

C. A. BALS.
BANK OF KEYS.

APPLICATION FILED AUG. 2, 1909. RENEWED OCT. 5, 1911.

1,033,859.

Patented July 30, 1912.

2 SHEETS—SHEET 1.

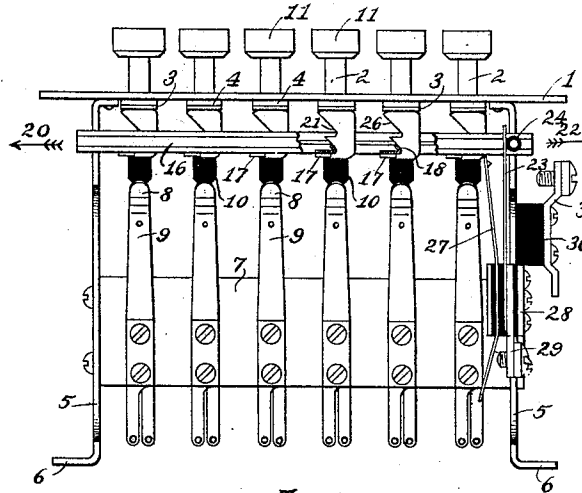


Fig. 1.

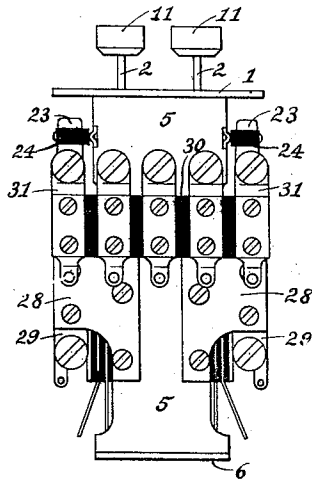


Fig. 2.

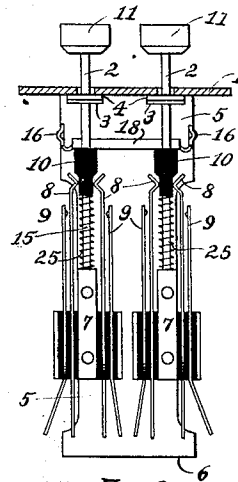


Fig. 3.

WITNESSES:

Maudie J. Baele.
Francis R. Parker.

INVENTOR:

CHARLES A. BALS

BY Frederick R. Parker
ATTORNEY.

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2 SHEETS-SHEET 2.

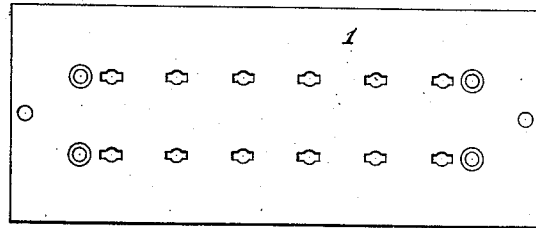


Fig. 4.

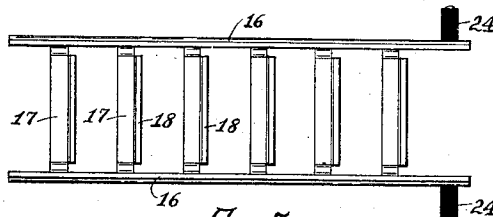


Fig. 5.

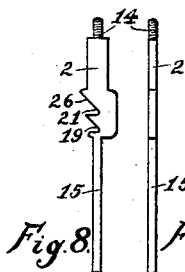


Fig. 8.

Fig. 9.

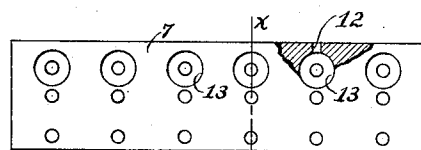


Fig. 6.

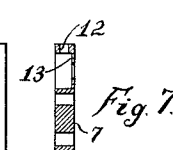


Fig. 7.

WITNESSES:

Maudie J. Ball.
Frances D. Parker.

INVENTOR:

CHARLES A. BALS
BY Frederick R. Parker
ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES A. BALS, OF CHICAGO, ILLINOIS, ASSIGNOR TO CORWIN TELEPHONE MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

BANK OF KEYS.

1,033,859.

Specification of Letters Patent.

Patented July 30, 1912.

Application filed August 2, 1909, Serial No. 510,844. Renewed October 5, 1911. Serial No. 652,959.

To all whom it may concern:

Be it known that I, CHARLES A. BALS, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Bank of Keys, of which the following is a specification, reference being had to the accompanying drawings, illustrating same.

My invention relates to electrical switching mechanism, and in particular to banks of switch keys preferably of the push-button type.

The principal objects of my invention are, to provide an improved switching arrangement for such a bank of keys, and improved means for operating such switching mechanism; to provide an improved construction in such a bank of keys and in the various parts thereof; and to provide simplicity of construction, accessibility and cheapness of manufacture in such keys.

