Dec. 22, 1953

E. R. MELLINGER ET AL

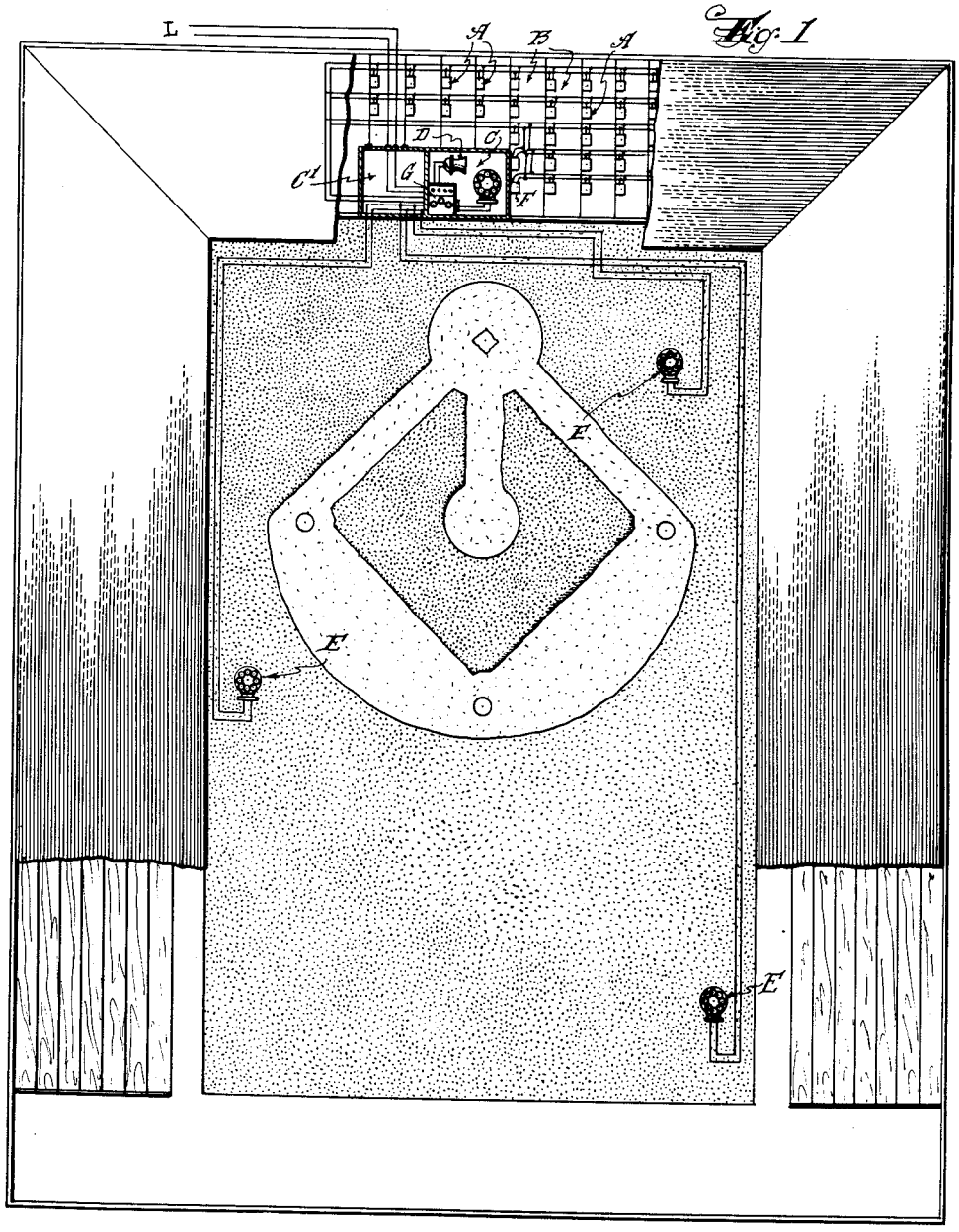
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KEY PLUG FOR SPECTATOR ANNOUNCEMENT SYSTEMS FOR PUBLIC EVENTS

Original Filed Dec. 21, 1948

4 Sheets-Sheet 1

Fig. 1



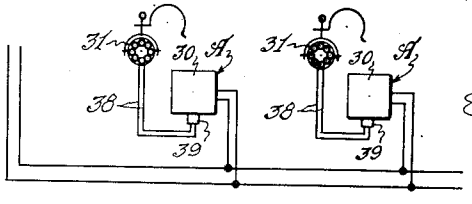


Fig. 2

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4 Sheets-Sheet 2

Fig. 3

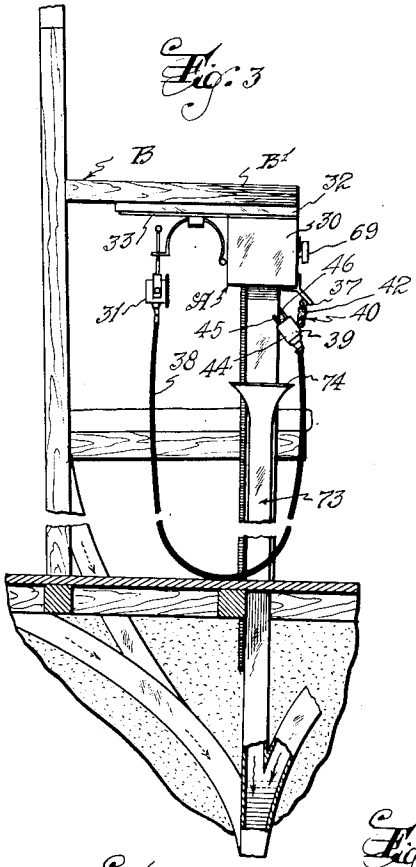


Fig. 4

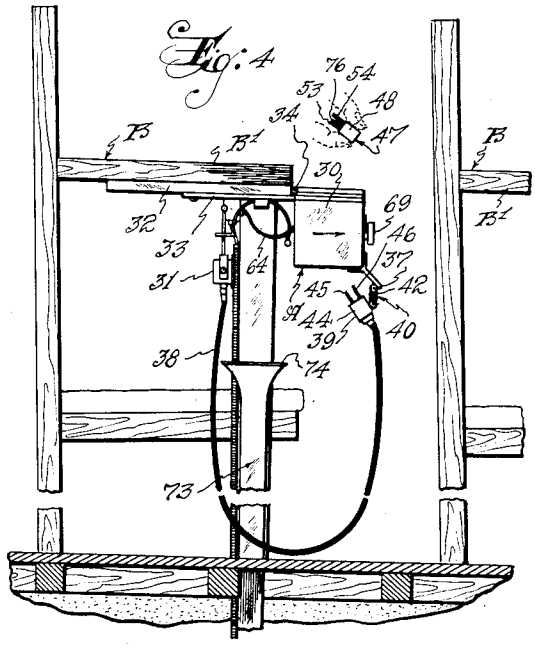
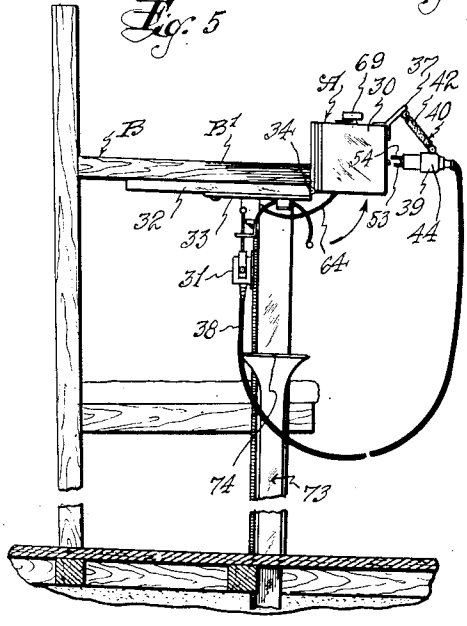
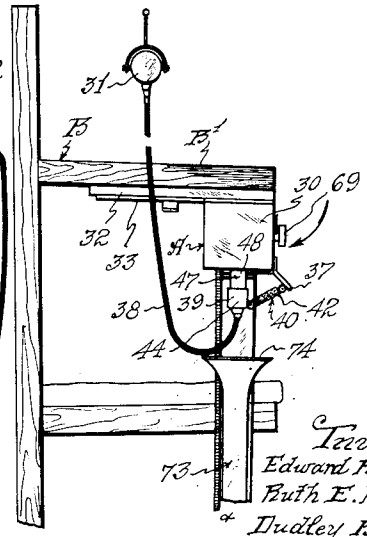


