

Dec. 30, 1924.

1,521,329

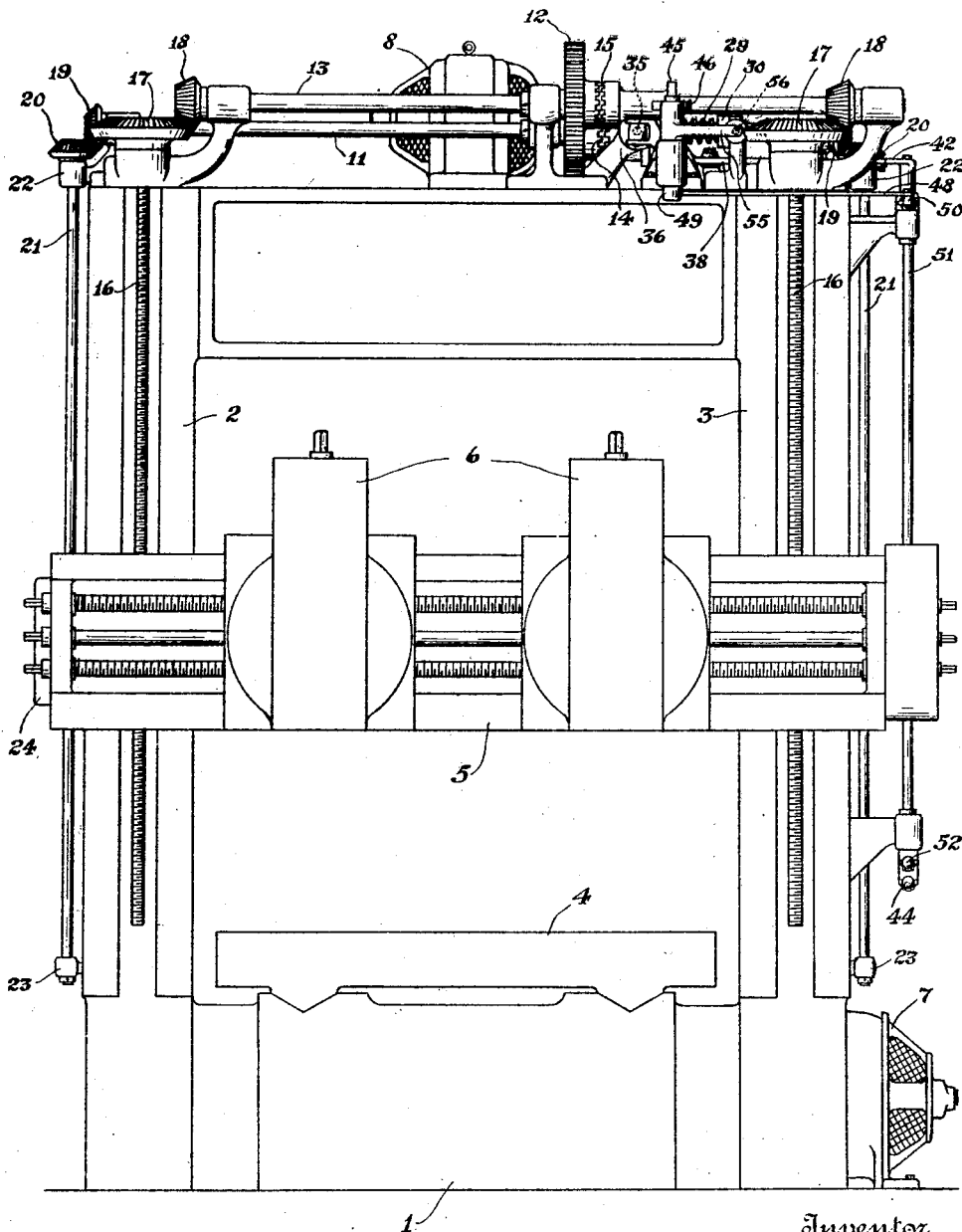
W. T. SEARS

RAIL CLAMPING MECHANISM

Filed Sept. 9, 1921

2 Sheets-Sheet 1

Fig.1.



Inventor
W. F. Sears.

W. T. Sears.

Wm. L. Witter
Attorney

Attorney

Dec. 30, 1924.

