PATENT SPECIFICATION

770,187

Date of filing Complete Specification: May 23, 1955.

No. 12009/54.

Application Date : April 26, 1954.

Complete Specification Published: March 20, 1957.

Index at acceptance:—Class 105, A9(A:X).

International Classification:—B61l.

COMPLETE SPECIFICATION

Improvements in or relating to Power-operated Signal Control Systems for Railways and the Like

SPECIFICATION NO. 770,187

INVENTORS:- ROBERT DELL and WALTER OWEN

By a direction given under Section 17(1) of the Patents Act 1949 this application proceeded in the name of British Transport Commission, a public authority established by the Transport Act, 1947, of 55, Broadway, Westminster, London, S.W.1.

THE PATENT OFFICE,
4th March, 1957

DB 43558/1(17)/3676 100 2/57 R

...like, the term "signal control" being intended to include all the normal controlling operations performed from a signal cabin, such as the actuation of signals and the setting of points at junctions.

Power-operated signal control systems are in use in which the points and signals are controlled by electric circuits including contacts operated by the turning movement of rods, the rods associated with a plurality of signals, points or other operable devices being mounted in a frame and associated with interlocking mechanism consisting of a plurality of slide bars, one of which is coupled to each rod so as to be moved longitudinally when the rod is turned, and a plurality of interlocking bars extending in a direction at right angles to the slide bars, the slide bars carrying dogs or projections and the interlocking bars carrying other projections, the arrangement being such that movement of selected slide bars to predetermined positions displaces one or more interlocking bars, through interengagement of projections thereon to positions in which other projections on the said interlocking bars lie in the path of dogs or projections on other slide bars and prevent movement of those slide bars. Power-operated signal control systems as defined in this paragraph are here-

[Price 3/-]

...by of the interlocking mechanism or a power-operated signal control system as herein defined, and a further object is to improve and simplify the apparatus consisting of the interlocking mechanism and the point and signal control contacts.

According to the invention, in a power-operated signal control system as herein defined both the slide bars and the interlocking bars are flat metal strips, separate pieces of metal being secured thereto by bolts, screws or the like to form the dogs and the projections on the interlocking bars co-operating with the said dogs.

Further, according to the invention, in a power-operated signal control system as herein defined the slide bars of the interlocking mechanism are uniformly spaced one from another, and the interlocking bars are also spaced uniformly one from another, both the slide bars and the interlocking bars being flat metal strips pierced at regular intervals to receive bolts, screws or the like, pieces of metal of predetermined shape and dimensions being secured to the said strips by such bolts, screws or the like, the pieces secured to the slide bars forming the dogs or like projections thereon, and the pieces secured to the interlocking bars co-operating with the said dogs to displace the interlocking bars as the result of movement of the slide bars or

PATENT SPECIFICATION

770,187

Date of filing Complete Specification: May 23, 1955. No. 12009/54.

Application Date : April 26, 1954.

Complete Specification Published: March 20, 1957.

Index at acceptance:—Class 105, A9(A:X).

International Classification:—B61l.

COMPLETE SPECIFICATION

Improvements in or relating to Power-operated Signal Control Systems for Railways and the Like

We, BRITISH TRANSPORT COMMISSION, a Public Authority established by the Transport Act, 1947, of 55, Broadway, Westminster, London, S.W.1, and ROBERT DELL, of 51, Eton Avenue, Sudbury, in the County of Middlesex, and WALTER OWEN, of 19, Lomond Close, Wembley, in the County of Middlesex, both British Subjects, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to power-operated signal control systems for railways and the like, the term "signal control" being intended to include all the normal controlling operations performed from a signal cabin, such as the actuation of signals and the setting of points at junctions.

