July 19, 1966 C. THUMIM 3,261,979

AUTOMATIC SET-UP FOR PHOTO ELECTRIC BACK GAUGE SPACER

Filed Feb. 7, 1962

FIG. 1a

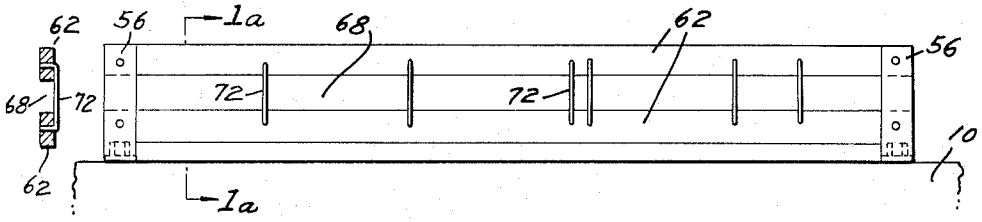


FIG. 1

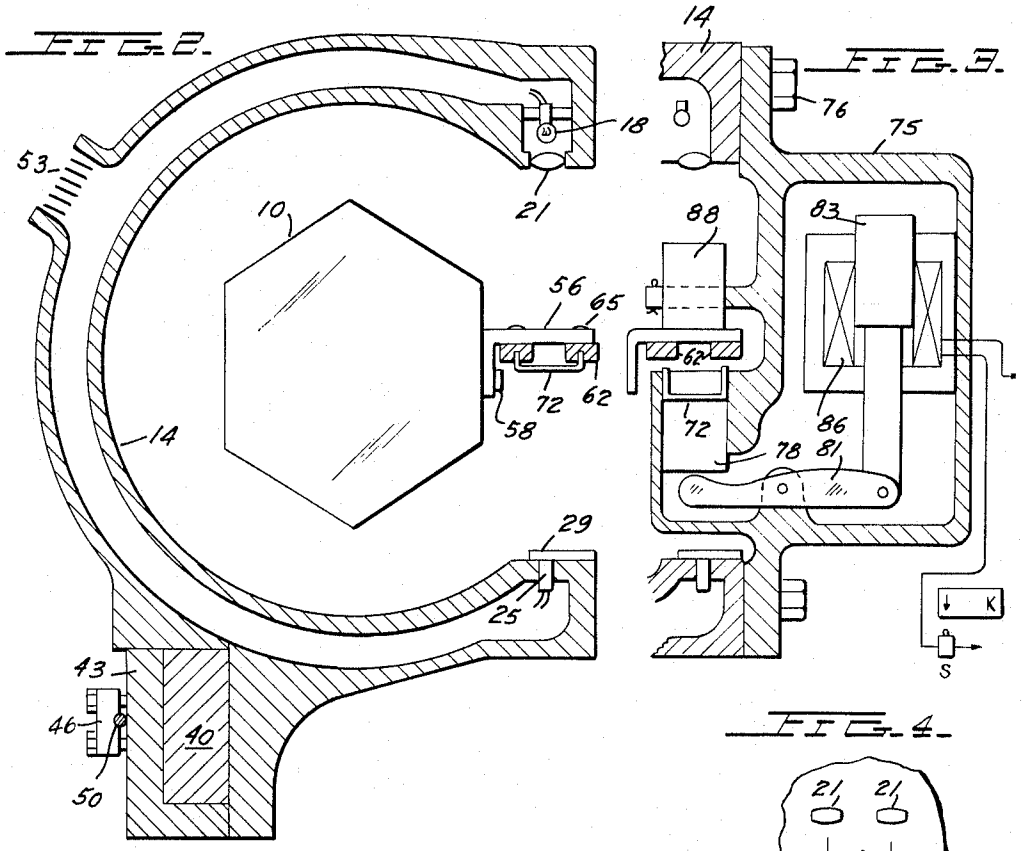


FIG. 2

FIG. 3

FIG. 4

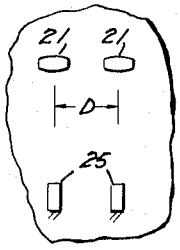


FIG. 8

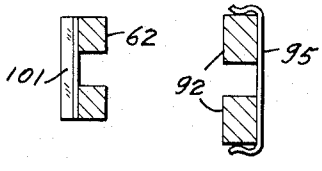
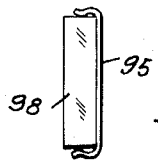


FIG. 7



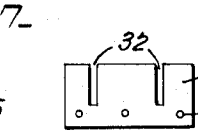


FIG. 5

FIG. 6

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AUTOMATIC SET-UP FOR PHOTO ELECTRIC BACK GAUGE SPACER

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This invention relates to paper cutting machines of the guillotine type, and more particularly to means for setting signals for photo-electric sensing to program the movement of a back gauge.