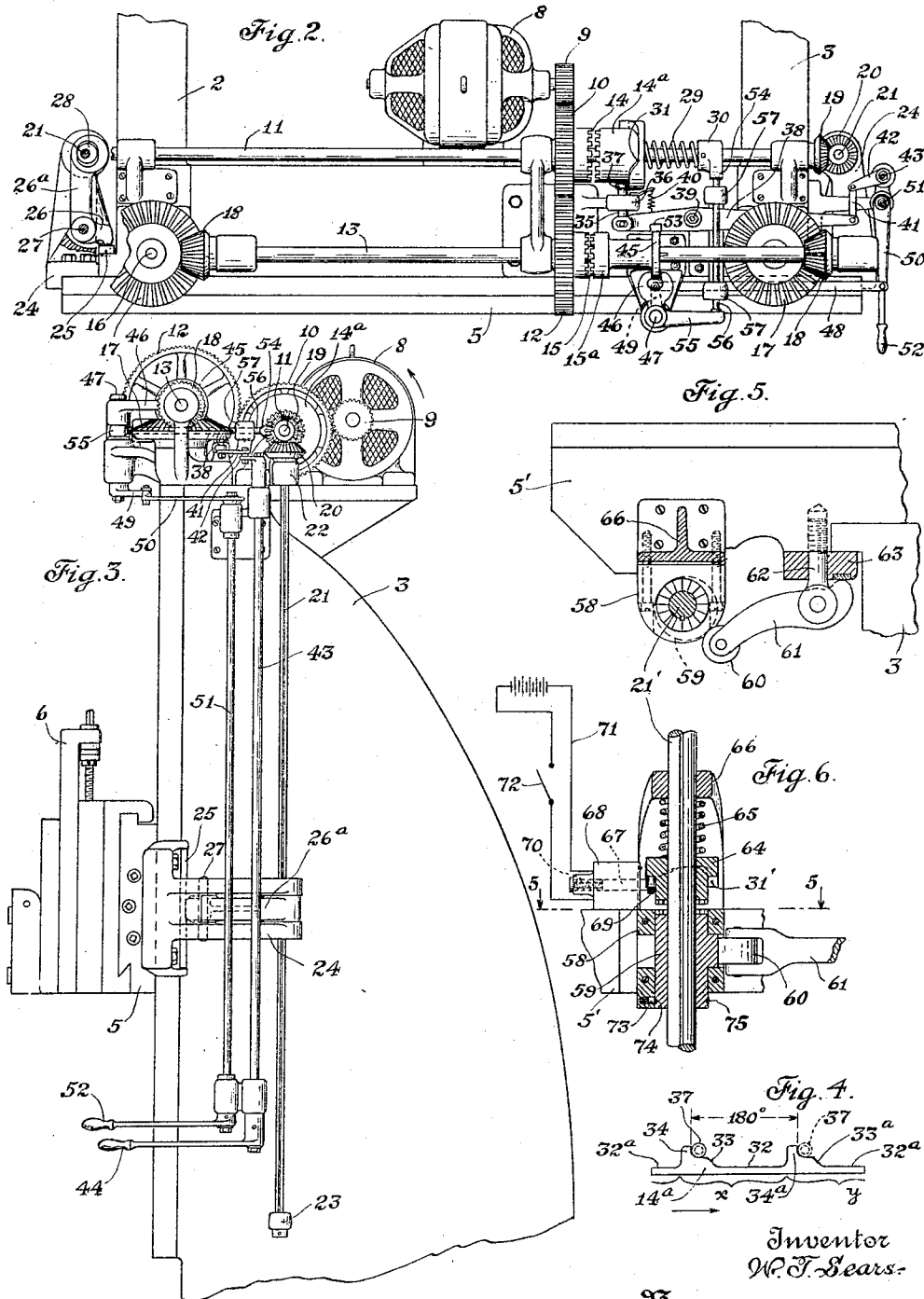
1,521,329

W. T. SEARS

RAIL CLAMPING MECHANISM

Filed Sept. 9, 1921

2 Sheets-Sheet 2



Inventor
W. T. Sears.

By *James F. Witter*
Attorney

UNITED STATES PATENT OFFICE.

WILLARD T. SEARS, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO NILES-BEMENT-POND COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

RAIL-CLAMPING MECHANISM.

Application filed September 9, 1921. Serial No. 499,523.

To all whom it may concern:

Be it known that I, WILLARD T. SEARS, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Rail-Clamping Mechanism, of which the following is a specification.

