Jan. 19, 1965 E. C. BEAN ETAL 3,166,647

BINARY SWITCH KEY

Filed Nov. 29, 1961 2 Sheets-Sheet 1

FIG. 1

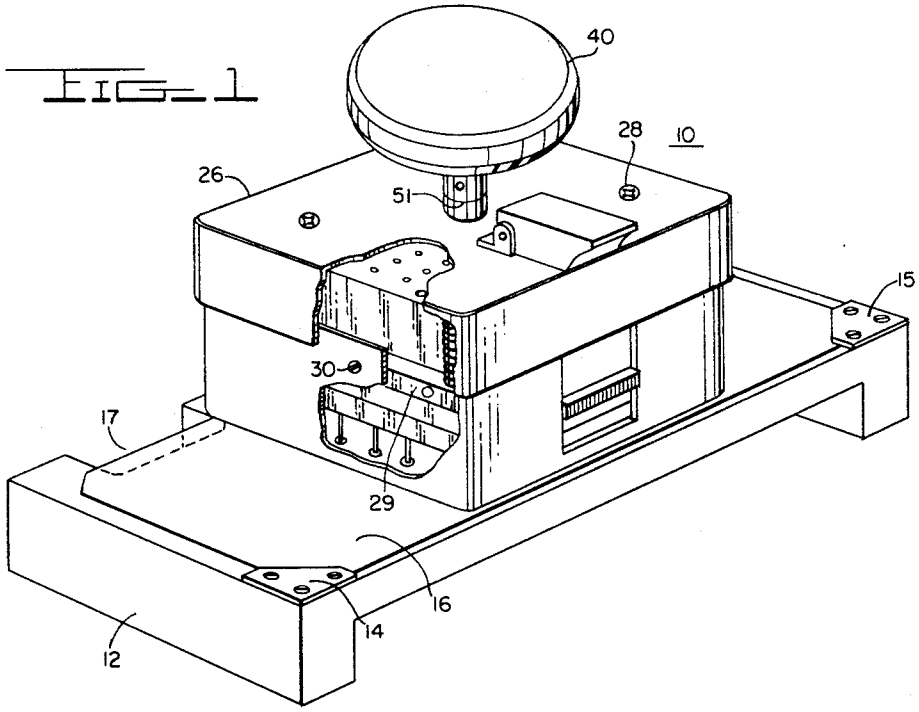
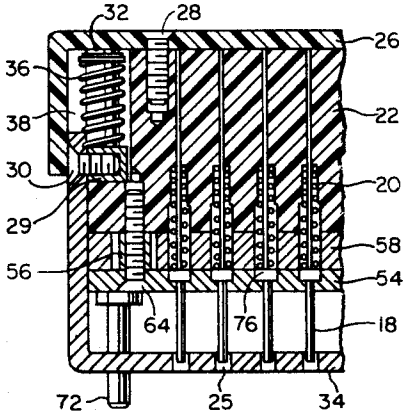


