to project slightly into the path of a cutting element when the latter moves upwardly, the upper edge of the cutting element will strike the beveled end face of the projecting stop pin and force it out of the way without injuring any part of the machine.

I claim:—

1. A machine having an operating means, a driven member operable by said operating means, an automatic stopping device actuated by said operating means to stop said driven member, a manually controlled starting member associated with the aforesaid parts to provide for the starting of said operating means, and a normally ineffective stopping device adapted to stop said driven member automatically when said automatic stopping device fails to perform its function, said normally ineffective stopping device being movable to its operative position in response to movements of said operating means and movable to its inoperative position in response to movements of said starting member.

2. A machine having an operating means, a driven member operable by said operating means, an automatic stopping device actuated by said operating means to stop said driven member, a manually controlled starting member associated with the aforesaid parts to provide for the starting of said operating means, and a second stopping device adapted to stop said driven member when said automatic stopping device fails to perform its function, both of said stopping devices being movable to their operative positions in response to movements of said operating means and movable to their inoperative positions in response to movements of said starting member.

3. A machine having an operating means, a driven member operable by said operating means, an automatic stopping device actuated by said operating means to stop said driven member, said automatic stopping device including a power transmission clutch and a brake, a manually operated starting member whereby said clutch is shifted to start said operating means, and a second stopping device adapted to stop said driven member when said automatic stopping device fails to perform its function, said second stopping device being movable automatically to its operative position in response to movements of said operating means.

4. A machine having an operating means, a driven member operable by said operating means, and a safety device including an obstruction movable into the path of and adapted to stop said driven member, said operating means including a power transmission member having a relatively weak

portion adapted to break so as to discontinue the transmission of power to said driven member when said safety device becomes effective.

5. A machine having an operating means, a driven member operable by said operating means, automatic means for stopping said driven member, and a safety device adapted to stop said driven member when said automatic means fails to perform its function, said operating means including a power transmission member having a relatively weak portion adapted to break so as to discontinue the transmission of power to said driven member when said safety device becomes effective.

6. A machine having operating means, a driven member operable by said operating means, and a positive stop device movable into the path of said driven member so as to stop the latter automatically, the portion of said positive stop device which lies adjacent to said driven member being so formed that the stop device will be actuated by the driven member when said stop device is accidentally positioned in the path of the driven member.

7. In a machine of the character described a driven member movable toward and away from the work, operating means for actuating said driven member, automatic means for stopping said driven member in an elevated position, and a normally ineffective safety device whereby said driven member is stopped in an elevated position when said automatic means fails to perform its function, said normally ineffective safety device including a stop member movable into the path of said driven member to positively stop the latter in an elevated position, and said stop member being actuated by said operating means.

8. In a paper cutting machine, vertically movable cutting elements, operating means whereby said vertically movable cutting elements are reciprocated toward and away from the work, automatic means for stopping said vertically movable cutting elements in elevated positions, and a normally ineffective safety device whereby said vertically movable cutting elements are stopped in elevated positions when said automatic means fails to perform its function, said normally ineffective safety device including positive stop members movable into the paths of said cutting elements, and means for transmitting movement from said operating means to said stop members.

In testimony that I claim the foregoing I hereunto affix my signature.

CHARLES F. PFLANZE.