Other objects will be apparent from the following specification.

In banks of keys heretofore made, there have been employed certain parts made of heavy metal pieces, such as castings or machined portions, to fill the various requirements. This generally produces a somewhat cumbersome bank of keys and also makes the cost of manufacture very high. In the present invention I have constructed a bank of keys almost entirely of parts punched and formed from sheet metal, thereby producing a bank of keys which has a very neat appearance and which is very much cheaper to manufacture than keys heretofore made.

In this invention I have also provided switches near one end of the bank of keys, and have arranged the latch frame for the various plungers to operate these switches, thereby greatly simplifying the construction of the keys and doing away with a great many switch-contact members usually employed in such keys. The switches at the end of the bank of keys, which are operated by the latch frame, are preferably used as common ringing switches, especially in intercommunicating telephone systems, but of course these switches may be used for any desired purpose or purposes.

In the accompanying drawings illustrating the preferred form of my invention, Figure 1 is a side elevation of the improved bank of keys, with a portion of the latch frame removed; Fig. 2 is an end elevation of the

bank of keys shown in Fig. 1; Fig. 3 is an end view of the bank of keys shown in Figs. 1 and 2, with the end portions removed to show the construction of the plungers and switches; Fig. 4 is a plan view of the top plate of the bank of keys; Fig. 5 is a plan view of the improved latch frame used in the bank of keys; Fig. 6 is a side elevation of one of the switch-contact mounting bars of the bank of keys, with a portion cut away to show the bearing for the lower ends of the plungers; Fig. 7 is a cross-sectional view of the bar shown in Fig. 6, taken on plane *x x* of Fig. 6; Fig. 8 is a side elevation of the improved sheet metal plunger used in the bank of keys; and Fig. 9 is an edge elevation of the improved plunger shown in Fig. 8.

Like characters refer to like parts in the several figures.

In the drawings 1 is the top plate through which the sheet metal plungers 2 2 extend, each plunger 2 carrying a metal washer 3 and a cushion member 4 underneath the plate 1 for forming a cushion for the plunger when same is thrown up through the plate 1.

At each end of the bank of keys is provided a formed sheet metal portion 5 adapted to be mounted to a suitable support at their lower outturned ends 6 6. Mounted between the end plates 5 5 are one or more bars 7 7 carrying sets of switch-contact members 8 8 9 9, preferably as shown, these switch-contact members being suitably insulated from each other and also from the bars 7 7.

Each of the plungers 2 2 carries an insulating portion 10 adapted to press the corresponding spring members 8 8 outwardly into engagement with the corresponding spring members 9 9 respectively, when the thumb piece 11 of the plunger is properly depressed. These switch springs or contacts may extend to any suitable circuits, in some instances some of them being connected in common through the bank of keys. They may if desired be connected so as to connect a telephone set with a plurality of telephone lines, as is generally done in an intercommunicating telephone system.

Each of the bars 7 7 is provided with a series of holes 12 in the upper edge thereof, to accommodate the lower ends of the plungers 2 2, the bars 7 7 being also recessed

as at 13 to provide a short bearing at 12 for the ends of the plungers. This construction greatly reduces the friction on the plungers 2 2 and thereby gives them an easier action.

5 The plungers 2 2 are preferably formed out of sheet metal as shown in Figs. 8 and 9, the upper ends having screw threads 14 formed thereon for connecting the thumb pieces 11 with the plungers. The lower portions 15 15 of the plungers 2 2 are preferably rounded off to provide a round pin. These plungers 2 2 can be readily formed in suitable dies without having any machine work done thereon.

15 The latch frame illustrated, and shown more in detail in Fig. 5, is formed from a piece of sheet metal. It comprises a pair of upturned side portions 16 16 adapted to slide in suitable notches in the end plates 5 5 preferably as shown, and a plurality of cross-strips 17 17 each of which is formed with an upturned edge portion 18 preferably as shown. The upturned edge portions 18 18 fit in notches 19 19 in the plungers 2 2 when the latter are in their raised positions. When, however, one of the plungers 2 2 is depressed so as to cause the corresponding spring members 8 8 to engage the corresponding spring members 9 9 respectively, the latch plate is moved in the direction of arrow 20 until the plunger is depressed far enough to allow the corresponding portion 18 to slip back into the upper notch 21 in the plunger 2 which is being depressed. The latch frame is moved in the direction of arrow 22 by one or more spring members 23 23 which bear against insulating hubs 24 24 carried by the latch frame. Each of the plungers 2 2 has a coil spring 25 encircling the lower end thereof and tending to throw the plunger to its uppermost position shown in Fig. 1. When the portion 18 engages the upper notch 21 of a plunger 2, as just described, the plunger is thereby locked in depressed position and cannot be thrown to its uppermost position until released. Now if another plunger 2 is depressed, the latch frame will be again moved in the direction of arrow 20 so that any of the other plungers which may have been depressed are thereby released, the corresponding springs 25 25 then throwing them to their uppermost position. Thus it will be seen that depressing any of the plungers to locking position releases any of the other plungers which may have been previously locked in depressed position.

