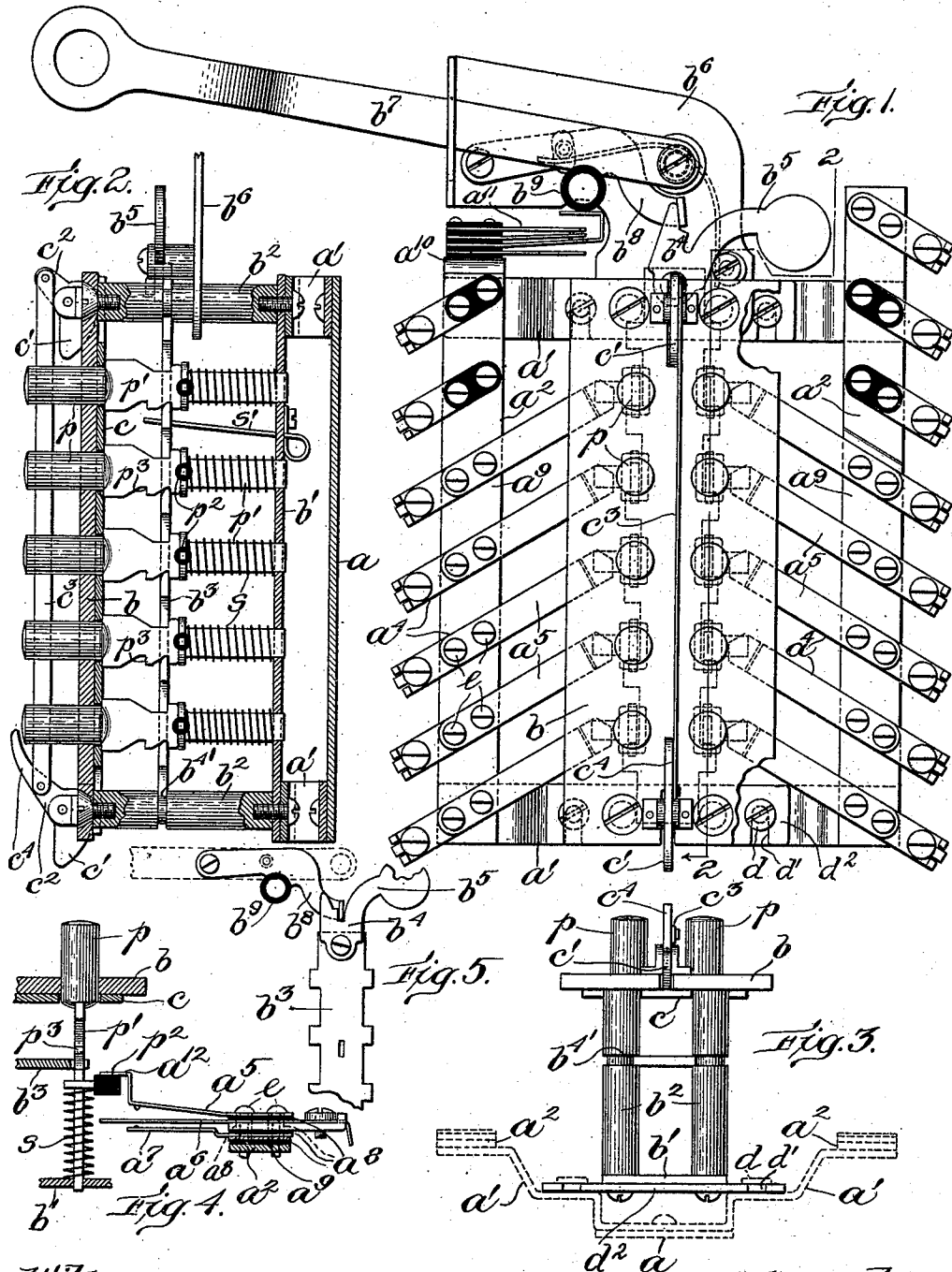


S. A. KOLTONSKI.
 TELEPHONE SWITCH APPARATUS.
 APPLICATION FILED JAN. 21, 1910.

982,213.

Patented Jan. 17, 1911.



Witnesses:

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UNITED STATES PATENT OFFICE.

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TELEPHONE SWITCH APPARATUS.

982,213.

Specification of Letters Patent.

Patented Jan. 17, 1911.