Fig. 6

Fig. 5





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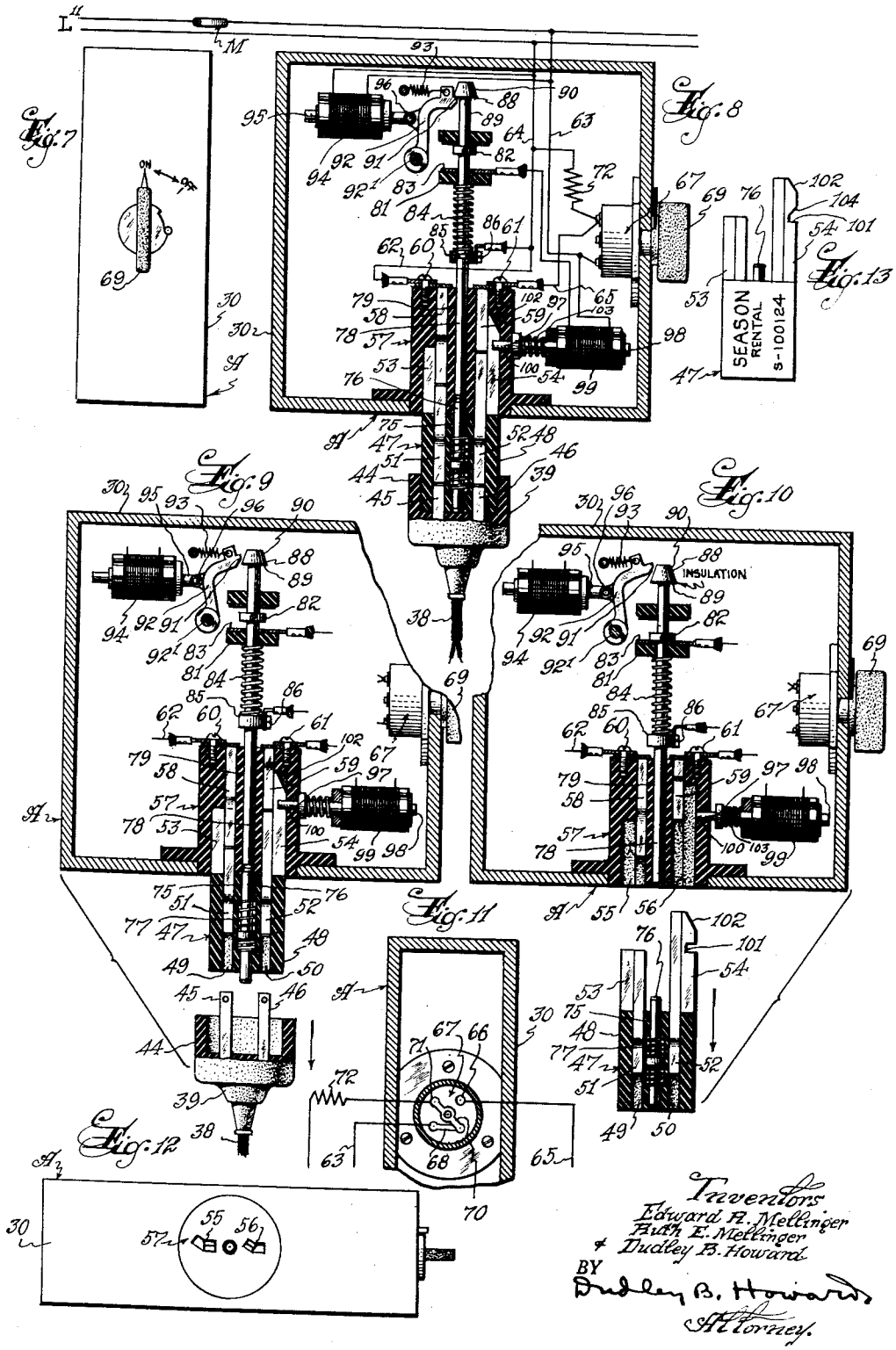
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KEY PLUG FOR SPECTATOR ANNOUNCEMENT SYSTEMS FOR PUBLIC EVENTS