Reference is made to Seybold et al. Patent No. 2,737,158 as background for the present invention. The patent shows and describes a guillotine type paper cutter wherein a series of opaque elements, or flags, are predeterminately set at points on a bar which extends transversely across the front of the machine. The spacing between the flags corresponds to distances which the back gauge is to move between cuts. A photo-electric sensing means transverses the bar and senses each flag in turn to control movement of the back gauge through suitable circuitry. Particular reference is made to FIGURES 18 and 21 of the aforementioned patent.

While machines built in accordance with the teaching of the patent have been found commercially practical and have gained trade acceptance, it has been found that the placing of the signal flags on the supporting bar is time consuming, requiring various readjustments of position and various test runs in order to place the flags for precision control of the back gauge.

The present invention has for its principal object the provision of a device for automatically setting signal elements at various desired points, wherein no readjustment or test runs are required. Another object of the invention is to provide means in the form of staples or clips which are substantially wire thin bodies, for use as signal elements, thus considerably reducing the cost of such components. An additional object of the invention is to provide a construction which is exceedingly simple and economical to manufacture. Other objects and features of the invention will be apparent from the detailed description set forth hereinbelow.

Briefly, the invention contemplates the use of an elongated turret bar of hexagonal or similar shape, as in the aforementioned patent, the bar being provided with substantially co-extensive light permeable support means for holding staples or clips ejected from a magazine into engagement with the holding means at predetermined points. Such staples or clips are utilized as signal elements and can be sensed photoelectrically in a manner to be described. A notable feature of the invention is a mechanism in the form of a signal element applying gun, which can be constructed in accordance with generally conventional stapling gun principles, comprising a staple or clip magazine and combined with the machine for securing staples or clips to the support means. Such mechanism is suitably carried in a housing that may be temporarily secured to a movable component which carries the photo-electric sensing means, comprising a light source and photo cell or photo cells. Thus the support means may consist of a pair of parallel spaced wood strips into which the legs of staples are pushed wherein the staples are visibly exposed through the gap afforded by the spacing of the wood strips. Accordingly, a beam of light can be interrupted by such staples as the light sensing component moves along the length of the support means. Such interruption of the beam is then utilized to control movement of the back gauge in accordance with well known principles, all as disclosed in the afore-mentioned patent. Another feature of the invention resides in the fact that the placing of staples can be effected automatically by motion of the knife in the course of taking a cut at a point precisely measured with respect to a preset position of the back gauge. Thus having precisely set the back gauge for a particular length of cut, it is only necessary to actuate the knife, the motion of which actuates a switch to energize a solenoid which is part of the staple setting mechanism and in such manner a staple is secured in precision position relative the support means to correspond to the position of the back gauge at that time. A further form of the invention may utilize resilient clips, preferably of wire thin body, which can be ejected by a mechanism substantially the same as the staple setting mechanism, but which clips resiliently engage a support means carried by the turret and thus serve as signal elements in the manner described above, for the staples. A still further feature of the invention resides in the simplicity in which a single staple, or clip, can be utilized to effect an initial slow-down control of the back gauge, followed by complete stopping thereof. Thus by using two light sources with respective photo-electric cells, each cell being suitably baffled by a slitted plate, each beam traverses and is interrupted by each staple, or clip, in turn. The first interruption effects slow-down control while the second interruption effects complete stoppage of the back gauge. The circuitry for producing such effect in response to light interruption as described, is generally disclosed in the aforementioned patent and need not be repeated here.

Referring now to the drawing:

FIGURE 1 illustrates a plan view of one type of signal holding means secured to a turret bar;

FIGURE 1*a* is a section through 1*a*—1*a* of FIGURE 1;

FIGURE 2 is an elevation, sectional, showing the relationship of the turret bar, the signal support means and the photo-electric sensing component;

FIGURE 3 is an elevation, sectional, showing the relationship of the photo-electric sensing component, illustrated fragmentarily, and a signal setting means temporarily secured thereto and further illustrating the positioning of the signal support means with respect to the signal setting means;

FIGURE 4 is a diagram illustrating the positional spacing of the light sources and the photo cells as carried by the signal support means;

FIGURE 5 is a plan view of a light baffle used in conjunction with the photo cells;

FIGURE 6 is an end elevation of a modified form of signal and signal support means;

FIGURE 7 is another modification of the signal support means, and

FIGURE 8 is a still further modification of a signal support means.

