April 16, 1957 E. ERBSTÖSSER 2,789,167

SWITCHING ARRANGEMENT

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FIG. 1.

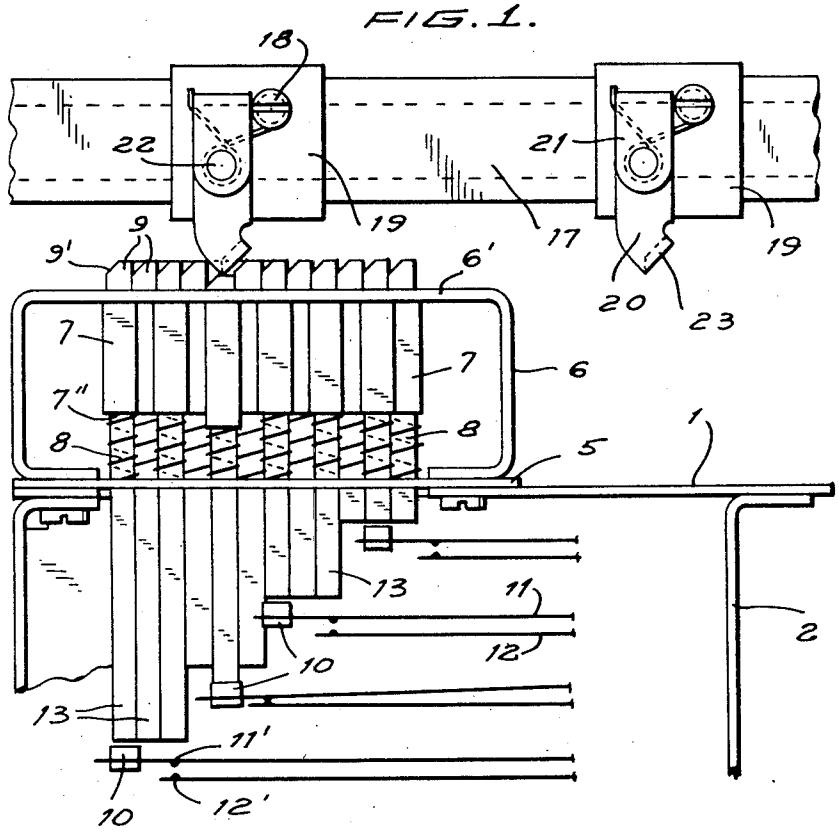
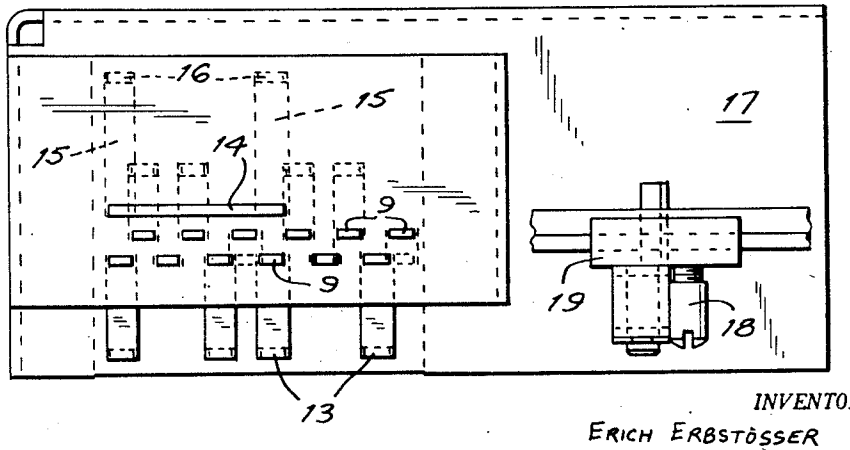


FIG. 2.