Power-operated signal control systems are in use in which the points and signals are controlled by electric circuits including contacts operated by the turning movement of rods, the rods associated with a plurality of signals, points or other operable devices being mounted in a frame and associated with interlocking mechanism consisting of a plurality of slide bars, one of which is coupled to each rod so as to be moved longitudinally when the rod is turned, and a plurality of interlocking bars extending in a direction at right angles to the slide bars, the slide bars carrying dogs or projections and the interlocking bars carrying other projections, the arrangement being such that movement of selected slide bars to predetermined positions displaces one or more interlocking bars, through interengagement of projections thereon to positions in which other projections on the said interlocking bars lie in the path of dogs or projections on other slide bars and prevent movement of those slide bars. Power-operated signal control systems as defined in this paragraph are hereinafter referred to as "power-operated signal control systems as herein defined."

In the power-operated signal control systems as herein defined which are now in use, the rods operating the electric contacts are each coupled to a separate rod in an interlocking frame supporting the slide bars and interlocking bars, and the slide bars and interlocking bars are formed of strips of metal parts of which are cut away to leave the dogs or projections, the latter being integral with the strips.

The principal object of the present invention is to improve and facilitate the assembly of the interlocking mechanism of a power-operated signal control system as herein defined, and a further object is to improve and simplify the apparatus consisting of the interlocking mechanism and the point and signal control contacts.

According to the invention, in a power-operated signal control system as herein defined both the slide bars and the interlocking bars are flat metal strips, separate pieces of metal being secured thereto by bolts, screws or the like to form the dogs and the projections on the interlocking bars co-operating with the said dogs.

Further, according to the invention, in a power-operated signal control system as herein defined the slide bars of the interlocking mechanism are uniformly spaced one from another, and the interlocking bars are also spaced uniformly one from another, both the slide bars and the interlocking bars being flat metal strips pierced at regular intervals to receive bolts, screws or the like, pieces of metal of predetermined shape and dimensions being secured to the said strips by such bolts, screws or the like, the pieces secured to the slide bars forming the dogs or like projections thereon, and the pieces secured to the interlocking bars co-operating with the said dogs to displace the interlocking bars as the result of movement of the slide bars or

[*Price* 3/-]

to prevent movement of a slide bar when an interlocking bar is in a predetermined position.

Preferably the contacts are operated directly by the rods to which the slide bars are coupled, each of the said rods having the contact operating mechanism at one end, and power actuating means for operating the rod from a remote point at the other end, the mechanical interlocking mechanism, an electric lock for retaining the rod in a set position until the train movement for which it was set has been completed, and a manual operating lever, being arranged along the rod in that order between the power actuating means and the contact operating mechanism.

The invention is hereinafter described with reference to the accompanying drawings, in which:—

Fig. 1 is a front elevation of one form of apparatus embodying the present invention;

Fig. 2 is a side elevation of the apparatus shown in Fig. 1;

Fig. 3 is a front elevation of some of the slide bars and interlocking bars of the interlocking mechanism the interlocking bars being shown in chain-dotted lines; and

Fig. 4 is a plan view showing the coupling means between a contact-operating rod and the slide bar associated therewith.

Referring to Figs. 1 and 2 of the drawings, an upright rectangular frame 10, conveniently built up from **H**-section girders, is supported on vertically adjustable screws 11 to enable it to be accurately levelled regardless of irregularities in the floor surface on which it is supported. Brackets 12, 13, 14 and 15 mounted on the frame carry bearings for a plurality of vertical rods 16, equally spaced one from another in a horizontal direction, the rods being disposed in a common plane parallel to that of the frame. Each of the rods is movable through a predetermined angle by a double acting air pressure motor 17 controlled in any suitable manner from a remote point, the motor 17 acting on the lower end of the rod. The upper part of each rod 16 carries a plurality of electric contacts 18 co-operating with fixed contacts on the frame to open and close electric circuits in accordance with the angular position of the rod. Mechanical interlocking means, generally indicated by the reference 19 are positioned immediately above the air pressure motors 17, the interlocking means being more fully described below. Above the mechanical interlocking means 19, each rod 16 has fixed thereto a quadrant 21, formed with apertures to receive a pin 22 urged upwardly by energisation of a solenoid 23 to lock the rod against movement. Solenoids 23 are energised by the setting of the signal and point circuits to lock the appropriate rods 16 in the set positions, and are de-energised by the passage of a train over the controlled section of track, so that the settings cannot be changed until the train has passed. Between the quadrant 21 and the contacts 18, each rod 16 carries a hand lever 24 serving both for manual operation of the rod and as a visual indication of its position.