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To all whom it may concern:

Be it known that I, STANISLAW A. KOLTONSKI, a subject of the Czar of Russia, and resident of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Telephone Switch Apparatus, of which the following is a specification.

This invention relates to a telephone switch apparatus and particularly to a switch apparatus of the kind which forms the subject matter of my copending application Serial No. 448,133, filed by me August 12, 1908, allowed June 23, 1909.

The invention consists in certain features set forth in said application and reserved for a separate application, and also in certain modifications of and improvements upon the apparatus set forth in said application.

Referring to the drawings which illustrate one embodiment of my invention,—Figure 1 is a front view of a telephone switch apparatus embodying the invention; Fig. 2 is a longitudinal sectional view of said apparatus on line 2—2 of Fig. 1, viewed in the direction of the arrow; Fig. 3 is an end elevation of the upper frame-part of the apparatus viewed from the lower end of Fig. 1; Fig. 4 is a detail view, partly in cross section and partly in elevation, showing one of the groups of branch circuit contact springs and the plunger for operating the same; and Fig. 5 is a detail view on a reduced scale of the mechanism for operating the latch plate from the receiver hook, showing the position assumed when the receiver hook is depressed.

The apparatus illustrated in the drawings comprises a readily separable two-part frame, one of which parts, which may be termed the inner part, carries all the groups of circuit springs including the group operated by the receiver hook, said inner frame part and groups of circuit springs constituting a self-contained separable unit complete in itself, and the other of which parts, which may be termed the outer part of the frame, carries all the switch operating devices including the receiver hook lever, and constitutes a removable self-contained unit complete in itself.

The inner part of the separable frame consists of a base plate a which may be fastened, if desired, to a wall, board or other suitable support; cross arms a' one at each end of the base plate a ; and side bars a^2 connecting the

ends of the cross arms, which side bars carry the groups of circuit springs for the branch or intercommunicating circuits. The arms a' are bent upwardly or outwardly from the base as best shown in dotted lines in Fig. 3, so as to bring the circuit springs forward into the path of the circuit spring operating devices presently to be described.

Mounted on each bar a^2 is a row of groups of circuit springs a^4 , the several springs of which lie flat or substantially parallel with relation to the base, and are susceptible of a forward and backward play when the apparatus is viewed in its normal or upright position. Each group a^4 of the circuit springs is composed of a spring a^5 for the talking circuit, a spring a^6 for the line circuit and a spring a^7 for the ringing or signaling circuit. These circuit springs are insulated from one another at their bases as shown at a^8 and the several springs a^7 are mounted upon and connected by a thin plate a^9 which serves as a bus bar, and is insulated from the side bar a^2 as shown at a^8 . It will be noted that the groups a^4 of circuit springs are in rows lying in a plane perpendicular to or transverse of the plane of the plungers, hereinafter described, and that the several groups of circuit springs extend diagonally of the axis of the frame into the paths of the several switch operating studs carried by the plungers. The several springs of each group are fastened together and fastened to the side bar a^2 by screws e . Said screws are insulated from the line springs a^6 , the signaling springs a^7 and the plate a^9 , but form an electrical connection between the talking springs a^5 and the side bar a^2 , which serves as a bus bar connecting the talking springs. All of said insulations are indicated by the reference character a^8 .

The upper end of the side bar a^2 at the side of the apparatus toward which the receiver hook extends is turned backwardly at right angles, as shown at a^{10} , forming a support, to which is secured the group a^{11} of the circuit springs controlled by the receiver hook. The wiring of the circuits controlled by the several circuit springs above described may be of usual arrangement and does not need to be particularly described or illustrated.

The outer part of the separable frame consists of the outer plate b , and the inner plate b' connected by posts b^2 . The plates b and b'