Referring now to the drawing, and more particularly to FIGURE 2; an end view of a hexagonal turret **10** is disclosed encompassed by a U-shaped bracket **14** which carries a pair of spaced light sources such as the lamp **18** and lens **21**, the spacing in the direction of the axis of turret **10** being designated as "D" in FIGURE 4. Thus two beams of light emanate from one leg of bracket **14** and impinge against respective photo cells such as **25**. Disposed above the cells is a baffle plate **29** having slits **32** which confine the beam portions narrowly, before entry to the cells. The baffle plate may be secured in any desired manner as by screws (not shown) passing through suitable bores **35** and threaded into the material of bracket **14**.

Bracket **14** is slidably carried on a fixed support bar **40** secured thereto by the angle plate **43**, to which a fitting **46** is suitably bolted and which fitting clamps a cable **50**. The cable will be understood to connect to the back gauge

(not shown) so that bracket **14** is moved therewith supported on bar **40** and having relative motion with respect to turret **10**, all in a manner which can be clearly understood from consideration of FIGURES 1, 2, 17, 18 and 20 of the aforementioned patent, wherein substantially the same cable drive is utilized. Thus, any motion of the back gauge in either direction will be accompanied by a proportional motion of bracket **14**.

The lamps and photo cells will be understood to be connected via suitable leads (shown foreshortened) which extends through the hollow bracket body and emerge for connection to flexible cables (not shown) at the opening **53**.

In FIGURE 1 there is shown by way of example, carried on one of the faces of turret **10**, a signal support means comprising a pair of spaced brackets **56** disposed near the ends of the turret. Such brackets are suitably bolted as by bolts **58** to the turret and secured to the brackets and extending therebetween are a pair of spaced parallel wooden strips **62** fastened as by rivets **65**. The wooden strips **62** have a gap **68** therebetween, through which the light beams can pass, as indicated in FIGURE 2. Carried by the wood strips, as seen in FIGURE 1, are a series of staples **72** having legs protruding into respective wood strips, as indicated in FIGURE 2. The staples are, of course, wire-like bodies or members which are thin and in conjunction with the slits **32** of baffle plate **29**, can effect very precise control of the overall system by interruption of light beams, the beams being interrupted by the center portion of the staple, as indicated in FIGURE 2, which center portion spans the gap between the wood strips.

It will be appreciated that each face of the turret can carry a device as above described.

Thus the staples are signal elements carried by the signal element carrying a support means comprising the spaced wood strips and it will be apparent that such signal elements may be applied at any desired points relative to the length of the turret **10** with a specific back gauge program on each face thereof, any selected program being brought into use by rotation of the turret to bring a set of signal elements into light interrupting position.

In order to apply the staples to the wood strips, a signal setting means is utilized which comprises a housing or frame **75**. Such housing can be temporarily bolted as by bolts **76** to the ends of the arms of bracket **14**, shown fragmentarily in FIGURE 3, for setting a program. Housing **75** carries a suitable staple setting mechanism constructed in accordance with conventional staple applying principles. Thus the mechanism may comprise a staple feeding magazine (not shown) for feeding staples **72** into position to be struck by a hammer **78** actuated through a lever **81**, by force effected by a solenoid plunger **83** motivated by solenoid **86**, all carried within housing **75**. It will be noted that when the staples setting means is bolted to bracket **14**, the wood strips **62** are in position to be pierced by the legs of staples **72**. Accordingly, energization of the solenoid will cause the hammer to strike a staple and force the legs of a staple into the said strips **62**. A suitable arm on the housing carries a roller anvil **88** to support the strips against the blow of the hammer.

In order to set the staples precisely where desired along the length of the wood strips, a simple procedure is utilized. Thus for the setting of any particular staple, a measurement is taken from the face of the back gauge to the cutting line of the knife, in accordance with a desired length of cut. The knife is then actuated. As shown in FIGURE 3, a knife component, e.g., the knife bar, as indicated by the reference K, has in its path a switch S. The solenoid **86** is connected so as to receive current upon closure of the switch, effected by downward movement of the knife, the elements being connected in series to any suitable source of current, as indicated by the arrow leads. Accordingly, any position of the back gauge may be set by accurate measurement and a signal element applied to the turret for that position upon actuation of the knife.