It will be evident that the arrangement of the various mechanisms in the relative positions shown ensures that the contacts cannot be operated by the air pressure motors unless the mechanical interlocking means and the electric lock permit.

The mechanical interlocking means 19, as shown in Fig. 3, include a plurality of horizontally disposed slide bars 25 each having, as shown in Fig. 4, an aperture 26 into which projects a pin 27 projecting laterally from one of the rods 16, one or more slide bars 25 being coupled to each rod 16 so that turning of any rod is accompanied by movement of one or more slide bars. Each slide bar 25 comprises a flat metal strip drilled at equal intervals with pairs of holes 28, 28 tapped to receive screws, bolts or the like, the bars being arranged in pairs, each pair spaced vertically from the next.

Vertically disposed interlocking bars 29 are disposed in front of the slide bars 25, the interlocking bars 29 being equally spaced one from another, and, like the slide bars, being formed with spaced pairs of holes 31, 31, the holes 31 being plain. The interlocking bars 29 are spaced from the slide bars 25. Dogs comprising flat metal plates 32, each chamfered at 33 at one corner, are secured to the front faces of the slide bars 25 by screws 34 entering pairs of holes 28, 28 in the said bars, and similar plates 35, also chamfered at one corner 36 are secured by screws 37 to the backs of the interlocking bars to form projections therein co-operating with the dogs, the plates 32 and 35 being drilled with holes corresponding in spacing to the holes forming the pairs in the slide bars 25 and in the interlocking bars 29 respectively, and the holes in the plates 35 being tapped.

It will be seen that by suitably relating the spacing of the pairs of holes 28, 28 in the slide bars to the spacing of the interlocking bars, and by suitably relating the spacing of the holes 31, 31 in the interlocking bars 29 to the spacing of the slide bars, it is possible to provide for the mounting of a plate 32 on any slide bar 25 in a position to co-operate with a plate 35 on any interlocking bar so that movement of the slide bar displaces the interlocking bar 29 upwardly and moves one or more other plates 35 thereon into the path of the plates 32 on one or more other slide bars, thus obstructing the movement of the said other slide bar or bars.

The following description, which refers to Fig. 3, provides examples of the operation of

the interlocking mechanism. Four of the slide bars 25 shown are marked A, B, C and D respectively, and the two interlocking bars are marked X and Y. With the slide bar D in the position shown, the dog 32 on the slide bar B can slide to the left past the upper projection 35 on the interlocking bar Y, but, if the slide bar D is moved to the left, the chamfered corners 33 and 36 on the dog 32 of bar D and on the lower projection 35 of bar Y co-operate to lift the bar Y, thus causing the upper projection 35 on the bar Y to move into the path of the dog 32 on the bar B and prevent leftward movement of the latter. The interlocking bar X is divided, and, whilst the lower part of that bar is always lifted by leftward movement of the slide bar D, this movement is transmitted to the upper part, to restrain leftward movement of the slide bar A through the co-operating dog 32 and projection 35 on the said bars X and A, if the slide bar C is also moved to the left to insert the hinged arm 38, mounted on a plate screwed to the said slide bar C, between the projections 35 on the adjacent ends of the upper and lower parts of the bar X.

It will be obvious that by suitable positioning of the dogs 32 and projections 35, any one or more interlocking bars may be moved by movement of a slide bar to prevent movement of one or more other slide bars, and the movement of an interlocking bar by a slide bar may be dependent on the position of another slide bar at that time. The interlocking bars are preferably biased by gravity to their normal positions, being lifted by the interaction of the dogs and projections.