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Fig. 14

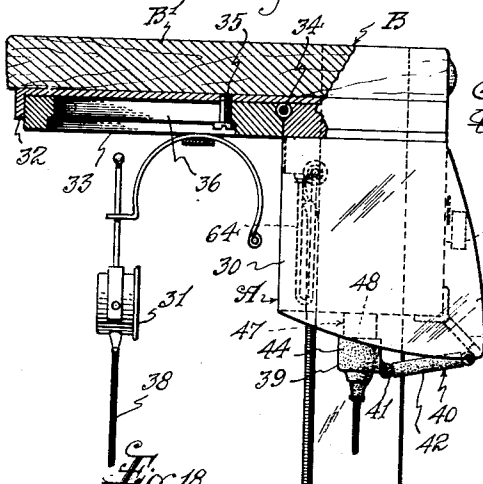


Fig. 16

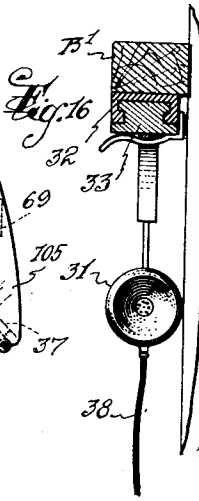


Fig. 15

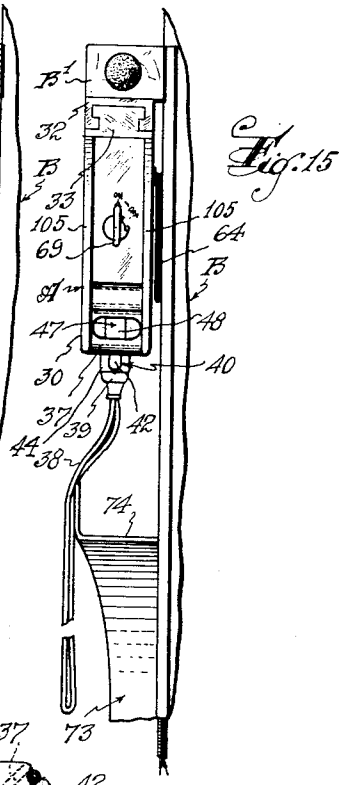


Fig. 18

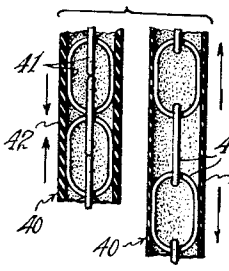


Fig. 17

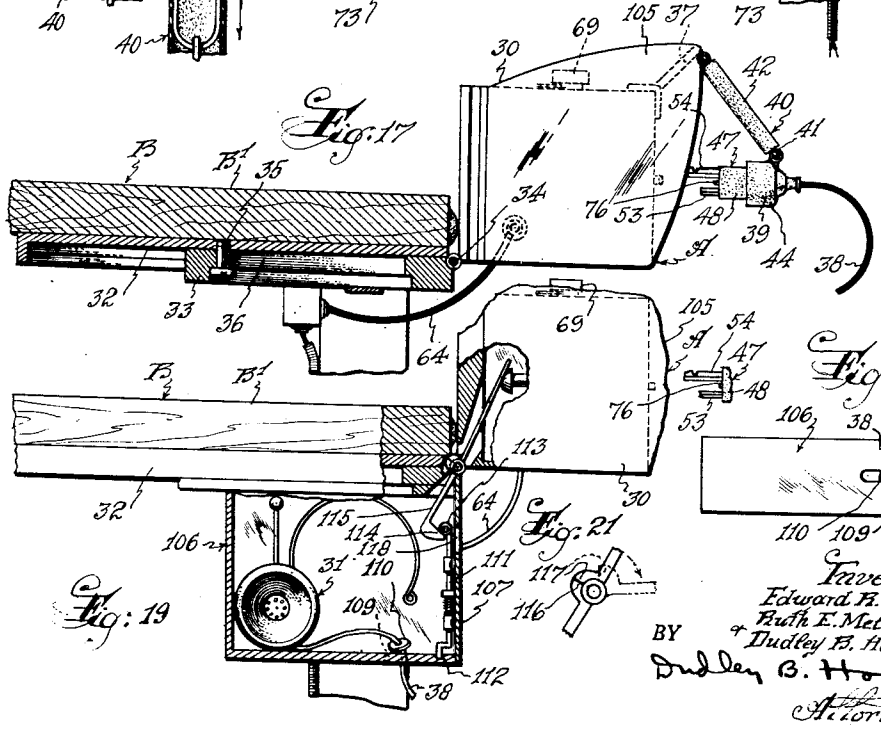


Fig. 20

Fig. 19

Fig. 21

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UNITED STATES PATENT OFFICE

2,663,850

KEY PLUG FOR SPECTATOR ANNOUNCEMENT SYSTEMS FOR PUBLIC EVENTS

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Original application December 21, 1948, Serial No. 66,412. Divided and this application June 11, 1952, Serial No. 294,594

10 Claims. (Cl. 339—45)

1

The invention relates in general to local electrical voice communication systems of which an example is the public address system, and has particular reference to a specially designed communications system adapted to the local reporting of public events for the benefit of spectators. By "public events" is meant individual athletic games which may or may not be included in a scheduled series, racing programs and aircraft demonstrations which may embrace a number of consecutive sub-events, horse shows and other animal shows, political conventions, and the like.

This application is a divisional of our co-pending application, Serial Number 66,412, filed December 21, 1948, for improvements in Spectator Announcement System for Public Events, now abandoned.

Prior to our invention, running accounts of public events have been made available exclusively to persons in their homes and at other places remote from the scene of the events through the medium of radio or television broadcasting. With the exception of brief, infrequent loudspeaker announcements of incidents of special interest, such as the names of principal participants and substitutions therefor as they are made, the spectators at public events have had to depend upon their own direct observation to follow the progress of the action.

In some kinds of public events, such as baseball and football games, the regular fans may be able to comprehend nearly everything that takes place by closely watching the action. They know at least the celebrated players by sight and have developed such keen interest in the outcome of the game that they miss very little that occurs. There are others, however, who attend sports events less frequently and are not so closely attuned to the contest in progress. Persons in this category, particularly those who have defective vision or have lost some of their youthful alertness, miss a great deal of the action and heretofore have had to rely upon their better informed neighbors at the game to keep them posted. Although they enjoy the atmosphere of the game and those parts of the action which they are able to comprehend, they really need to have their powers of visual perception supplemented by announcement service somewhat like that which is at the disposal of the radio and television audiences. However, it is impracticable to use radio sets or loud speakers at the scene of a sports event to broadcast a running account of the action for the benefit of a minority of the spectators, principally because of the great annoyance to others present who do not need such service.

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In the case of certain other public events, such as horse shows and other animal shows and aircraft demonstrations, the entire assemblage of spectators would benefit by a running account of the sub-events that make up the whole. In these events, greater importance is attached to the individual entrants or performers and there usually is not the continuity of action as in an athletic game. Consequently, it oftentimes is very difficult to keep in close touch with all details of the action by visual observation from a fixed position in the stands. This handicap is, in this instance, more detrimental to the habitues and to those who may have a personal interest in certain particular entrants than to the casual spectator. Heretofore, in this class of public events greater use has been made of the public address system as a means of supplementing the direct observation of spectators by reports from announcers more advantageously located. However, any such service has had to be restricted to the announcement of entrants and the results of individual contests, for otherwise there would be an objectionable continuous blare of loudspeakers.

With the above situation in mind, it has been our primary object to serve the needs of spectators at public events by providing a local communications system which includes individual telephone receivers suitably located for convenient use by those spectators who desire the service, together with means whereby a special announcer may transmit for their benefit an account of the action, which necessarily will be a version of the usual radio and television broadcast modified to suit the needs of listeners who are in direct observation. Obviously, the customary broadcast contains animated, crescendo utterances intended to convey the spirit of the event to the distant audience, and also mention of details which any spectator can see with his own eyes and fully comprehend. In accordance with our invention, the special announcer occupies a control booth located in a position which affords a clear view of the action and has at his disposal means for listening in on the radio and television broadcast, together with additional means by which he may switch the latter into the local announcement system whenever the announcements being broadcast happen to be appropriate for verbatim consumption by spectators.

Another object of the invention is to provide an announcement system for spectators which embodies means for restricting use of the individual telephone receivers to those spectators who have paid a toll charge. In this feature, we have

departed from the usual employment of coin-controlled apparatus, because of its inherent defects which we have sought to avoid. Instead, we have provided seat-installed jackboxes in electrical connection with the system and associated telephone receivers which are disconnected electrically from the jackboxes when not in use and which can be plugged into the latter only by means of special portable key-plugs that must be procured from the ticket office when buying an admission ticket. The key-plug in effect is rented for a specified period of use, which is usually for the duration of a daily public event.