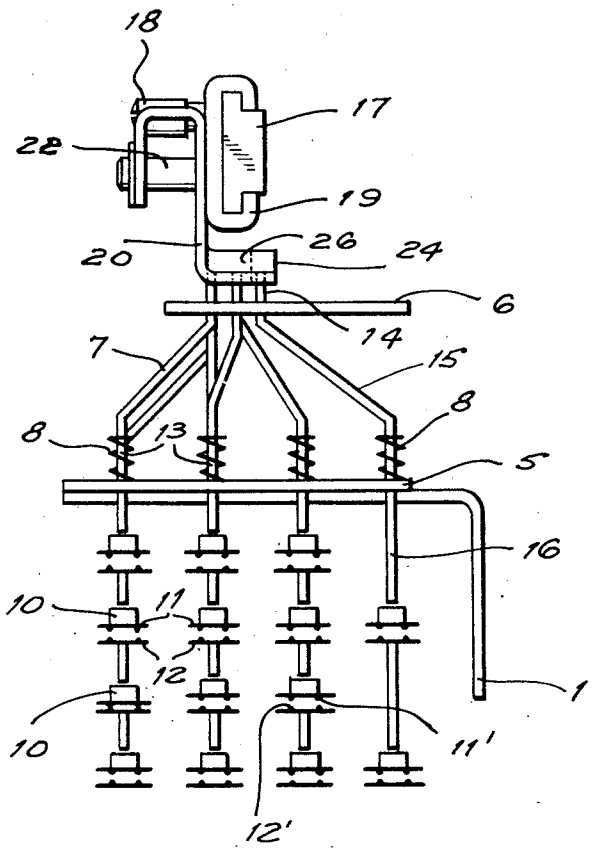
INVENTOR.
ERICH ERBSTÖSSER
BY

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FIG. 3.



INVENTOR.
ERICH ERBSTÖSSER
BY

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SWITCHING ARRANGEMENT

Erich Erbstösser, Eiserfeld (Sieg), Germany, assignor to Firma Siemag Feinmechanische Werke G. m. b. H., Eiserfeld (Sieg), Germany

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2 Claims. (Cl. 200—18)

The present invention relates to switching mechanisms for closing a plurality of electrical circuits.

More particularly the present invention relates to a switching mechanism used with remotely operated printing devices to sequentially operate a plurality of circuits.

There are many machines in use today wherein calculating devices are combined with printing mechanisms. The calculator or computer automatically determines what quantity is to be printed and remotely operates a printing mechanism to print the desired quantity. These are used for example in bookkeeping machines where the entries must be made in specific columns on the paper. One column may represent for example the gross receipts; the next column the cost of an object; and the third column the net profit. In such a situation the third column would be the difference between the first and second column entries.

Conventional machines in use today make use of a switch actuating member which is mounted on the carriage of the typewriter mechanism. The switch actuating member operates one of a plurality of switches as the carriage moves along. In this manner the computer is always aware at what part of the paper the next entry is to be made. It is well known that the space between each recorded letter of the typewriter is quite small. Accordingly in conventional machines, the switches to be operated by the switch actuating member are very close together. For this reason the actuating member sometimes actuates two adjacent switches simultaneously resulting in the blocking of the printing device. Also, in this arrangement the switches are exposed and soon become clogged with dirt or other foreign matter.

The present invention overcomes these difficulties by interposing a plurality of transmission members between the actuating members and the switches to be operated.

Accordingly it is an object of the present invention to provide a new and improved switching arrangement for operating a plurality of switches in a given sequence.

A second object of the present invention is to provide a new and improved switching arrangement for use with remotely operated printing devices.

Another object of the present invention is to provide a switching arrangement for use with remotely operated printing devices wherein a plurality of transmission members are arranged between the actuating members and the switches to be operated.

Still another object of the present invention is to provide a switching arrangement wherein a plurality of switches are completely enclosed within a housing to prevent dirt and other foreign matter from reaching the switches.