The plates 32 and 35 may be chamfered on two corners so as to be able to co-operate during movement of the slide bars in either direction.

It will be seen that, to assemble an interlocking mechanism for any signal installation it is necessary only to have a supply of slide bars, interlocking bars and plates of a few standard shapes, it being then possible to arrange any desired combination of interlocks between signals, points and the like merely by screwing the plates to the slide bars and interlocking bars in the appropriate positions.

What we claim is:—

1. A power-operated signal control system as herein defined, wherein both the slide bars and the interlocking bars are flat metal strips, separate pieces of metal being secured thereto by bolts, screws or the like to form the dogs and the projections on the interlocking bars co-operating with the said dogs.

2. A power-operated signal control system as herein defined, wherein the slide bars of the interlocking mechanism are uniformly spaced one from another, and the interlocking bars are also spaced uniformly one from another, both the slide bars and the interlocking bars being flat metal strips pierced at regular intervals to receive bolts, screws or the like, pieces of metal of predetermined shape and dimensions being secured to the said strips by such bolts, screws or the like the pieces secured to the slide bars forming the dogs or like projections thereon, and the pieces secured to the interlocking bars co-operating with the said dogs to displace the interlocking bars as the result of movement of the slide bars or to prevent movement of a slide bar when an interlocking bar is in a predetermined position.

3. A power-operated signal control system according to Claim 1 or 2, wherein the contacts are operated directly by the rods to which the slide bars are coupled, each of the said rods having the contact operating mechanism at one end, and power actuating means for operating the rod from a remote point at the other end, the mechanical interlocking mechanism, an electric lock for retaining the rod in a set position until the train movement for which it was set has been completed, and a manual operating lever, being arranged along the rod in that order between the power actuating means and the contact operating mechanism.

4. A power-operated signal control system according to Claim 3, wherein the rods are arranged vertically in a substantially upright frame provided with vertically adjustable feet to enable it to be accurately levelled regardless of irregularities in the floor surface on which it is supported.

5. A power-operated signal control system as herein defined, substantially as described with reference to, and as shown in, the accompanying drawings.

For the Applicants,
F. J. CLEVELAND & COMPANY,
Chartered Patent Agents,
29, Southampton Buildings, Chancery Lane,
London, W.C.2.

PROVISIONAL SPECIFICATION

Improvements in or relating to Power-operated Signal Control Systems for Railways and the Like

We, BRITISH TRANSPORT COMMISSION, a Public Authority, established by the Transport Act, 1947, of 55, Broadway, Westminster, London, S.W.1, and ROBERT DELL, of 51, Eton Avenue, Sudbury, in the County of Middlesex, and WALTER OWEN, of 19, Lomond Close, Wembley, in the County of Middlesex, both British Subjects, do hereby

declare this invention to be described in the following statement:—

This invention relates to power signalling systems for railways and the like, the term "signalling" being intended to include all the normal controlling operations performed from a signal cabin, such as the actuation of signals and the setting of points at junctions.

It has already been proposed, in such power signalling systems to control the points and signals by means of contacts operated by turning movement of a rod, which rod is coupled to a manual operating lever and to a second similar rod in an interlocking frame, the rods in the interlocking frame associated with a plurality of signals, points or other operated devices being each coupled to one of a plurality of slide bars so that angular movement of a rod is accompanied by rectilinear movement of the corresponding slide bar. The slide bars carry dogs or projections co-operating with notches in interlocking bars extending in a direction perpendicular to that of the slide bars, the dogs or projections and the notches being so arranged that movement of one or more of the slide bars can take place only when another of those bars is in a predetermined position. Power means controllable from a remote point are provided, in addition to the manual levers, for operating the contact actuating rods.

A principal object of the present invention is to improve, and facilitate the assembly of an interlocking mechanism as above set forth, and a further object is to improve and simplify the apparatus consisting of the interlocking mechanism and the point and signal control contacts.