A further object is to provide means for automatically locking the key-plugs in inserted position in the jackboxes in order to prevent unauthorized retention beyond the period of time contemplated in the implied rental agreement for subsequent re-use without paying for it. However, to admit of an arrangement whereby key-plugs may be rented for extended use, such as for a season of sports events, we have provided key-plugs of modified key characteristics which may be extracted by the spectator at any time and thus may be retained in his possession. Supplementary to the locking means, releasing means operable only by the operator of the public events establishment is provided to permit release and extraction of all key-plugs from the jackboxes at the end of each public event, after all spectators have gone.

A still further object is the provision of means associated with all jackboxes, whereby an operator at a central control location may electrically disconnect all key-plugs from the telephone receivers, release all key-plugs from the jackboxes, and cause the key-plugs to be conveyed by mechanical means to one or more collection containers. This feature is intended to make it unnecessary for attendants to make a tour of the seats for the purpose of gathering up the key-plugs.

Other objects and advantages of the invention will appear as the following specific description is read in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary plan view of a baseball stadium equipped with the spectator announcement communications system;

Fig. 2 is a diagrammatic view of the telephone receiver installation for a pair of adjoining seats in the grandstand;

Fig. 3 is a fragmentary side elevation of a seat equipped with the individual spectator communication facilities unit, showing the telephone receiver suspended in condition of disuse;

Fig. 4 is a similar view, showing the jackbox in the first stage of movement into convenient position for plugging in the receiver and with the key-plug being held in readiness;

Fig. 5 is a similar view, showing the jackbox in final stage position for the plugging-in operation, the key-plug being shown applied to the receiver plug and about to be inserted in the jackbox sockets;

Fig. 6 is a similar view, showing the jackbox restored to normal position with the receiver in position of use;

Fig. 7 is a simplified front elevation of the jackbox, showing the local receiver switch in closed, or "on", condition;

Fig. 8 is a vertical sectional view of the jackbox, with diagrammatic representation of the electrical circuits, showing the telephone receiver cord (broken away) plugged in and the current turned on in the communications system;

Fig. 9 is a similar exploded view, partly broken away, with the operative parts shown in the condition wherein the local receiver switch is closed but the current has been turned off in the communications circuit system to eject the receiver plug from the key-plug;

Fig. 10 is a view similar to Fig. 9, with the operative parts in the condition wherein the communications current has been turned on again to eject the key-plug;

Fig. 11 is a fragmentary transverse sectional view of the jackbox, with diagrammatic representation of the electrical circuits, showing the local switch in open condition;

Fig. 12 is a bottom plan view of the jackbox when the key-plug has been ejected;

Fig. 13 is a detail side elevation of a modified form of key-plug;

Fig. 14 is a fragmentary side elevation, on an enlarged scale, of a seat arm with the individual spectator unit installed, showing the slideway for the jackbox in longitudinal vertical section, the receiver being shown plugged in but suspended in position of disuse;

Fig. 15 is a front elevation similar to Fig. 14;

Fig. 16 is another similar view, showing the slideway for the jackbox in transverse vertical section;

Fig. 17 is a view similar to Fig. 14, showing the jackbox in withdrawn, up-tilted position with the joined receiver plug and key-plug about to be plugged;

Fig. 18 is an exploded fragmentary view of the rubber-sheathed securing chain for the telephone receiver, showing the chain both in contracted condition and in expanded condition;

Fig. 19 is a view similar to Fig. 17 of a modified form of the device, wherein a locked box houses the telephone receiver in condition of disuse;

Fig. 20 is a detail bottom plan view of the receiver box; and

Fig. 21 is an enlarged, fragmentary sectional view of the latch-tripping lever for the receiver box.

Referring now to the drawings, in which like characters of reference indicate corresponding parts in the several views, Fig. 1 represents adaptation of our spectator announcement system to a baseball stadium, although it is to be understood that we do not intend to be limited to use of the system in connection with any particular type of public event. The baseball adaptation is merely illustrative.

In accordance with the invention, it is proposed to install a telephone receiver unit A at each of the seats B which have been selected for spectator announcement service. The number of units and their location will depend upon local requirements as determined from preliminary estimation and later experience. It may be preferable at first to restrict the installation to one or more sections of the grandstand.

In Fig. 1, the roof of the grandstand is shown broken away to reveal the receiver unit installation in a section directly behind the backstop. At a suitable location, and not necessarily anywhere near the receiver-installed seat section as shown, a control room C is provided for use of the special announcer for the system. This control room may have an adjoining room or compartment C' to house the wire section of the electrical control apparatus, which will be de-

scribed presently, and should be provided with a window (not shown) facing the playing field so that the special announcer may observe as much of the action as possible.

Since it is intended that the special announcer shall be able to utilize the services of observers stationed at points of vantage along the side lines of the playing field where they may observe and report on close plays, rules invoked, and other incidents which it may not be possible for the special announcer to see clearly, a loudspeaker D is provided in control room C for electrical connection with microphones E located at the said points of vantage. For the baseball adaptation of the system, it may be preferable to place the microphones in the vicinity of First Base, the Outfield, and the Third Base-Home Plate line, as shown in Fig. 1. For other public events, the disposition of the observers' stations will depend upon the nature of the particular athletic sport, or the like, concerned. When arrangements therefor are practicable, the services of the usually present radio or television announcers at their customary observation stations may be substituted for those of observers under direct control of the special announcer. Under such an arrangement, microphones E may be grouped with the microphones of the radio or television installation (not shown), or means may be provided for connecting the latter microphones with loudspeaker D. If a working arrangement with the radio or television organization cannot be effected, a radio receiving set (not shown) may be included in the equipment of control room C for use of the special announcer, who may adjust it for reception of the local broadcast.

The control room is provided also with a microphone F for use in making announcements to the spectators, and with a switchboard G which serves as convenient means whereby the special announcer may establish precisely controlled and coordinated electrical connection between various elements of the spectator announcement system. Likewise, through the medium of switchboard G, it is possible to connect the communication circuits with a source of electricity (alternating current) or to shut off the current, at will. As shown in Fig. 1, line L for the current supply enters switchboard G preferably through wire compartment C'. The switchboard is shown as being connected with the receiver units A by main line L' and its branches L'', which latter preferably are connected in parallel to line L' and may be extended along the rows of seats B served by units A. Each line of the total communications system preferably comprises a pair of conductors consisting of a primary operating circuit to permit electrical connection with specific secondary circuits of the individual receiver units A in a manner which will be described later herein. The master switch M shown in Fig. 8 is located in control room C for use by the announcer in turning the current for the entire system on and off.

A general idea of the construction of a seat-installed receiver unit A may be gained from the external appearance thereof as disclosed in Figs. 3 to 6 inclusive. The principal elements of the unit are jackbox **30** and telephone receiver **31**, which latter preferably is of the headset type shown. A convenient out of the way location for the unit is under one arm B' of seat B. For reasons which will appear presently, it is preferred to mount jackbox **30** adjustably so that it

may be pulled forward into the cross aisle between seat rows, as shown in Fig. 4, and then swung upward through an angle of substantially 90 degrees into the position of Fig. 5. Provision for this adjustment has been made by affixing a lengthwise slideway **32** to the underside of seat arm B'. This slideway preferably has the cross-sectional shape shown particularly in Figs. 15 and **16**, which is adapted to fit the correspondingly shaped top portions of jackbox **30** and a slide-bar **33** whose front end is pivotally connected to the upper rear corner of the jackbox as by hinge **34**. Horizontal movement of slide-bar **33** may be limited by some such means as pin **35** and slot **36**. In the normal, retracted position of jackbox **30**, (Figs. 3 and 6), the rear external face of the latter abuts the preferably square-cut front end of slide-bar **33** and thereby affords lateral support for said jackbox.