This invention relates to boring mills, planers and like machines and particularly to mechanism for elevating the cross rail and for clamping the same in any position of vertical adjustment. Heretofore, this clamping of the cross rail has been performed either by hand or by a separate power means for such purpose. It is the primary object of this invention to provide means whereby this clamping operation may be readily and conveniently performed from a main power means on the machine.

It is an object of the invention to provide a rail clamping mechanism of the type stated wherein the clamping means clamps and unclamps the rail by an intermittent rotary movement of an eccentric clamping means in the same direction, means, as a clutch and its controlling mechanism, being provided for controlling these movements as desired.

A further object of the invention is to provide a clamping mechanism of the above type and electro-magnetic means for controlling the clamping operation, the mechanism preferably comprising a clutch and electro-magnetic means for controlling the operation of the clutch in a manner to quickly and conveniently clamp and unclamp the rail at the will of the operator.

With the above and other objects in view, my invention consists in the features of construction and operation set forth in the following specification and illustrated in the accompanying drawings. In such drawings annexed hereto and forming a part of this specification, I have shown my invention embodied in a planer, but it will be understood that the invention can be otherwise embodied and that the drawings are

not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

Referring to the figures of the drawings:

Figure 1 is a front elevation of a planer embodying my invention.

Fig. 2 is a partial plan view thereof.

Fig. 3 is a partial side elevation thereof.

Fig. 4 is a diagrammatic detail view.

Fig. 5 is a fragmentary plan view taken on line 5—5 of Fig. 6 and showing a modified form of the invention.

Fig. 6 is a fragmentary side elevation of the modified form of the invention shown in Fig. 5.

Referring more specifically to the drawings by reference characters, 1 indicates the base of a planer and 2 and 3 a pair of uprights on the base at opposite sides of the table 4 thereon. A cross rail 5 is mounted for vertical movement on the uprights and supports a pair of tool saddles 6 thereon. The table may be operated in the usual manner from a motor 7 and the cross rail may be adjusted vertically and secured in adjusted position by mechanism hereinafter described and preferably operated from a motor 8.

I preferably operate the novel rail clamping means from the motor 8 through the mechanism hereinafter described, although it should be clearly understood that the same may be operated in the same manner from the motor 7 if desired. As illustrated in the drawings, the motor 8 is provided with a pinion 9 meshing with a gear 10 loose on a shaft 11 and in turn meshing with a gear 12 loose on a shaft 13. The shaft 11 may be called the horizontal clamping shaft and the shaft 13 may be called the rail elevating shaft. Each of gears 10 and 12 is provided with a toothed hub respectively forming half of a pair of clutches 14 and 15 whereby the shafts may be operated from the motor 8 when desired.

The rail may be moved vertically from the shaft 13 by means of elevating screws 16 having bevel gears 17 thereon in mesh

with bevel gears 18 on the ends of shaft 13.

The horizontal shaft 11 is provided at its ends with a pair of bevel gears 19 meshing respectively with gears 20 on the upper ends of vertical clamping shafts 21. Each shaft 21 is mounted in bearings 22 and 23 and each is provided with a splined portion extending through a bracket 24 secured to the cross rail. A clamping shoe 25 carried on each end of the cross rail is adapted to be forced into clamping engagement with its upright by means of a clamping lever 26. This lever is pivoted to the bracket 24 at 27 and the long arm 26^a thereof is engaged by an eccentric 28 on the vertical clamping shaft, the eccentric being splined to the shaft. In Fig. 2 the eccentric is shown in the rail clamping position and rotation of the eccentric 180° therefrom is adapted to unclamp the rail. The bevel gears 19 and 20 each have the same number of teeth whereby the rotation of the horizontal clamping shaft 11 exactly corresponds with the rotation of the vertical clamping shafts 21.

The clutch element 14^a is splined to its shaft 11 and is normally closed by means of a spring 29 on the shaft between the clutch and a collar 30 pinned to the shaft. The clutch element 14^a is provided with a cam path 31 thereon, such path being shown diagrammatically in Fig. 4. It will be noted that the two diametrically opposite halves *x* and *y* of this path are symmetrical, each half comprising a low portion (32, 32^a), a raised portion or shoulder (33, 33^a) and a higher shoulder (34, 34^a). A pin 35 is slidably mounted in a bracket 36 and a roller 37 on one end of the pin is adapted to ride on the cam path. The other end of the pin is secured to one end of the lever 38 pivoted at 39. A spring 40 normally holds the pin in engagement with the clutch. A link 41 connects the other end of this lever with an arm 42 on the upper end of a controlling shaft 43. A handle 44 at the lower end of this shaft is adapted to rotate the shaft to move the pin longitudinally.