According to one feature of the invention, the slide bars are uniformly spaced one from another, and the interlocking bars are also spaced uniformly one from another, both the slide bars and the interlocking bars being flat metal strips pierced at regular intervals to receive bolts, screws or the like, additional pieces of metal of predetermined shape and dimensions being secured to the said strips by such bolts, screws or the like, the pieces secured to the slide bars forming the dogs or like projections thereon, and the pieces secured to the interlocking bars defining between them the notches co-operating with the dogs.

According to another feature of the invention the contacts are operated directly by the rods to which the slide bars are coupled, each of the said rods having the contact operating mechanism at one end, and power actuating means for operating the rod from a remote point at the other end, the mechanical interlocking mechanism, an electric lock for retaining the rod in a set position until the train movement for which it was set has been completed, and a manual operating lever, being arranged along the rod in that order between the power actuating means and the contact operating mechanism.

The rods are preferably arranged vertically in a substantially rigid upright frame provided with vertically adjustable feet to enable it to be accurately levelled regardless of irregularities in the floor surface on which it is supported.

In one arrangement according to the present invention, which will now be described by way of example, a signal interlocking machine comprises an upright rectangular frame, built up conveniently from **H**-section girders, and having vertically adjustable feet at its lower corners to enable it to be set in a truly level position. Brackets mounted on one side of the frame carry bearings for a plurality of equally spaced vertical rods arranged side by side in a common plane parallel to that of the frame. Each of the rods is movable through a predetermined angle by power means such as a double-acting air pressure motor or a pair of solenoids, the power means being controlled from a remote point. The power means act on the lower end of the rod, and the upper portion of the rod, by its angular movement, operates contacts controlling a particular signal or set of points. Mechanical interlocking means are positioned immediately above the power means, said interlocking means comprising a horizontal slide bar associated with each rod and a plurality of vertical interlocking bars co-operating with the slide bars. Further details of the mechanical interlocking means are given below. Above the mechanical interlocking means, each rod has fixed thereto a quadrant co-operating with a solenoid-operated locking member the solenoid of which is energised by the setting of the corresponding signal or other device for a desired train movement to lock the rod in the appropriate angular position, and is released automatically when that movement is completed. Between the quadrant and the switch operating mechanism, a hand lever is mounted on the rod, the hand lever serving both for manual operation of the rod, and as an indication of its position.

It will be evident that the arrangement of the various mechanisms in the relative positions stated above ensures that the contacts cannot be operated unless the mechanical interlocking means and the electric lock are also operated.

Referring again to the mechanical interlocking means, the slide bars are arranged one above another at equal intervals, and each slide bar is either formed with rack teeth engaging a toothed quadrant on the rod with which it is associated, or carries a pin engaging in a slot in an arm fixed to the rod. Each slide bar comprises a flat metal strip drilled with a row of equally spaced

tapped holes along its length, to receive screws, bolts or the like for securing thereto one or more flat metal plates forming dogs. Each flat metal plate is formed with two plain holes to receive screws or bolts passing through it into two adjacent holes in the slide bar.

The interlocking bars lie side by side and are equally spaced one from another, the said bars each comprising a flat metal strip which, like the strips forming the slide bars, is drilled with a row of suitably spaced plain holes. Notches to co-operate with the dogs on the slide bars are defined by the ends of short pieces of metal secured to the interlocking bars by screws, bolts or the like passing through the holes in said bars, each short piece of metal being formed with two tapped holes spaced apart by the same distance as the holes in the interlocking bars.

It will be seen that by suitably relating the spacing of the holes in the slide bars to the intervals between the interlocking bars, and by suitably relating the spacing of the holes in the interlocking bars to the intervals between the slide bars, it is possible to mount a dog on any slide bar in a position to co-operate with any interlocking bar, and it is also possible to mount pieces defining a notch on any interlocking bar to co-operate with a dog on any slide bar.