More particularly the present invention relates to a new and improved switching arrangement which includes support means, a plurality of switches spaced from each other, actuating means carried by the support means for movement along a predetermined path, and transmission means located between the actuating means and the

switches for operating the switches in a given sequence as the actuating means moves along the path whereby a particular switch is operated depending on the location of the actuating means along the path.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is an elevational view of one embodiment of apparatus embodying the principles of the present invention;

Fig. 2 is a plan view of the apparatus illustrated in Fig. 1; and

Fig. 3 is a side elevational view of the same apparatus.

Referring now to the drawing and more particularly to Fig. 1, the carriage **17** of the printing device is shown in the upper portion of the figure. Beneath the carriage is mounted a housing **1** to which is fastened a casing **2**. For simplicity of the drawings, the entire casing **2** is not shown. Actually it extends beneath and completely around the enclosed switches to protect them from dirt and other foreign matter.

Mounted on the housing **1** against a plate **5** is a bracket **6** having an upper planar surface **6'**. Mounted on plate **5** are transmission members **7** which have free end portions **9** extending through corresponding holes in the surface **6'**. Members **7** are urged away from plate **5** by compression springs **8** which bear up against a shoulder **7''**.

The members **7** are so arranged that their free ends **9** are all disposed in substantially one plane. However, the length of the members vary so that the other ends **13** thereof are disposed in a stepwise relationship with respect to each other. In Fig. 3 it can be seen that the members **7** have transverse portions which extend in both directions away from the vertical plane.

Mounted beneath the ends **13** of the members **7** are a plurality of switches **11** and **12**, each having contact points **11'** and **12'**. Mounted on the portion **11** of the switches are insulating members **10** which are adapted to be engaged by the ends **13** of the members **7**.

Disposed above the ends **9** of the members **7** and mounted on the carriage **17** of the printing device is a slidable clamp **19**. In Figs. 1 and 3 it can be seen that clamp **19** is positioned on the carriage **17** by a screw **18**. A second screw member **22** pivotally mounts a pawl **20** on the clamp **19**. A spring **21**, shown in Fig. 1, urges the pawl **20** towards the screw **18** so that the pawl is arranged substantially perpendicular to the carriage **17**. The end **23** of pawl **20** is slanted to correspond to the slant of a bevel **9'** on the ends **9** of the members **7**.

In operation, when the carriage **17** and the clamp **19** are moved from right to left in Fig. 1 the pawl **20** engaging the ends **9** will be pivoted away from the screw **18** against the action of the spring **21**. However, when the carriage and clamp are moved from left to right the pawl will be restrained from pivoting by the screw **18** and the slanted surface **23** will engage the bevel **9'** of member **7** to depress this member against the action of the spring **8**. This is illustrated in Fig. 1 where the fifth member **7** is shown depressed by th pawl **20**. The opposite end **13** of this member **7** now bears against the insulated member **10** to close the particular switch corresponding to the fifth switch activating member.

The closing of this fifth switch sends an indication to the remote computing mechanism that the carriage of the printing device is now at the position indicated by the

particular switch closed. Therefore, if the computer has any information which has to be printed at this particular column of the printing device, it in turn transmits a signal back to the printing device actuating the proper key thereof. This latter part of the operation, of course, forms no part of the percent invention which deals only with the switching arrangement and not with the computing mechanism.

In Fig. 1 it can be seen that the particular bevel arrangement of the ends 9 and the slanted corresponding edge 23 of the pawl 20 makes it impossible for the pawl to depress more than one member 7 at any one time. Similarly in Fig. 2, it can be seen that the free end portions 9 are arranged along two lines with the end portions in one line being staggered with respect to the end portions in the other line. In this manner the ends 9 can be made wider than the spaces between each end.

This arrangement of the transmission members 7 permits the switches to be arranged within the housing in any suitable fashion. Accordingly they can be arranged to permit easy replacement and maintenance. This is markedly different from the conventional arrangement where the switches are activated directly by a mechanism mounted on the carriage of the printing device. In that conventional arrangement the switches must be mounted very close together.