After setting of a program, the setting means is readily removed. While strips **62** have been described as being of wood, it will, of course, be obvious that any suitable material pierceable by the legs of staples could be used. For example, soft plastic or fibrous materials. Further, while I have shown how staples can be used as signal elements, primarily for the reason that they are commercially obtainable in standard sizes and suitable setting mechanisms can be readily constructed in accordance with well known principles, it will be understood that the invention is not necessarily limited to the use of staples as signal elements. For example, as shown in FIGURE 6, in place of wood strips I may utilize spaced metal strips **92** to which resilient wire-like clip bodies **95**, of general channel shape, or U-shaped, may be affixed. Thus the gap between strips **92** permits the light beams to pass through to the clip body, and such clips adhere by virtue of the resiliency of their legs against the sloped outer faces of strips **92**, as will be clearly understood from FIGURE 6. The clips may be applied by a mechanism substantially identical with the staple applying mechanism hereinabove described.

In FIGURE 7 there is disclosed a transparent plastic strip **98** to which may be secured clips **95** in precisely the same manner as described in conjunction with FIGURE 6. Thus the light beams are able to pass through the material of the clip holding strip **98**.

In FIGURE 8 there is disclosed a further modification wherein wood strips **62** are maintained in spaced parallel relation, by being cemented to a transparent strip **101** in place of the brackets **56**, as shown in FIGURE 1.

It is contemplated that removal of staples or clips from the support means may be readily accomplished by securing a suitably shaped hook or edged tool to the stapling gun hammer, or in place of the hammer, thus, movement of the setting means to effect engagement of such tool with staples or clips will pull them from the support means.

Having thus described my invention, I am aware that certain changes may be made without departing from the spirit thereof, and accordingly I do not seek to be limited to the exact illustrations herein given, except as set forth in the appended claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. In a device of the class described, a support means for holding a series of spaced signal elements for programming the back gauge of a paper cutting machine; signal elements carried by said support means and comprising members of wire material, in spaced array thereon, and sensing means for detecting the presence of said signal elements, said supporting means and said sensing means having relative motion with respect to each other, said members being U-shaped staples having legs, said support means comprising a pair of spaced elongated parallel elements of a material pierceable by legs of said staples.

2. In a device of the class described, a support means for holding a series of spaced signal elements for programming the back gauge of a paper cutting machine; signal elements carried by said support means and comprising members of wire material, in spaced array thereon, and sensing means for detecting the presence of said signal elements, said supporting means and said sensing means having relative motion with respect to each other, said support means comprising an elongated transparent strip, and means for holding said members thereon.

3. A device of the class described for programming back gauge movement of a paper cutting machine to stop at selected points, comprising elongated signal element support means for receiving and and holding a plurality of signal elements at any point thereon, signal element

applying means disposable adjacent said support means and having signal element ejection mechanism for effecting adherence of signal elements with said support means at points corresponding to said selected points, and movable means to provide relative motion between said support means and said applying means, and sensing means for sensing said signal elements, said sensing means being carried by said movable means.

4. In a device of the class described, an elongated support means for holding a series of signal elements for programming back gauge movement of a paper cutting machine, said support means having a median area uninterruptedly permeable to light transmission, and at least one signal element comprising a body of wire material straddling said median area so as to be exposed therethrough, and a connection between said body and said support means for securing said body thereto, and a sensing means comprising light means and photo electric cell means, said light means and said cell means being disposed on opposite sides of said support means wherein light may impinge on said cell means to be interrupted by said body in the course of relative motion of said sensing means and said body and movable means for supporting and carrying said sensing means relative to said body.

5. In a device as set forth in claim 4, including baffle means interposed intermediate said light means and said cell means, and comprising spaced slits, said light means comprising spaced light sources, and said cell means comprising respective spaced cells aligned with respective slits whereby said relative motion effects a signal for each interruption of light transmission from a light source to a respective cell.

6. In a device of the class described, an elongated support means for holding signal elements at predetermined spacing therealong, a sensing means comprising a light source and a light detecting element for sensing said signal elements and being movable with respect to said support means, said sensing means having a U-shaped bracket encompassing said support means and having a leg carrying said light source, and a leg carrying said light detecting element, wherein said light source effects a light beam interruptable by said signal elements in the course of said relative motion, and signal setting means for applying said signal elements to said support means comprising a mechanism for ejecting said elements into engagement with said support means, and means coacting with said signal elements and said support means for holding said elements on said support means upon ejection thereagainst, and means for temporarily securing said signal setting means to said bracket so as to be movable therewith during the course of signal setting.