FIG. 4



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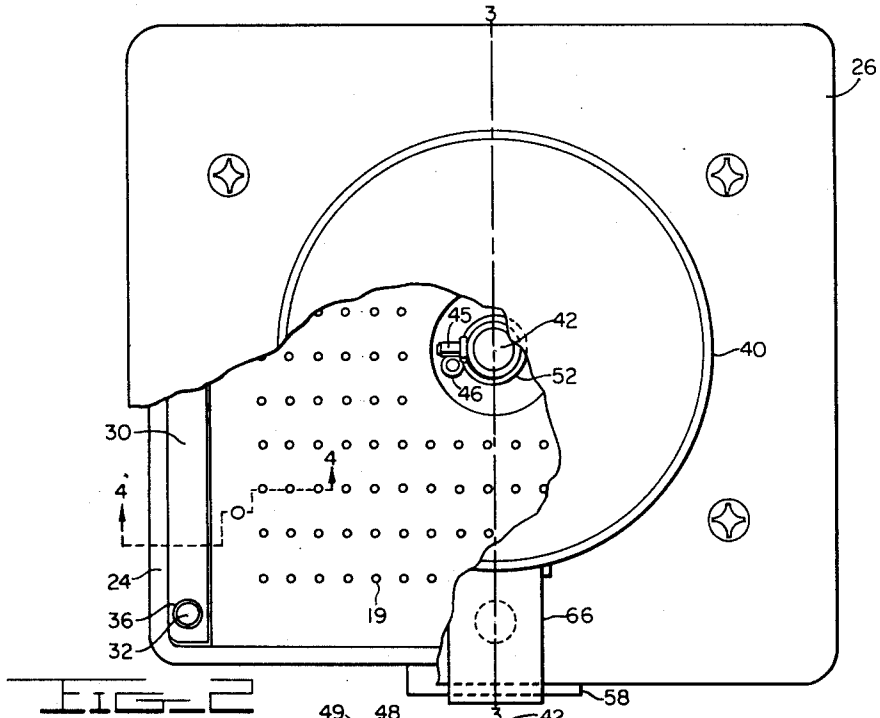


FIG. 2

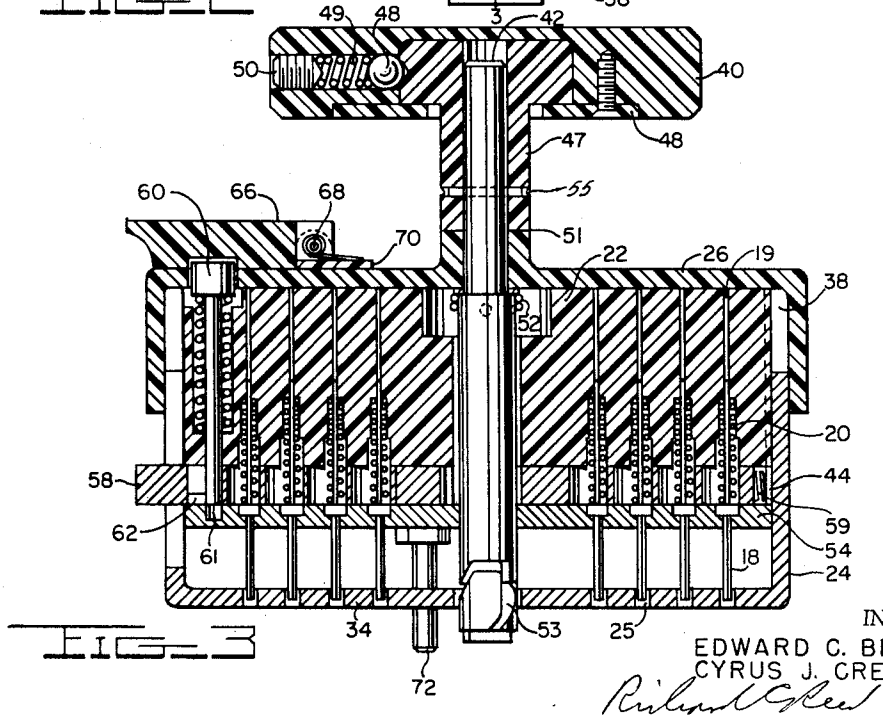


FIG. 3

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United States Patent Office 3,166,647
Patented Jan. 19, 1965

3,166,647

BINARY SWITCH KEY

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Filed Nov. 29, 1961, Ser. No. 155,874
6 Claims. (Cl. 200—46)

(Granted under Title 35, U.S. Code (1952), sec. 266)
The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates in general to a device for setting a switch circuit and more particularly to a lightweight portable coding key whose code pattern can be easily and rapidly changed.