In order to facilitate manipulation of the jackbox, a handle **37** has been provided on the lower front corner thereof. The location of handle **37** is also well suited for cooperation with the means by which telephone receiver **31** and its flexible cord **38** and connector plug **39** are permanently secured to jackbox **30** to prevent unauthorized removal from the seat B with which the unit is associated. The specific securing means preferred is an elastic, contractible member **40**, which, as disclosed in Fig. 18, is composed of chain **41** and tubular sheathing **42**. The latter is made of rubber or other elastic material, so that it may be stretched to elongate flexible member **40** as a whole under certain conditions of use which will be explained hereinafter. Elongation of member **40** is permitted by using a chain having elongated links which telescope in effect when the sheathing **42** is contracted in length. The ends of sheathing **42** should be fixedly secured to the terminal links of chain **41** in some suitable manner, as by making the said ends constricted in diameter. In Fig. 18, the left-hand fragment of member **40** is shown in normal contracted condition, whereas the stretched condition is shown at the right. The terminal chain link at one end of member **40** preferably is secured fixedly to the outermost portion of handle **37** and the terminal link at the other end is secured in like manner to connector plug **39**. It is essential to the operativeness of certain functional parts of the receiver unit that, in the normal condition of member **40**, (Figs. 3 and 4) connector plug **39** shall be suspended below the level of jackbox **30** but in laterally spaced relation to the central area of the bottom face thereof so as to clear the space beneath the same for a purpose to be made known later herein. For convenience in suspending telephone receiver **31** in an out of the way position when not in use, a spring clip **43** may be provided on the underside of slide-bar **33**.

Referring now to Figs. 7 to 13 inclusive, it will be noted that connector plug **39** of telephone receiver **31** is of standard type except for sleeve **44** which projects from its outer end in partially enclosing and spaced relation to contact prongs **45, 46**. Although said contact prongs **45, 46** may be plugged into a standard electrical outlet, they will not fit the sockets in jackbox **30** which are of a special kind to be described later. In accordance with the principle of our invention, it is necessary to interpose a special key-plug **47** between the receiver's connector plug **39** and jackbox **30**. As previously explained, this key-plug must be rented by a spectator in order that

he may take advantage of the spectator announcement service.

Key-plug 47 has a body 48 of non-conducting material, such as hard rubber, Bakelite, or the like, which preferably is flat and elongated in shape to match as nearly as practicable the size of an admission ticket and thus facilitate storage, issue and transportation. In one end of body 48 there are sockets 49, 50 adapted to receive contact prongs 45, 46 of connector plug 39. Suitable female contacts 51, 52 embedded in sockets 49, 50 of key-plug 47 are adapted to frictionally engage contact prongs 45, 46 when the connector plug and key-plug are united. In this condition, sleeve 44 embraces substantially half of body 48 of the key-plug and shields the same from direct grasp by the hand of the spectator when plugging into jackbox 30. The reason for this provision will appear later. Specially shaped contact prongs 53, 54 project from the end of body 48 of key-plug 47 opposite to sockets 49, 50 and are preferably integral with contacts 51, 52 respectively. Contact prongs 53, 54 are shaped to fit sockets 55, 56 provided in the bottom wall of jackbox 30. Sockets 55, 56 actually are formed in a block 57 of non-conducting material, which will be termed the socket member of the jackbox. Fixed female contacts 58, 59 are embedded in sockets 55, 56 for frictional engagement with contact prongs 53, 54 respectively of key-plug 47. To provide further security against unauthorized use of the receiver's connector plug, such as might be accomplished by twisting its contact prongs into formations which might permit insertion thereof into sockets 55, 56, contact prong 54 has been made considerably longer than contact prong 53 and fixed contact 59 has been located correspondingly further from the exposed face of socket member 57 than fixed contact 58. Fixed contacts 58, 59 are electrically connected with binding posts 60, 61, which are located preferably on the inner end of socket member 57 in spaced relation to the central area thereof. Binding post 60 is connected to the inner terminal of electrical conductor 62 which is paired with conductor 63 in a lead 64 extending from jackbox 30 to a suitable point of connection of conductors 62, 63 to the respective conductors of branch line L'' of the communications system. Binding post 61 is connected with the terminal of an electrical conductor 65 which leads to one single pole 66 (Fig. 11) of a 3-way snap switch 67 mounted in the front wall of jackbox 30. The double pole 68 of switch 67 is connected with the inner terminal of conductor 63 of lead 64. When the exteriorly presented manipulating knob 69 of switch 67 is turned into the "on" position shown in Fig. 7, the movable switch contact arm 70 rigidly united to said knob will bridge poles 66 and 68 and thereby close the line circuit to telephone receiver 31 through key-plug 47, connector plug 39 and cord 38. Fig. 11 shows switch 67 in the "off" position, wherein arm 70 bridges double pole 66 and a second single pole 71 which is connected through impedance element 72 to conductor 62 of lead 64. The impedance, or effective resistance, of element 72 should be equal to that of telephone receiver 31 and the circuit leading thereto so as to prevent fluctuation in the load imposed on the communications system as receivers are switched on and off in the normal operation of the announcement service.

Before proceeding further with description of the internal mechanism of jackbox 30, mention will be made of four special functions which are to be performed by that mechanism in addition to electrical connection of the telephone receiver with the communications system. Those functions are: (1) automatic locking of the key-plug in plugged-in position; (2) preliminary ejection of the connector plug of the telephone receiver from engagement with the key-plug; (3) subsequent unlocking of the key-plug; and (4) final ejection of the key-plug from the jackbox. The second, third and fourth functions are performed by the special announcer through operation of a master switch in the control room at the end of the game or other public event and after all spectators have vacated the stands. Simply unlocking all key-plugs simultaneously would suffice to permit collection by manual withdrawal from the jackboxes for return of the key-plugs to the ticket office, but we have made provisions for automatic release and conveying of the key-plugs to central collection points more readily accessible to the ticket office. The announcer-controlled unlocking and ejecting of the key-plugs cooperates with conveying means which will now be described.

Referring again to Figs. 3 to 6, it will be seen that a vertical conveyor chute 73 extends downward from a flared mouth 74 thereof located directly under the key-plug sockets in the bottom of each jackbox 30. This chute 73 leads into a system of conveyor chutes, as shown particularly in Fig. 3, which extend to one or more collection receptacles (not shown) located at a lower level in the stands, where stadium attendants may gather them up for return to the ticket office with far less effort and expenditure of time than would be required for a tour of the seats to withdraw the key-plugs from the jackboxes by hand. The reason for the contractible feature of securing member 40 and its attachment to the laterally displaced handle 37 of the jackbox should now become apparent. There is sufficient space between the mouth 74 of chute 73 and the bottom of jackbox 30 to accommodate the plugged-in receiver connector plug 39 and key-plug 47, as shown in Fig. 6, but it is essential that plug 39 shall be moved out from under key-plug 47 as soon as plug 39 is ejected from the latter in order not to obstruct gravitation of the key-plug into the chute mouth when the said key-plug is subsequently unlocked and ejected from the jackbox sockets. Contractible securing member 40, which is expanded and under tension when the telephone receiver is plugged in (Fig. 6), will contract and pull plug 39 out from under key-plug 47 and clear of the mouth of chute 73 immediately upon ejection of plug 39 from the key-plug. Fig. 3 shows this chute-clearing position of plug 39.