The interlocking mechanism according to the invention operates in the known manner, that is to say a slide bar which, when moved to a certain position, is desired to lock other slide bars against movement, carries a dog formed with a ramp co-operating with a corresponding ramp leading into a notch on an interlocking bar to lift the said interlocking bar as the slide bar moves to the appropriate position, the lifting of the interlocking bar moving notches therein out of alignment with dogs on the slide bars which are to be prevented from moving.

For the Applicants,
F. J. CLEVELAND & COMPANY,
Chartered Patent Agents,
29, Southampton Buildings, Chancery Lane,
London, W.C.2.

Printed for Her Majesty's Stationery Office by Wickes & Andrews, Ltd., E.C.4. 684/2.—1957.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

770187
3 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale

Sheet 1

Fig. 1.

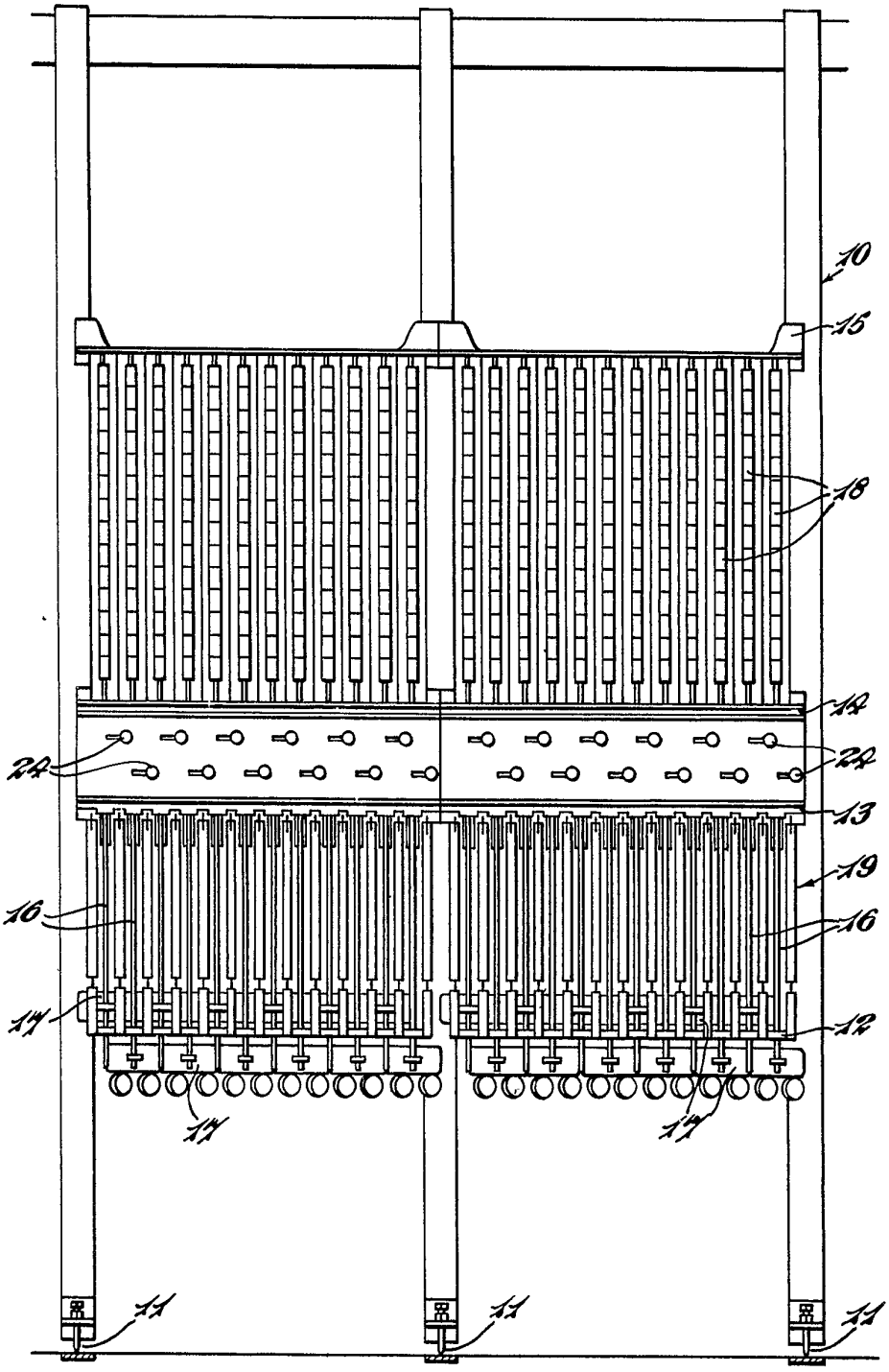