are provided with apertures through which the switch operating plungers extend and in which they play. Each plunger for the intercommunicating circuits comprises a key portion p extending through an aperture in the outer plate b and a shank p' which extends through an aperture in the inner plate b' . The shank p' carries a circuit spring operating stud p^2 , which is of insulating material, and is fastened to the shank p' in any suitable manner. A coil spring s surrounds the shank p' of each plunger and is held between the inner plate b' and a collar on the plunger thereby normally urging the plunger outward toward its inoperative position. The shank of each plunger is also provided with a catch p^3 to engage the latch plate b^3 , which is mounted to slide lengthwise in the grooves b^{41} of the posts b^2 , and is normally held in elevated position by the spring s' , secured at one end to the inner plate b' and extending through a hole in latch plate b^3 . The latch plate b^3 is provided with notches or shoulders, adjacent to each catch p^3 on the plungers, and when any plunger is depressed, said latch plate is adapted to engage the catch p^3 and hold the plunger in depressed or operative position until released by the depression of another plunger or by the receiver hook, in the manner fully set forth in my copending application above referred to. At the upper end of latch plate b^3 is a dog b^4 having a weighted arm b^5 which operates in the same manner as the similar spring-pressed dog described in said application. Secured to the upper posts b^2 of the outer frame part and forming a part of the outer frame is a bracket b^6 , to which is pivoted the receiver hook b^7 . Said bracket, receiver hook, the lever b^8 , and stud b^9 for operating the group of circuit springs a^{11} , are all as more particularly described in said application. Thus it will be seen that the device comprises a readily separable two-part frame, the inner part of which carries all the circuit springs including the group of circuit springs operated by the receiver hook and the outer part of which carries all the circuit spring operating devices including the receiver hook; and that each separable part, and the devices carried thereby, constitute a unit complete in itself, which may be detached from the other unit without dismembering or disturbing any of the parts carried by the respective frame members, and without disturbing any of the electrical connections with the circuit springs. It is, therefore, possible quickly and conveniently to remove the outer frame and its devices from the lower frame and its devices for the purpose of repair or inspection without disturbing the inner frame part, the circuit springs or the wiring connected with and controlled by said circuit springs. It will also be seen that as the several groups of branch

or intercommunicating springs a^4 are arranged diagonally to the axis of the apparatus, one edge thereof faces partially outward, so that the contacts between said springs may be readily inspected; also that as the springs are operated by laterally extending projections p^2 the contacts between said springs instead of being underneath the plungers are brought to the side of the rows of plungers where they are unconcealed either by the plungers or the frame, thus greatly facilitating the inspection or repair of said springs or contacts. By referring to Fig. 4 it will also be seen that the upper spring or talking spring a^5 is provided with an offset portion a^{12} , spaced apart from the line spring a^6 , to afford room for the spring operating projection p^2 . The projection p^2 normally holds the talking spring a^5 out of contact with the spring a^6 as shown in Fig. 4, and the line spring a^6 is normally out of contact with the signaling spring a^7 . When the plunger p is depressed the first part of the movement permits the talking spring a^5 to make contact with the line spring a^6 and the complete stroke of the plunger again disconnects said springs and connects the line spring a^6 and the signaling spring a^7 . This final movement carries the catch p^3 of the plunger some distance below the latch plate b^3 so that after the signal has been rung and the plunger p is released, the plunger p will be returned by the coil spring s until the catch p^3 engages the under side of latch plate b^3 , in which position the talking spring a^5 and the line spring a^6 will be connected while the line spring a^6 and the signaling spring a^7 will be disconnected.

The plungers p^3 will ordinarily be operated individually. Should it be desired however to depress all the plungers at once, in order to call up simultaneously all the stations on the branch or intercommunicating system, as might be desired when the apparatus is used, for example, in a factory connecting several departments, I have provided a plate c which lies just underneath the outer plate b of the top frame, and is provided with perforations through which the plungers p extend. The plate c engages shoulders at the upper ends of the shanks p' of the several plungers. When a plunger p is depressed in the usual way it will play freely through said plate c as though the latter were a part of the plate b . Should it be desired to depress all the plungers simultaneously, the plate c is moved inwardly, thereby carrying with it all the plungers at once, by means of the shoulders on the shanks of the plungers engaging said plate c . The mechanism herein shown for moving the plate c for this purpose, consists of a cam or eccentric c' mounted at each end of the plate b of the outer frame and extending through a slot in the plate b into en-

gagement with the plate *c*. In order that the two cams *c'* and *c''* may operate the plate *c* equally and uniformly throughout its body, said cams are provided with arms *c²*, *c²*, connected by a link *c³*, and one of said arms is provided with a handle or lever *c⁴*, by swinging which downward both cams will be operated in unison to move the plate *c* inward and depress the plungers.