Turning again to Figs. 7 to 13, the ejecting means for both plugs and the locking means for the key-plug will be described. Key-plug 47 has a central, longitudinal bore 75 in which a metallic cocking plunger 76 is slidably mounted. Plunger 76 is maintained normally in the position shown in Fig. 10, wherein the forward (upper) end thereof projects outward a short distance, by spring means 77 which maintains the said plunger in a state of equilibrium subject to displacement in either direction longitudinally with respect to the key-plug. Inside jackbox 30, a metallic ejector bolt 78 is slidably mounted in a central, axial, through bore 79 in socket member 57 and in aligned upper and lower bearing brackets 80 and 81 respectively, which brackets are made of non-conducting material similarly

to said socket member. Bore 79 is in a position wherein it will be aligned with the cocking plunger 76 of any key-plug that is plugged into the jackbox. The diameters of each cocking plunger 76 and ejector bolt 78 are the same in order that the former may enter bore 79 in socket member 57 as the key-plug is plugged in. The normal shot position of ejector bolt 78 is shown in Fig. 10, wherein the outer (lower) end of the said bolt is substantially flush with the bottom face of socket member 57. In this position of ejector bolt 78, an adjustable stop collar 82 of conducting material carried by said ejector bolt will be in contact with an electrical contact ring 83 which is mounted on the upper face of bearing bracket 81 with its inner periphery spaced from ejector bolt 78 to prevent electrical contact between contact ring 83 and ejector bolt 78. Spring means 84 tends to maintain ejector bolt 78 in this shot position. Spring means 84 preferably is in the form of a compression spring interposed between bearing bracket 81 and a collar 85 of conducting material which is adjustably secured to ejector bolt 78 as by set-screw 86. This set-screw 86 additionally serves as an electrical binding post for attachment of the terminal of a conductor which leads to conductor 62 of lead 64. The tension of spring 84 may be varied to regulate the ejection force applied to ejector bolt 78 by adjusting the set position of collar 85 on said bolt.

When the cocking plunger 76 of a key-plug is forced into the lower end of bore 79 in socket member 57, the said plunger will push ejector bolt 78 upward. In order to obtain the desired upward displacement of ejector bolt 78, the connector plug 39 of the associated telephone receiver 31 must first be plugged into key-plug 47, so that cocking plunger 76 will be sustained in its upwardly protruding position of Fig. 10. It is for this reason that sleeve 44 is provided on connector plug 39. If a spectator, who usually will have no knowledge of the manner in which the jackbox mechanism functions, found it convenient to grasp the key-plug alone when plugging in, the cocking plunger 76 would back up in the key-plug bore upon being brought to bear against the lower end of ejector bolt 78 instead of pushing the latter upward in the jackbox as desired. The extensive sleeve 44 insures that connector plug 39 will be grasped and pushed upward, whereupon the upper end face of plug 39 will sustain cocking plunger 76 in its normal position (Fig. 6). As a result, ejector bolt 78 will be moved upward into the cocked position represented in Fig. 8.

Ejector bolt 78 has a catch 88 of non-conducting material secured in any suitable manner to its upper end. Catch 88 is preferably of the frusto-conical form shown so as to provide a perpendicular underneath catch face 89 and a tapered peripheral cam face 90 for cooperation with the locking point 91 of a detent 92 which is pivotally mounted on axis 92' in jackbox 30. Due to the specific shape of catch 88, faces 89 and 90 will always be properly presented to locking point 91 regardless of any incidental rotation of ejector bolt 78 in its bearings. Spring means 93 tends to maintain detent 92 normally in the position shown in Fig. 9, wherein locking point 91 will be clear of the path of catch 88. Magnetic means by which detent 92 may be moved into the position shown in Figs. 8 and 10 wherein locking point 91 is in the path of catch 88, may take the form of alternating current solenoid 94. This solenoid, which may be termed the "ejector bolt solenoid," is connected preferably in parallel with conductors 62 and 63 of lead 64, so that, when the current is turned on in the communications system, the said solenoid will be energized regardless of whether switch 67 is in "on" or "off" position. The core 95 of solenoid 94 has its inner end suitably connected as at 96 to detent 92, which latter should be made of non-magnetic material so as not to disturb the desired balanced position of core 95 when the solenoid is energized.

Automatic locking of key-plug 47 in plugged-in relation to jackbox 30 is accomplished preferably by use of a detent 97 which is integral with one end of the core 98 of a second solenoid 99, which will be known as the "key-plug lock solenoid." Detent 97 is slidably fitted in a radial bearing opening 100 provided in socket member 57 in registration with socket 56 below female contact 59. The longer contact prong 54 of key-plug 47 is provided with a locking notch 101 adapted to be engaged by detent 97. The extremity of contact prong 54 has a cam nosing 102 formed thereon for wedging contact with detent 97 to force the latter outward and clear of the said prong during the act of plugging in. Spring means 103 tends to force detent 97 inward into locking position within socket 56. The terminals of the coil of solenoid 99 are connected respectively to contact ring 83 on bearing bracket 81 and to conductor 63 of lead 64. Energization of solenoid 99 will cause outward movement of detent 97 against the action of spring means 103.

Fig. 13 shows a special key-plug which may be rented for repeated use of the same person, such as for a series or season of sports events. It has the locking notch 101 altered to provide a cam face 104 on the side thereof nearer the extremity of contact prong 54. This second cam face will cause deflection of detent 97 into the tripped position shown in Fig. 10 whenever the spectator chooses to manually withdraw the key-plug from the jackbox sockets.

Figs. 14, 15 and 17 disclose a modified feature of jackbox 30, in accordance with which exterior guard flanges 105 disposed substantially in the planes of the respective side walls of the jackbox are joined to handle 37. These guard flanges protect the manipulating knob 69 of switch 67 and key-plug 47 when plugged in from being hit and disturbed or damaged accidentally by spectators when moving about during the game or other public event. The flanges also strengthen handle 37 and shield securing member 40 which is attached to said handle.