Fig. 2.

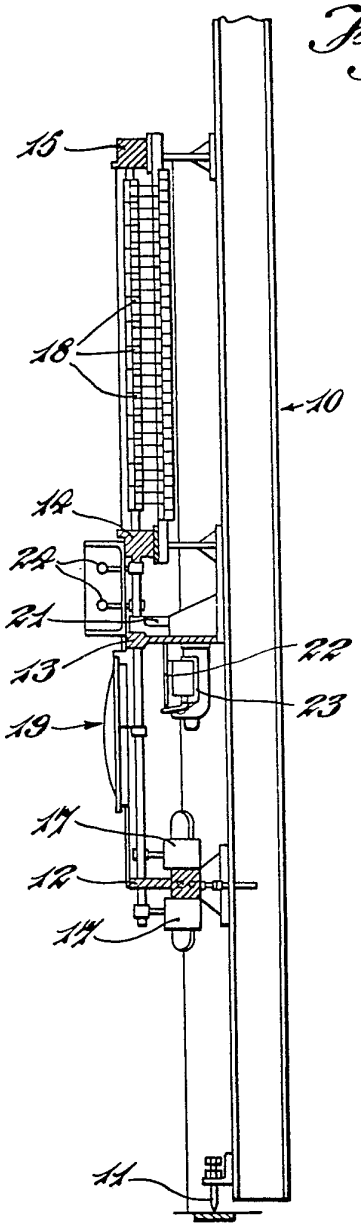
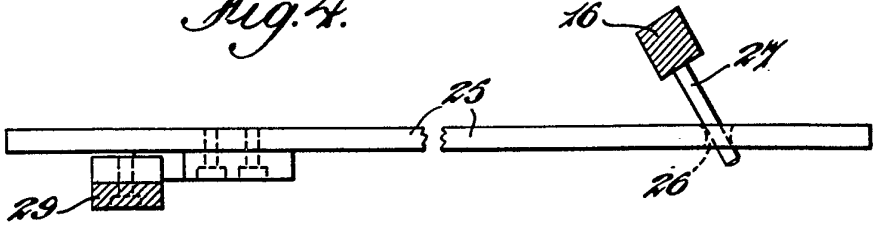
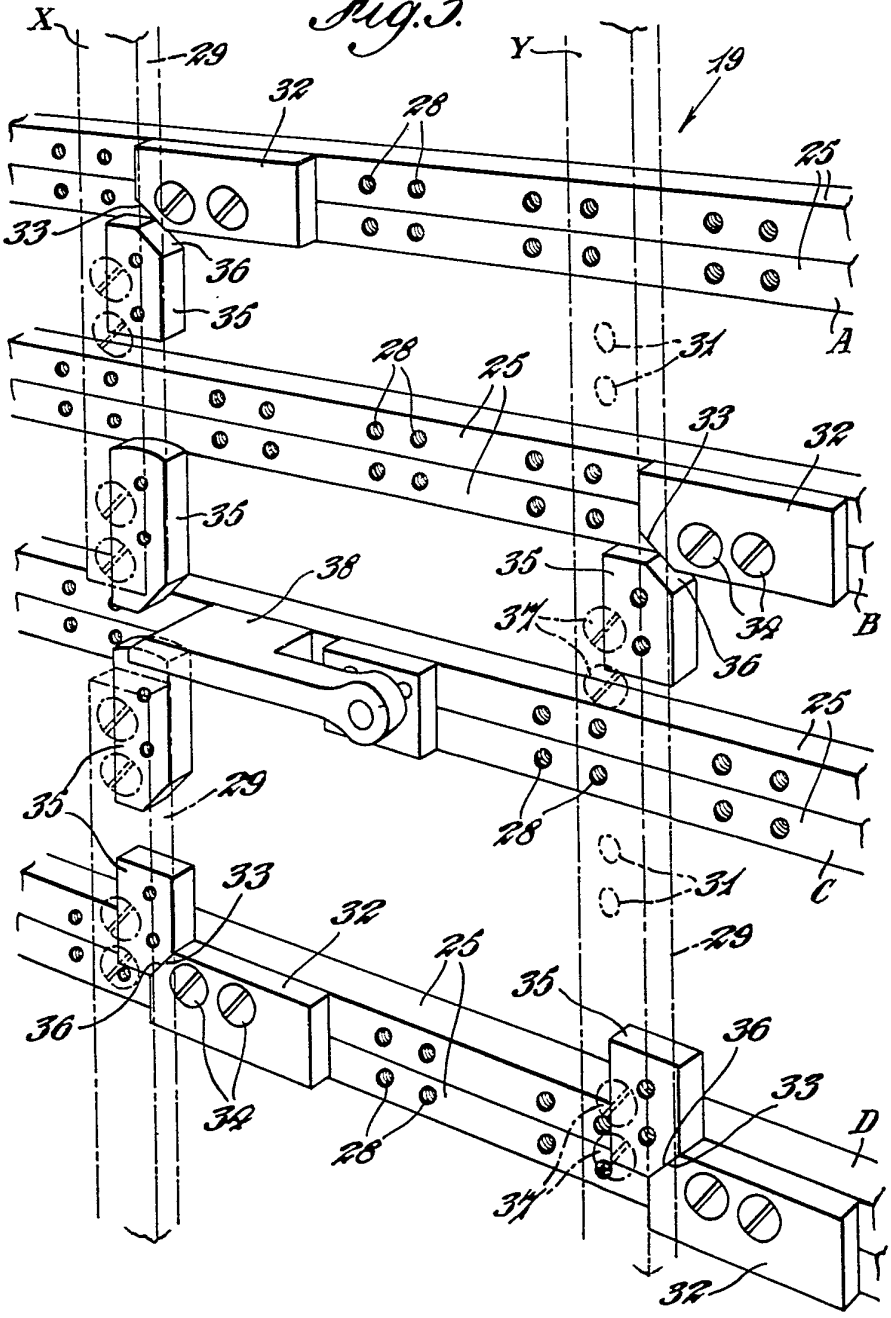


Fig. 4.



770187 COMPLETE SPECIFICATION
3 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheets 2 & 3

Fig. 3.



770187 COMPLETE SPECIFICATION
3 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheets 2 & 3

Fig. 2.

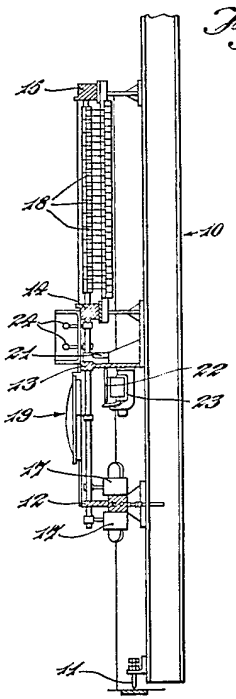


Fig. 4.

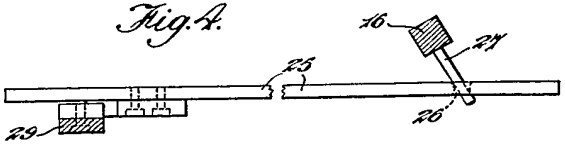


Fig. 3.