Today there exist many applications for transferring information contained in a programmed code to an electrical circuit. Where space and weight are a practical limitation, such as in IFF apparatus, usually a manually operated code key is employed for setting switch circuits, which in turn determines which electrical circuits are to operate and which are not to operate. Often it becomes necessary to change the code pattern and in turn to change the code pattern simultaneously at many remote and widely scattered locations. Such code changes are performed by operational personnel at the respective location and while present apparatus has been adequate a more reliable system is needed in order to remove the human factor in setting up an information pattern in a code key and to perform such changes, rapidly and with ease. Prior methods were further limited by the time consumed in resetting a coded key and if security protection were desirable adequate safeguards must be provided, further affecting the operational reliability of the system.

With these considerations in mind, it is an object of this invention to provide a portable code key that will remove the human factor in setting up a code pattern for actuating a switching network.

It is a further object of this invention to provide a self contained security and protective code key device for switch setting which is capable of resetting with ease within a matter of seconds.

It is another object of this invention to provide a code key setting device wherein the code pattern can be instantaneously destroyed yet capable of being used in close quarters and which will substantially remove the human factor in transposing the information from a master code to an electrical circuit.

It is yet another object of this invention to provide a portable self contained code key that is small and compact whose code can be neutralized or reset rapidly and with extreme ease, within a minimum of time.

It is still a further object of this invention to improve the operational reliability of a coded key switch setting device while still being capable of using presently existing equipment.

The code key of this invention is a portable self contained switch setting device employing spring loaded key pins, protected by a retractable skirt and a positive locking plate for securing the pins in either an extended or retracted position, which can be instantaneously neutralized and reset with ease within a matter of seconds while at the same time removing the human factor which is normally incurred in such code information pattern changes.

Other objects and features of this invention will become apparent to those skilled in the art as the disclosure is made in the following detailed description of a preferred embodiment of the invention as illustrated in the accompanying sheets of drawings in which:

FIG. 1 is a perspective view partly broken away of a coded key setting device resting upon a coded data card and its respective holder;

FIG. 2 is an enlarged top view of the coded key setting device;

FIG. 3 is a sectional side view taken on the line 3—3 of FIG. 2 of the coded key setting device; and

FIG. 4 is a vertical section taken on the line 4—4 of FIG. 2.

Referring now to the drawings, the code key switch setting device is generally shown by reference numeral **10**. In FIG. 1 the code key **10** is shown resting upon key platen **12** which acts as a holding and positioning plate when code key **10** is being set. The key platen **12** is equipped with corner tabs **14** and **15** located at each end of the platen to simplify positioning and holding a machine punched card **16**. An extraction notch **17** has been milled in the top edge of the platen to expedite removal of the card. As hereinafter described the punched card **16** is used to transfer its information code pattern to code key **10** which in turn is used for setting an electrical circuit.

The code key (FIG. 3) consists of a plurality of key pins **18** mounted within holes **19** of a storage block **22**. The block provides separate holes for individually guiding each key pin. Any number of key pins may be used and in this embodiment as many as 540 key pins have been employed. Each pin is capable of being tension-loaded by a spring **20**. Surrounding the storage block **22** is a spring-loaded retractable skirt **24** having openings **25** for pins **18**, which mechanically protects the key pins from damage when fully extended and a cover housing plate **26** overlapping the skirt **24**. As can best be seen in FIG. 4, the cover is attached directly to the storage block **22** by screws **28** while the skirt **24** is attached to a skirt retainer plate **29** by screws **30**. The skirt retainer plate moves vertically up and down with respect to cover **26** over a spring-loaded guide post **32**. Whenever a downward force is applied to the cover housing plate **26** the retainer plate **29** and the attached skirt **24** will move vertically upward, compressing spring **36** and occupying space **38**. The pins **18** will then extend below the base **34** of skirt **24** through openings **25**.