In the plan view of Fig. 2 it can be seen that a bar 14 is provided having two transverse portions 15 and ends 16 for operating two switches shown in Fig. 3. Such a bar is used in some printing-computer arrangements wherein the bar 14 is known as the minus bar. This might indicate to the remote computer for example that the quantities to be printed in the columns wherein bar 14 is depressed are to be subtracted rather than added.

In Fig. 3 it can be seen that the depth of the pawl 20 can be arranged to simultaneously depress one end 9 of a member 7 and the bar 14. That is the depth of the pawl 20 can be made to reach as far as the line 24 so that the bar 14 and the end 9 will be depressed. On the other hand, if the depth of pawl 20 is only as far the dotted line 26 the bar 14 will not be depressed.

Therefore, in the arrangement shown in Fig. 1, one of the pawls 20 can be made with one depth and the other pawl with either a longer or shorter depth. Similarly, the length of the bar 14 may be made to correspond to any number of desired columns of the printing device. In Figs. 1 and 2 the bar 14 corresponds to the first seven columns of the device.

While only two clamps 19 are illustrated in Fig. 1 it is of course apparent that any convenient number can be mounted on the carriage 17 depending on the length of the carriage and the number of different columns wherein it is desired to print figures. From Fig. 3 it can be seen that the pawls 20 can be quickly and easily changed when the printing device is used for different purposes.

In the arrangement illustrated above the actuating pawl 20 moves in a straight line with the carriage 17. Accordingly the ends 9 are arranged in a plane to be sequentially engaged by the pawl. However, it is apparent that the actuating pawl can be made to move along any predetermined path and the apparatus will operate properly if the free end portions 9 are also arranged along this predetermined path.

The illustrated switches 11, 12 are shown normally open. Therefore the transmission members 7 serve to close these switches. It is apparent that the same members could be used for opening the switches if the switches were normally closed.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of remotely controlled devices differing from the types described above.

While the invention has been illustrated and described as embodied in a switching mechanism for remotely controlled printing devices, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A switch arrangement comprising, in combination, support means; a plurality of switch operating members having free end portions arranged in at least two parallel planes; a plurality of groups of switches, each group of said groups of switches lying in a plane parallel to said parallel planes of said free end portions, each switch of each of said groups lying in a plane which is perpendicular to said parallel planes and which contains at least one switch of another group of switches; and actuating means carried by said support means for movement along a predetermined path for sequentially contacting said free end portions of said switch operating means to operate said switches in a given sequence as said actuating means moves along said path whereby a particular switch is operated depending on the location of said actuating means along said path.

2. A switch arrangement comprising, in combination, support means; a plurality of switch operating members having free end portions arranged in at least three parallel planes; a plurality of groups of switches, each group of said groups of switches lying in a plane parallel to said parallel planes of said free end portions, each switch of each of said groups lying in a plane which is perpendicular to said parallel planes and which contains at least one switch of another group of switches; and actuating means carried by said support means for movement along a predetermined path for sequentially contacting said free end portions of said switch operating means to operate said switches in a given sequence as said actuating means moves along said path whereby a particular switch is operated depending on the location of said actuating means along said path.

References Cited in the file of this patent

UNITED STATES PATENTS

1,763,006	Murphy	June 10, 1930
1,932,220	Kottman	Oct. 24, 1933
1,998,355	Boutet	Apr. 16, 1935
2,006,690	Blake	July 2, 1935
2,278,629	Winning	Apr. 7, 1942
2,381,077	Obszarny	Aug. 7, 1945
2,431,929	Goff	Dec. 2, 1947
2,635,154	Zuckerman	Apr. 14, 1953

FOREIGN PATENTS

470,023	Great Britain	Aug. 9, 1937
550,172	Germany	May 9, 1932