The notches 21 21 in the plungers 2 2 have beveled upper edge portions 26 26 adapted to move the latch frame in the direction of arrow 20 and thereby release any of the other plungers which may have been locked in depressed position. These beveled surfaces 26 26 are long enough so that by depressing any of the plungers 2 2 past

locking position the latch frame may be moved in the direction of arrow 20 somewhat farther than by merely depressing the plungers to locking position. This farther movement of the latch frame causes the spring members 23 23 to engage corresponding spring members 27 27, to close suitable circuits as desired, the spring members 23 23 and 27 27 being preferably mounted on one of the end plates 5 5 by means of suitable mounting plates 28 28 secured to the end plate 5, the springs 23 23 and 27 27 being suitably insulated from each other and from the plates 28 28. Each of the springs 23 23 is preferably provided with a heavy terminal member 29 electrically connected therewith as shown. Of course it will be readily understood that the spring members 23 23 may be made to operate any number of switch contacts in any manner desired, to control suitable circuits. It will be readily seen that this arrangement of causing the latch frame to operate suitable switch contacts, by depressing the plungers 2 2 past locking position, does away with a great many individual contact members for the various keys, as where each key is caused to control individual contact members by a depression thereof past locking position.

At one end of the bank of keys is preferably mounted a strip of insulation 30 carrying a plurality of terminal members 31 31 which may be suitably connected to the terminals of the bank of keys as desired.

It will be readily understood that the latch frame may operate its switches to control suitable circuits, either when a plunger is depressed to locking position, or depressed past locking position, whichever is desired.

It will readily be seen that by making the top plate 1, the plungers 2 2, the end plates 5 5, and the latch frame, all out of sheet metal, a bank of keys is provided which is very simple in its construction, very durable, and very cheap to manufacture.

I do not wish to limit this invention to all of the particular details herein set forth, as various modifications of same may be made without departing from the scope of the appended claims.

What I claim as my invention is:

1. In switching apparatus of the character described, the combination with a supporting frame, of a plurality of actuating plungers carried thereby, suitable switch contacts for each of the plungers and adapted to be operated thereby, a latch frame adapted to be actuated by the depression of any of the plungers to switching position, means for causing the latch frame to lock the plungers in the aforesaid depressed position, switch contacts adapted to be operated by the latch frame, and means whereby a further depression of any of the plungers

past locking position moves the said latch frame still farther in a longitudinal direction and thereby causes same to operate the last-mentioned switch contacts.

5 2. In switching apparatus of the character described, the combination with a supporting frame, of a plurality of reciprocating plungers and a plurality of switches carried by the said frame, each of the plungers having a normal position and a locking position and being capable of being depressed past locking position, a latch frame adapted to lock the plungers in locking position, the said plungers being adapted to operate the said switches when depressed to locking position, and also to give the said latch frame a longitudinal movement, switching mechanism adapted to be operated by the said latch frame, and means whereby a further depression of any of the plungers past locking position gives the said latch frame a greater longitudinal movement whereby it is caused to operate its said switching mechanism.

25 3. In switching apparatus of the character described, the combination with a supporting frame, of a plurality of actuating plungers carried thereby, switching mechanism for each plunger adapted to be operated thereby, a latch frame adapted to lock the plungers in depressed position, means upon depression of a plunger to locking position for causing simultaneous actuation of the latch frame for purposes substantially as described, switching mechanism adapted to be operated by the said latch frame, and means whereby a further depression of any

of the plungers past locking position gives the said latch frame an extreme longitudinal movement whereby it is caused to operate its said switching mechanism.

4. In switching apparatus of the character described having a plurality of plungers and switches adapted to be operated thereby, a latch frame for the plungers whereby the latter may be locked in depressed position, switching mechanism adapted to be operated by the latch frame, and means whereby a further depression of a plunger past locking position gives the said latch frame a longitudinal movement to cause same to operate its switching mechanism.

5. In a bank of keys of the character described, a suitable frame, mounting bars carried by the said frame and carrying sets of spring members, a plurality of plungers for operating the said spring members upon depression thereof, each mounting bar having an opening in an edge thereof, into which openings the ends of the said plungers extend, the said mounting bars being recessed from one side thereof to meet the said openings therein whereby the bearings for the said inserted ends of the plungers are reduced as desired, substantially as described.

As inventor of the foregoing I hereunto subscribe my name this 31st day of July, 1909.

CHARLES A. BALS.

Witnesses:

FRANCES K. PARKER,
FREDERICK R. PARKER.