Figs. 19 to 21 disclose a further modification wherein a box 106 is provided on the under side of slide bar 33 to house and thus better protect telephone receiver 31. Box 106 has no front wall, but the opening thus provided is adapted to be closed by a swinging door 107 which has hinge elements 108 incorporated in the hinge 34 for jackbox 30. A notch 109 has been provided in the front edge of the bottom wall of box 106 to accommodate receiver cord 38. A stop member 110, such as the ring shown, may be secured to cord 38 at such a distance from connector plug 39 that all the slack portion of cord 38 may be housed with receiver 31 in box 106 and will be prevented from slipping out through notch 109 when door 107 is in closed position. Latching means for door 107 may be provided in the form of a spring-pressed vertical bolt 111 whose lower end is adapted to engage a locking recess 112 in the bottom wall of box 106. Latch bolt 111

should be offset laterally from notch 109. The upper end of bolt 111 is provided with a horizontally projecting cam follower 113 adapted to be deflected upwardly by the underlying cam projection 114 provided on the lower arm of a releasing lever 115, which is pivoted coaxially with hinge 34. The upper arm of lever 115 projects into jackbox 30 and also into the path of catch 88 on ejector bolt 78. In order to permit necessary folding of lever 115 when jackbox 30 is moved into the normal position underlying seat arm B' (Figs. 3, 6, 14 and 15), the said lever is jointed medially as shown particularly in Fig. 21. This joint is suitably built into hinge 34 and includes shoulders 116 and 117, which are adapted to abut each other as shown in full lines when jackbox 30 is moved into the position shown in Figs. 5, 17 and 19 for convenience in plugging in the key-plug. When shoulders 116 and 117 are in abutting relation, movement of ejector bolt 78 to the left (Fig. 19) will cause lever 115 to rock as a whole counter-clockwise and thereby deflect cam follower 113 upward so as to unlatch door 107. Shoulders 116 and 117 will separate, as shown in broken lines, when jackbox 30 is restored to inswung position. A relief opening 118 is provided in door 107 to receive cam projection 114 when it is actuated by ejector bolt 78. When jackbox 30 is inswung to the point that door 107 is forced shut, the rear wall of said jackbox will strike cam projection 114 and thereby force it inward to release latch bolt 111, which will then be restored to latching position.

The operation of our spectator announcement system in its adaptation to a baseball stadium will now be described by way of illustration. At a proper time before the game starts, master switch M is closed by the special announcer. The immediate effect is to energize the ejector bolt solenoids 94 of all jackboxes, so that the detent 92 in each jackbox will assume the position shown in Fig. 10 in the path of catch 88 on ejector bolt 78. Each jackbox is now electrically "live" and mechanically ready for use of a spectator who is in possession of a key-plug of either the daily rental or the season rental type.

When the spectator arrives at his seat and is ready to listen in to the announcement service which may be in progress, he reaches down with his right hand for handle 37 and pulls jackbox 30 forward and upward until it is in the position shown in Figs. 5, 17 and 19. In this position, the sockets for the contact prongs of the key-plug will be exposed to the spectator's view so that he can see what he is doing. It will be easy now to include connector plug 39 of the telephone receiver 31 in the grasp of the right hand and to insert the contact prongs of plug 39 into the sockets of key-plug 47, which latter may be held in the left hand at this time. When this has been done, the left hand may be used to hold the jackbox handle while the two united plugs are aligned with the jackbox sockets by the right hand, in which operation securing member 40 will be stretched into the condition shown in Figs. 5 and 17. Now, the key-plug prongs are inserted into the jackbox sockets and plug 39 is pressed firmly against the key-plug so as to cause cocking plunger 76 to force ejector bolt 78 upward into the cocked position shown in Fig. 8. While moving into this position, cam face 90 of catch 88 will deflect the locking point 91 of detent 92 laterally until it is cleared by catch 88, whereupon the detent will be forced inward by the action of the ejector bolt solenoid 94 until locking point 91 becomes engaged beneath face 89 of catch 88. Likewise, during this movement of the ejector bolt, the key-plug will become locked automatically in position by engagement of detent 97 with notch 101 in contact prong 54.

In the embodiment of the invention disclosed in Figs. 3 to 6 and 14 to 17, the telephone receiver will be suspended by clip 43 under the seat arm. After the receiver has been removed from its supporting means, the jackbox may be lowered and slid back into its normal out of the way position, in which the spectator's control switch 67 will be readily accessible on the front face of the jackbox for use in connecting the receiver with the communications circuit or in disconnecting it, as desired.

If the modified form of the receiver unit shown in Figs. 19 to 21 is used, the receiver 31 and its cord 38 will be locked inside box 106 between games and until the key-plug has been plugged into the jackbox. When this has been done, ejector bolt 78 will unlatch door 107 when the said bolt moves into cocked position and transmits the necessary motion through lever 115 to cam projection 114. Thereupon, the spectator may withdraw the receiver from the box. When the jackbox subsequently is restored to normal position beneath the seat arm, the door to box 106 will become latched automatically. However, if the spectator later decides to replace the receiver in box 106, movement of the jackbox to the outswung position of Fig. 19 will unlatch door 107 to permit this to be done.

Throughout the game, the special announcer is enabled by use of the apparatus described to furnish interested spectators with a running account of the action, interspersed with reading of any new rules which may be invoked. In describing the action, he may rely upon his own observation, but is always prepared to connect the system with any one of the field microphones when he feels that the action may be observed more clearly and reported upon more accurately by the observer stationed at that microphone. Similarly, he may listen in on the current radio broadcast and possibly obtain information to clear up some incident not clearly seen nor understood from the control room window. In this way, the special announcer is enabled to keep his local audience accurately informed on all incidents of play. The radio broadcast may even be cut in on the local communications system on occasion, when appropriate, such as when announcements are being made of the arrival or presence of distinguished spectators or when reports are being broadcast as to current standing of teams or the final results of games being played in other parts of the country. This service is of even greater importance in the case of football games. As an incidental use of the local announcement system, the special announcer may request spectators to restore their telephone receivers to the supporting clips or storage boxes, as the case may be, toward the end of the game. In fact, the system is capable of unlimited variations in use in connection with all sorts of public events, especially when under the control of a versatile special announcer.

After the end of the game, when it is safe to release the key-plugs, master switch M may be opened to cut off the current for the communications system. When this is done, the ejector bolt solenoid in each jackbox will be de-energized, whereupon spring means 93 will trip catch 88 and thereby release ejector bolt 78, which will

descend as shown in Fig. 9 into contact with cocking plunger 76 in the key-plug. The key-plug will still be locked in the jackbox, so plunger 76 will be driven downward into contact with connector plug 39 and will eject the latter from plugged-in engagement with the key-plug. At the same time, spring means 84 of ejector bolt 78 and the weight of said bolt will place spring means 77 of the key-plug under tension and will maintain it in this condition temporarily. Descent of the ejector bolt will bring stop collar 82 into contact with contact ring 83 and thereby electrically connect key-plug locking solenoid 99 with conductors 62 and 63 of lead 64, in which connection the portion of ejector bolt which extends between contact ring 83 and collar 85 forms part of the electrical circuit. After this condition has been established, master switch M may again be closed, whereupon solenoid 99 will become energized and locking detent 97 will be withdrawn from engagement with notch 101 in prong 54 of the key-plug. When this happens, spring means 77 in the key-plug will react to eject the key-plug forcibly downward into the mouth of conveyor chute 73. Finally, master switch M is opened for the second time to shut off the current until the next game.

The combination of an electrical key-plug with a cooperating outlet socket has wider application than the presently proposed use in the receiver unit of a communications system. For instance, this invention could well be used to replace the coin control for clothes washers of the "Laundermat" type. In that application, each of the washers of the usual battery would have a standard connector plug on the end of a flexible cord, corresponding to the plug 39 and cord 38 of our telephone receiver. A key-plug identical with our plug 47 would be rented to users of the washers to establish an electrical connection between the connector plug of a washer and a wall outlet having special key-shaped sockets which will fit the key-plug but not the washer's standard plug. Another application would be in a trailer park, where trailer owners who engage parking space have to plug their electric light, cooking, and other circuits into an outside source of current under the control of the park owner. The key-plug feature could be adapted to metered outlets having the specially shaped sockets.