Inasmuch as the operating projections *p²*, in my preferred construction, extend between the offset portions *a¹²* of the talking springs and the ends of the line springs *a⁶*, it is necessary when separating or uniting the two frame members to move the same relatively longitudinally until the studs *p²* pass clear of, or pass under, as the case may be, the offset parts *a¹²*. To facilitate bringing the circuit springs and projections *p²* into coöperative relationship as described, said frame parts are provided with a sliding connection consisting of screws *d* in the arms *a'* of the inner frame, which engage the open ended slots *d'* in the cross pieces *d²* secured to the ends of the outer frame. When assembled as shown in the drawings the screws *d* may be set up thus holding the two frames firmly in coöperative relationship. When the frames are to be separated, the screws *d* are loosened, and the outer frame moved endwise until the slots *d'* are clear of the screws; the projections *p²* will then also be clear of the circuit springs and the outer frame and the devices carried thereby will be free to be removed from the inner frame.

I claim:

1. A telephone switch apparatus, comprising a separable two-part frame, one of which parts carries the switching devices consisting of the plungers and the movable receiver hook, and the other of which parts carries groups of circuit springs adapted to be operated by said plungers and also a group of circuit springs adapted to be operated by said receiver hook, said switching devices and groups of circuit springs arranged to come respectively into coöperative relationship when the two frame parts are placed together, and said first named frame part together with the plungers and receiver hook adapted to be removed from the second named frame part carrying the circuit springs, without disturbing any of the electrical connections of the circuit springs.

2. A telephone switch apparatus, comprising a separable two-part frame consisting of an inner part and an outer part, the outer part of the frame having a bracket supporting the receiver hook, and carrying switching plungers, means for normally holding the plungers in inoperative position, and means for holding them in operative position and releasing them therefrom, and the inner part of the frame carrying a group

of circuit springs adapted to be operated by the receiver hook and also carrying groups of circuit springs adapted to be operated by said plungers, said receiver hook and plungers and their appropriate groups of circuit springs arranged respectively to come into coöperative relationship when the two frame parts are placed together, and said outer frame part and the devices carried thereby adapted to be removed from the inner frame part and the circuit springs carried thereby, without disturbing the electrical connections of the circuit springs.

3. A telephone switch apparatus, comprising a base, groups of circuit springs mounted on said base adapted to be operated by the switching plungers, a group of circuit springs mounted on said base adapted to be operated by the receiver hook, and a removable frame separably fastened to said base carrying a movable receiver hook and a plurality of switching plungers, said removable frame and the devices carried thereby adapted to be removed from the base as a unit without disturbing the electrical connections of the circuit springs on the base.

4. A telephone switch apparatus comprising a plurality of groups of circuit springs, a plurality of individually movable plungers adapted to operate said circuit springs, a frame in which said plungers are mounted, each plunger being provided with a shoulder, and a plate movable in said frame normally constituting a stop or abutment for the shoulders of the several plungers, and adapted, when moved inwardly, to operate all of said plungers simultaneously by means of said shoulders.

5. A telephone switch apparatus comprising a plurality of groups of circuit springs, a plurality of individually movable plungers adapted to operate said circuit springs, a frame having an outer plate through which said plungers play, each plunger being provided with a shoulder, and another plate movable in said frame and normally lying immediately underneath said outer plate, said movable plate normally constituting a stop or abutment for the shoulders of the several plungers, and adapted when moved inwardly away from said outer plate to operate all of said plungers simultaneously by means of said shoulders.

6. A telephone switch apparatus comprising a plurality of groups of circuit springs, a plurality of individually movable plungers adapted to operate said circuit springs, and means to move all of said plungers simultaneously to operate all of said groups of springs at once, said means comprising a movable plate provided with apertures through which said plungers pass, projections on said plungers engaging the under side of said plate and means to move said plate to depress the plungers.

7. A telephone switch apparatus comprising a plurality of groups of circuit springs, a plurality of individually movable plungers adapted to operate said circuit springs, and means to move all of said plungers simultaneously to operate all of said groups of springs at once, said means comprising a movable plate engaging all of said plungers, cams adapted to move said plate, and means to actuate said cams.

8. A telephone switch apparatus comprising a plurality of groups of circuit springs, a plurality of individually movable plungers adapted to operate said circuit springs, and means to move all of said plungers simultaneously to operate all of said groups of springs at once, said means comprising a movable plate, and means at each end of said plate to move the plate to the same extent throughout its body, to depress the plungers.