The key is also provided with a handle **40** which operates a dual purpose shaft **42** (FIG. 3) which passes through the center portion of the code key providing a key pull down function with the first 127° of rotation of the shaft **42** and a switch locking function with the next 90° of rotation of the shaft. The rotation of the shaft is limited by an upstanding pin **46** and a travel pin **45**. The handle **40** is attached to a detented hub **47** extending above cover **26** by a retaining plate **48**. The hub is a separate unit as shown at point **51** and is connected to the shaft **42** by a roll pin **55**. In order to prevent damage to the switch being set, such as if jamming should occur in the switch itself, an adjustable slip clutch is provided within the handle **40** comprising a detent ball **48** which is compressed against the cover hub **47** by a spring **49** and an adjustable screw **50**. The screwdriver type end **53** of shaft **42** comprises a double female threaded end and is employed for locking the code key to the switch being set. When the shaft **42** is rotated it becomes spring-loaded by a spring **52** connecting travel pin **45** and limiting pin **46**.

The code key as shown in the embodiment consists of **192** spring-loaded key pins confined between a key plate **54** and the storage block **22** that are separated by four spacers **56**. The spacers allow a lock plate **58** to slide between the key plate **54** and storage block **22**. The sliding action causes the key pins **18** to become locked in either an extended or retracted position depending upon the information pattern for which the code key is being set. The lock plate is spring-loaded by a spring **59** lo-

cated between a spring stop plate **44** and lock plate **58**. In the extremity of its travel, the lock plate **58** is retained by a spring-loaded neutralizing button **60** and its locking pawl **61** which locks into depression **62** and will remain locked until the spring-loaded catch is depressed releasing pawl **61** from depression **62**. In FIG. 4 the spacers **56** are shown surrounding screws **64** which attach key plate **54** to storage block **22** and in this manner can be used as both a vertical and lateral guide in counteracting any undesirable movement of lock plate **58**. Covering the release button **60** is a protection button cover **66** spring-hinged at **68** to a cover mounting bracket **70**.

In the operation of the code key, a coded data card **16** is inserted in the key platen **12** as shown in FIG. 1 and the key pins **18** are set in the code key to match the holes punched in the data card. Then, with the code key in hand, the neutralizing button is depressed to assure that any existing code setting of the key pins is removed. This will cause the lock plate to move to its forward position (shown in FIG. 3) because of the bias by spring **59** against a spring stop plate **44**.

Code key **10** is provided with two dowel pins **72** one on each side of the shaft hole so that the key can be easily and accurately positioned on platen **12**. The handle of the key is then turned through approximately an arc of 130°, pulling the key to the platen while at the same time locking the key to the platen. Cover **26** is pulled down towards the platen and the retractable key skirt **24**, whereby turning handle **40** the key rises vertically due to the movement of skirt retainer plate **29**. This causes the key pins to extend through the card where holes exist and to be retracted where no holes are found. In this position the forward end of the lock plate **58** is pressed, causing pawl **61** to rise into the depression **62** and locking all the key pins in their respective extended or retracted positions. The handle is then turned through approximately another 90° arc, detaching the code key from key platen **12** while the key skirt returns to its initial position. Thus, a complex information pattern has been set in the key within the time it takes to pick up the code key, place it on the platen and turn the handle less than three-quarters of a turn.

When the key pins are being set in the key, and where no holes exist in the data card, the card will cause the key pins to be moved upwardly sufficiently far so as to cause a collar **76** to rise above the lock plate **58**. When lock plate **58** is actuated the collars become confined above the lock plate while the collars for the key pins that have become settled in an opening are confined below the lock plate. It is the difference in length between the retracted and extended key pins that determines whether or not a pin will set the switch.