It is to be understood that the term "field" as used in the specification and appended claims means the playing field, floor, arena, or other area where the action of a sports event occurs. Similarly, the same term refers to the ring or other exhibition area of an animal show, or to the landing field or general outlying area such as is defined by the turn pylons of an aircraft show, demonstration, or racing event.

Whenever the term "transmitter" is used, it is intended to embrace telephone transmitters, microphones, and equivalent devices. Similarly, the term "receiver" may be considered to include telephone receivers of any type as well as muted individual loudspeakers of the office interphone type, an example of the latter being the loudspeaker D in the special announcer's control room. Furthermore, the term "key-shaped" as applied to the outlet sockets of the jackbox and the cooperating contact prongs of the key-plug is intended to define irregular, nonstandard form and relates to security against unauthorized use of standard plugs and not to electrical circuit adaptation.

The embodiments of the invention herein disclosed are illustrative only and may be modified in many respects without departing from the spirit and scope of the inventive concept as pointed out in and limited by the appended claims.

Having thus described the invention, what we claim as new and desire to secure by Letters Patent is:

1. In an electrical system including a primary operating circuit and switching means therefor; a jackbox including a socket member having outlet sockets of special key-shape, electrical contacts embedded in said sockets and being connected with the primary operating circuit, a connector plug adapted to be connected with a secondary circuit and having standard contact prongs; a key-plug including a body having standard sockets therein adapted to fit the contact prongs of the secondary circuit connector plug, electrical contacts embedded in the sockets of the key-plug, and contact prongs connected with said electrical contacts of the key-plug and being specially key-shaped to fit the sockets of the outlet socket member of the jackbox; locking means provided in the jackbox for engagement with the key-plug when plugged in, means tending to maintain the locking means in locking condition, and means actuated by changing the electric current condition of the primary operating circuit whereby the locking means may be released to free the key-plug.

2. A device of the character defined in claim 1, wherein the locking means for the key-plug includes a detent movably mounted in the jackbox and wherein one contact prong of the key-plug has a side notch engageable by said detent.

3. In an electrical system including a primary operating circuit and switching means therefor; a jackbox including a socket member having outlet sockets of special key-shape, electrical contacts embedded in said sockets and being connected with the primary operating circuit, a connector plug adapted to be connected with a secondary circuit and having standard contact prongs; a key-plug including a body having standard sockets therein adapted to fit the contact prongs of the secondary circuit connector plug, electrical contacts embedded in the sockets of the key-plug, and contact prongs connected with said electrical contacts and being of special key-shape to fit the sockets of said outlet socket member of the jackbox, the key-plug body being provided with a through bore disposed with its ends facing in the direction of the sockets and contact prongs respectively, a plunger slidably mounted in said bore, spring means tending to resist longitudinal thrust of the plunger in either direction in said bore; the socket member of the jackbox being provided with a bore adapted to be aligned with the plunger bore in the key-plug when plugged into the outlet sockets, an ejector bolt slidably mounted in said socket member bore and adapted to be contacted by and thrust longitudinally inward into cocked position by the key-plug plunger during plugging in of said key-plug, spring means tending to drive the ejector bolt outward and thereby impart thrust to the key-plug plunger to eject the connector plug from connection with the key-plug, means for locking the ejector bolt in cocked position, and means responsive to opening of the primary operating circuit for releasing said ejector bolt locking means.

4. A device of the character defined in claim 3 wherein the locking means for the ejector bolt

comprises a catch on said bolt, a solenoid connected electrically in the primary operating circuit and having its core disposed to lockingly engage the bolt catch in the energized condition of said solenoid, and spring means tending to move the solenoid core into tripped position out of the path of the bolt catch.

5. A device of the character defined in claim 3 wherein the key-plug plunger is longer than the bore in the key-plug body and is normally maintained with the end thereof adjacent to the contact prongs protruding from said body and adapted to enter the bore of the jackbox socket member when the key-plug is plugged in.

6. A device of the character defined in claim 3 wherein one contact prong of the key-plug has a locking notch and means is provided for locking the key-plug in plugged-in relation to the jackbox including a solenoid having its core engageable with said locking notch of the key-plug contact prong, spring means tending to maintain said key-plug locking solenoid core in locking position, and means actuated by the ejector bolt for connecting said key-plug locking solenoid electrically in the primary operating circuit when said bolt is shot into ejecting position whereby the key-plug will be released when the current in the primary operating circuit is turned on again after being turned off to release the ejector bolt.

7. A key-plug of the class described comprising a body having standard outlet sockets in one face thereof, electrical contacts embedded in said outlet sockets, special key-shaped contact prongs projecting from the opposite face of the body and being connected with the respective contacts, the body being provided with a through bore extending between the said opposite faces thereof, a plunger slidably mounted in said bore, and spring means interposed between the key-plug body and the plunger for resisting longitudinal thrust of the plunger in either direction.

8. In an electrical system including a primary operating circuit, a support including a horizontal slideway, a slide-bar slidably fitting said slideway, a jackbox having its top part also slidably fitting said slideway and its upper inner corner hinged to the forward end of the slide-bar, the jackbox being provided in its bottom wall with outlet sockets adapted to be exposed in forwardly presented position for a user's view during plugging-in by sliding the jackbox forward and swinging it upward on its hinge, a connector plug for a secondary circuit permanently secured to the jackbox and having standard contact prongs, a key-plug having sockets of standard shape in one face thereof adapted to fit the contact prongs of the secondary circuit connector plug, electrical contacts embedded in the key-plug sockets, contact prongs of special key-shape projecting from the key-plug oppositely with respect to the sockets and connected to said electrical contacts and being adapted to fit the outlet sockets of the jackbox, the key-plug being provided with a through bore extending parallel to the contact prongs thereof, a plunger slidable in said key-plug bore, spring means for resisting end thrust of said plunger, an ejector bolt slidable in the jackbox and adapted for alignment with the key-plug plunger when the said key-plug is plugged into the jackbox sockets, the key-plug plunger being adapted during plugging in motion to thrust the ejector bolt inward into cocked position, spring means tending to force the ejector bolt outward and cause plug ejecting force to be transmitted through the key-plug plunger to the secondary circuit connector plug, means for automatically locking the ejector bolt in cocked position, means for locking the key-plug in plugged-in position, means by which the locking means for the ejector bolt may be tripped, and means by which the key-plug locking means may be tripped subsequently to tripping of the ejector bolt locking means to release and eject the key-plug.

9. A device of the character defined in claim 8 wherein the means for securing the secondary circuit connector plug to the jackbox comprises an extensible normally contracted member connecting the said connector plug to a part of the jackbox laterally offset from the outlet sockets and being adapted to be placed under tension when the two plugs are united and plugged into the said outlet sockets whereby the said connector plug will clear the ejection path of the key-plug prior to delayed ejection of the latter from the jackbox sockets.

10. A device of the class defined in claim 8 wherein a box to house the receiver is mounted in depending position on the said slide-bar, said box having its front wall open, a door hinged to the box to close the opening, latching means for said door, and means actuated by cocking of the ejector bolt in the jackbox for automatically unlatching the door latch.

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