9. A telephone switch apparatus comprising a plurality of groups of circuit springs, a plurality of individually movable plungers adapted to operate said circuit springs, and means to move all of said plungers simultaneously to operate all of said groups of springs at once, said means comprising a movable plate, means at each end of said plate to move the plate to the same extent throughout its body to depress the plungers, and a single handle to actuate said plate-moving means.

10. A telephone switch apparatus comprising a plurality of groups of circuit springs, a plurality of individually movable plungers adapted to operate said circuit springs, and means to move all of said plungers simultaneously to operate all of said groups of springs at once, said means comprising a movable plate engaging all of said plungers, a cam at each end of said plate adapted to move the same, a single operating handle and connections between said handle and said cams to actuate both together to move the plate and depress the plungers.

11. In a telephone switch apparatus, a frame, a plurality of switching plungers mounted in said frame having on their sides laterally extending spring-operating projections, groups of circuit springs mounted at the side of said plungers lying in a plane transverse of the plane of the plungers, said springs extending toward the paths of said plungers and into the paths of said projections but terminating short of the paths of said plungers, whereby said springs are located wholly at the side of and outside the path of said plungers.

12. In a telephone switch apparatus, a frame, a row of switching plungers mounted in said frame provided with laterally extending projections, a row of groups of circuit springs mounted at the side of said plungers, lying in a plane transverse of the

plane of the plungers, and extending diagonally to the row of plungers into the plane of said lateral projections, whereby the contact points between said springs will be unconcealed by said frame or by said plungers, and the edges of said springs at one side will face outwardly, the contact points thus being readily accessible for inspection or repair.

13. In a telephone switch apparatus, a frame, a switching plunger mounted in said frame provided with a laterally extending projection, and a group of circuit springs mounted at the side of said plungers and extending in a line transverse of the axis of the plunger into the path of said projection, and adapted to be operated thereby, two of the springs of said group being spaced apart at their ends and said projection extending into the space therebetween.

14. In a telephone switch apparatus, a frame, a switching plunger mounted in said frame provided with a laterally extending projection, and a group of circuit springs mounted at the side of said plunger, and extending in a line transverse of the axis of the plunger into the path of said projection, said group of contact springs comprising a spring for controlling the talking circuit, a spring for controlling the line circuit and a spring for controlling the bell or signal circuit, the talking spring and the line spring being spaced apart at their ends, and said projection on the plunger extending into the space therebetween.

15. In a telephone switch apparatus, a frame, a switching plunger mounted in said frame provided with a laterally extending projection, and a group of circuit springs mounted at the side of said plunger, and extending in a line transverse of the axis of the plunger into the path of said projection, said group of contact springs comprising a spring for controlling the talking circuit, a spring for controlling the line circuit and a spring for controlling the bell or signal circuit, the talking spring and the line spring being spaced apart at their ends, and said projection on the plunger extending into the space therebetween, and normally holding the talking spring out of contact with the line spring and adapted when depressed first to permit the talking spring to make contact with the line spring and thereafter to move the line spring out of contact with the talking spring and into contact with the signal spring.

16. In a telephone switch apparatus, a frame, a switching plunger mounted in said frame provided with a laterally extending projection, and a group of circuit springs mounted at the side of said plunger and extending in a line transverse of the axis of the plunger into the path of said projection, said group of contact springs comprising a

spring for controlling the talking circuit, a
spring for controlling the line circuit and a
spring for controlling the bell or signal cir-
cuit, the end of the talking spring being
5 bent to form an outwardly offset portion,
and the projection on the plunger extending
between said offset portion and the end of
the line spring, normally holding the talk-
ing spring out of contact with the line
10 spring and adapted when depressed first to
permit the talking spring to make contact
with the line spring and thereafter to move
the line spring out of contact with the talk-
ing spring and into contact with the signal
15 spring.

17. In a telephone switch apparatus, a

frame having an inner and an outer plunger
guide, a plurality of switching plungers
mounted in said guides, said plungers pro-
vided with circuit spring operating means 20
located between said inner and outer guides,
groups of circuit springs mounted at the
side of said plungers lying in a plane trans-
verse of the plane of the plungers and ex-
tending into the paths of said spring-oper- 25
ating means.

Signed by me at Boston, Massachusetts,
this 19th day of January 1910.

STANISLAW A. KOLTONSKI.

Witnesses:

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