The code key is now inserted in a switching circuit in the same manner as it is inserted in platen **12**. By turning the handle, the screwdriver type end **53** pulls the key to the switch, locks the key pin setting into the switch, thereby setting the switching network. If the handle is rotated further the key is unlocked and released from the switching network. The code key could then be neutralized by pressing release button **60** allowing all the key pins to return to their initial position. The code key could also be retained indefinitely with its present information pattern without fear of losing it or accidently changing it because the retractable skirts **22** will be lowered to a position below the key pins **18** due to the spring-tension loading of skirt retainer plate **29** thereby providing a protective covering for the key pins. The positioning dowels and shaft **42** would alleviate the chance of the key skirt being accidentally forced up and the key pins damaged, if for example, it was inadvertently dropped.

Obviously many modification and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A code key for providing an information code pattern for a switching network comprising, a plurality of key pins, block means for individually storing each pin, said pins normally extending externally of said block and mounted for retractable movement into the block, cover means attached to said block for partially housing said block, retractable skirt means partially surrounding said block storing means and extending between said cover means and said block storing means, shaft means extending through said block storing means and said retractable skirt means, rotatable handle means mounted above said cover means and causing said shaft to rotate, means slidable in said block storage means for locking said key pins in either a retracted or extended position, means in said block for neutralizing said locking means, and means extending downwardly from said block means for positioning said key with respect to a switch network.

2. In a device for setting a switching network, the combination of, a plurality of movable key pins, a plurality of springs, a separate spring surrounding each key pin, a storage block for holding each key pin for movement therein, said block being provided with separate spaces for each key pin and spring, a portion of said key pins initially extending externally of said storage block, a housing cover attached to said storage block and surrounding the upper part of said storage block, a movable skirt cover surrounding the portion of said key pins that are external of said storage block and surrounding the lower part of said storage block while extending between the storage block and the portion of said housing cover that surrounds said storage block, individual openings in said skirt for each key pin that extends externally of said storage block, a dual purpose shaft extending through the housing cover, the storage block and the movable skirt, a rotatable handle having an adjustable slip-clutch and secured to said dual purpose shaft, and a locking plate having individual openings for each key pin and spring mounted between said storage block and said movable skirt cover for movement normal to said key pins, whereby upon movement of said locking plate to an actuated position said key pins are secured in an array of predetermined positions.

3. In the device as set forth in claim 2 wherein said dual purpose shaft is provided with a screwdriver type end.

4. A code key for setting a switch matrix comprising, a storage block, a plurality of spring-loaded key pins mounted for movement within and partially extending externally of said storage block, a housing cover attached to said storage block, a key skirt covering the extended portion of said partially externally extending key pins and movably secured to said housing cover and said storage block, a dual purpose shaft extending through said housing cover, said storage block and said key skirt, a locking plate movably mounted between said key skirt and said storage block for locking said key pins in selective relative positions to said storage block, and means for rotating said dual purpose shaft.

5. A code key as set forth in claim 4 wherein said means for rotating said dual purpose shaft is provided with an adjustable slip-clutch and dowel pin means on said storage block for positioning said code key with respect to the switch matrix being set.

6. A code key for receiving a code pattern and transferring said code pattern to a switching network comprising:

(*a*) a plurality of key pins,

(*b*) a storage block having a plurality of vertically extending openings therein, said openings receiving one each of said key pins,

(*c*) spring means mounting said key pins for movement in said openings and urging said pins to a position in which a portion of said pins extends externally of said storage block,

(*d*) a key cover skirt mounted on said storage block for movement toward and away from said block in response to external forces thereon, said key cover shielding said extended portion of said key pins and having a plurality of openings therethrough concentric with said openings in said storage block,

(*e*) a locking plate movable between an active and inactive position mounted between said storage block and said key cover skirt, said locking plate being urged to an inactive positon and being provided with a plurality of openings therethrough concentric with the openings in said storage block and said key cover skirt, and

(*f*) means on said storage block for drawing said storage block toward a data display whereby said key cover skirt will be moved toward said storage block, and certain of said key pins will be moved in opposition to the urging of said spring means thereby permitting said key pins to be locked in selected positions upon movement of said locking plate from an inactive to an active positiion.

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