7. A device of the class described for programming back gauge movement of a paper cutting machine, comprising signal element support means for receiving and holding a plurality of signal elements, signal element applying means disposable adjacent said support means for applying signal elements to said support means at predetermined points, sensing means movably mounted relative said support means for detecting the presence of said signal elements in the course of operation of a back gauge, and fastening means for temporarily securing said applying means to said sensing means during the course of applying signal elements to said support means.

8. In a device of the class described, elongated support means having a light permeable area for substantially the length thereof, a series of signal elements for programming back gauge movement of a paper cutting machine signal element holding means, each signal element comprising a clip of resilient material attachable to said support means anywhere in the span thereof so as to leave exposed at least an intermediate portion of said clip for coaction with a sensing means, and sensing means movably mounted relative said support means for detecting the presence of said clip, said support means having surfaces engageable by said signal element clips for securement thereto.

9. In a device as set forth in claim 8, said sensing means comprising a source of light and a photo electric cell, said source of light and said cell being disposed on opposite sides of said clip wherein a beam of light from said source to said cell is cut by said clip in the course of relative motion of said sensing means and said clip.

10. In a device of the class described, an elongated support having a light permeable area for substantially the length thereof, comprising a pair of spaced parallel strips of suitably soft material for receiving a series of staples operative as signal elements for programming back gauge movement of a paper cutting machine wherein said staples are disposable across the spacing between said strips, and sensing means movably mounted relative said support for detecting the presence of said staples.

11. In a device as set forth in claim 10, said sensing means comprising a source of light and a photo electric cell, said source of light and said cell being disposed on opposite sides of said support wherein a beam of light from said source to said cell may be cut by said staples in the course of relative motion of said sensing means and said body.

12. In a device of the class described, an elongated support having a light permeable area for substantially the length thereof, for holding a series of signal elements for programming back gauge movement of a paper cutting machine, at least one signal element comprising a body resiliently securable to said support and having at least one clip-like end portion operative to grip an edge of said support at any point in the length thereof so as to extend across said support transversely, and sensing means movably mounted relative said support for detecting the presence of said body.

13. In a device as set forth in claim 12, said sensing means comprising a source of light and a photo-electric cell, said source of light and said cell being disposed on opposite sides of said support wherein a beam of light from said source to said cell is cut by said body in the course of relative motion of said sensing means and said body.

14. In a device of the class described, an elongated support means having a light permeable area for substantially the length thereof, for holding a series of signal elements for programming back gauge movement of a paper cutting machine, at least one signal element comprising a staple having legs piercing said support means and being disposed transversely thereof and having an intermediate portion for coaction with a sensing means, and sensing means movably mounted relative said support means for detecting the presence of said staple.

15. In a device as set forth in claim 14, said sensing means comprising a source of light and a photo electric cell, said source of light and said cell being disposed on opposite sides of said support means wherein a beam of light from said source to said cell is cut by said staple in the course of relative motion of said sensing means and said body.

16. In a system for utilizing signal elements in the form of staples to program back gauge movement of a paper cutting machine having a knife, said machine comprising support means for a stapling gun, and a stapling gun carried thereby, said machine having staple receiving means for receiving staples spacedly applied thereto by said gun, said machine having sensing means for sensing the presence of staples on said staple receiving means and having actuating means whereby said sensing means is movable relative to said staple receiving means to sense staples applied thereto, fastening means for securing said stapling gun support means to said sensing means while applying staples, and means for actuating said stapling gun responsive to movement of the knife of said machine.

17. In a system for utilizing signal elements in the form of members of wire material to program back

gauge movement of a paper cutting machine having a knife, an elongated support means and applying means for applying said members spacedly along the length thereof, a sensing means movable along the length of said support means for sensing members thereon, fastening means for securing said applying means to said sensing means whereby said applying means is moved thereby to be positioned at selected points along said support means in applying said members thereto.

18. In a system as set forth in claim **17**, and means for actuating said applying means responsive to movement of the knife of said machine to apply members to said support means.

19. In a device of the class described, a support means for holding a series of spaced signal elements for programming the back gauge of a paper cutting machine, signal elements carried by said support means and comprising members of wire material, in spaced array thereon, and sensing means for detecting the presence of said signal elements, means providing said supporting means and

said sensing means with relative motion with respect to each other, and means for securing said members at selective places on said support means, said support means comprising a structure effecting uninterrupted access to said members by said sensing means.

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