In operation the motor and gearing rotates in the direction of the arrow (Fig. 3). With the rail clamped as illustrated in the drawings, the roller 37 rests against the shoulder 34 and prevents further rotation of the clamping shafts and eccentrics. When the operator desires to unclamp the rail, he moves the handle 44 inwardly which operation pulls the pin 35 and the roller 37 outwardly from engagement with the cam path. The spring 29 then forces the clutch element 14^a into engagement with the toothed hub portion of gear 10 whereby the clamping shafts are rotated. The operator immediately releases the handle 44 whereupon the spring 40 forces the pin

toward the clutch. When the shoulder 34 has passed the roller 37, the latter moves inwardly into a position over the low portion 32^a of the cam path. The clutch continues to rotate until the raised portion 33^a engages the roller 37 whereby the clutch element 14^a is forced out of driving engagement with the gear 10. The shoulder 34^a acts as a stop to prevent further rotation of the clamping shafts. It will be noted that the clamping shafts and eccentrics have in this operation been rotated 180° whereby the rail has been unclamped. To again effect the clamping of the rail, the operator merely moves the handle 44 inwardly and the clutch mechanism will automatically operate to clamp the rail and to stop the clamping mechanism in the rail clamping position. It will thus be seen that the mechanism is adapted to alternately clamp and unclamp the rail by a 180° rotation of the clamping shafts and eccentrics.

The clutch element 15^a is splined to its shaft 13 and an annular flange 45 thereon is engaged by a fork 46 whereby the clutch may be shifted longitudinally. This fork is mounted on the upper end of a rock shaft 47. A link 48 connects an arm 49 on the shaft 47 with an arm 50 on the upper end of a controlling shaft 51. A handle 52 is provided at the lower end of the shaft 51 for rotating the shaft and shifting the clutch element 15^a.

I preferably provide an automatic interlocking means between the rail clamping mechanism and the rail elevating mechanism for the purpose of preventing their simultaneous engagement and thereby causing breakage of the machine. The lever 38 is notched at 53 over the flange 45 as illustrated in Fig. 2. In the position illustrated, the clutch element 15^a is in the disengaged position. When the element 15^a is moved longitudinally to close the clutch 15 and thereby drive the rail elevating screws 16, the flange 45 is moved out of alignment with the notch 53 whereby the lever 38 cannot be moved to disengage the roller 37 from the cam path 31. The clamping mechanism, therefore, cannot be operated while the rail elevating mechanism is in engagement.

The collar 30 on shaft 11 is provided with a projecting portion 54 on one side thereof. The rack shaft 47 is provided with an intermediate arm 55 secured thereto. A pin 56 is slidably mounted in bearings 57 between the collar 30 and arm 55. As illustrated in Fig. 2, the clamping mechanism is in the rail clamping position and the projection 54 of the collar 30 is in engagement with the pin 56. The pin in such position bears against the outer end of the arm 55 and prevents the rotation of shaft 47 to engage the clutch 15. The rail elevat-

ing mechanism, therefore, cannot be engaged while the rail is clamped.

In Figs. 5 and 6, I have illustrated a modified form of my invention wherein a clamp operating clutch is mounted on each vertical clamping shaft and wherein such clutches are controlled electro-magnetically. In this form of the invention, the vertical clamping shafts 21' may be in permanent driving connection with the motor 8. The cross rail 5' is provided with a bracket 58 on each end thereof in which is rotatably mounted an eccentric 59. This eccentric engages a roller 60 on the long arm of a clamping lever 61 pivoted to a pin 62 in the cross rail, the short arm of the lever engaging a clamping shoe 63.

The upper end of eccentric 59 is provided with clutch teeth adapted to be engaged by a clutch element 64 splined to the shaft 21'. A spring 65 between the clutch element 64 and a portion 66 of the bracket normally forces the clutch element into driving engagement with the eccentric. This clutch element is provided with a cam path 31' like the cam path 31 heretofore described and illustrated in Fig. 4. A pin 67, forming the core of a solenoid 68, is provided with a roller 69 on its end adapted to engage the cam path. A spring 70 normally holds the pin and roller projected towards the clutch element. An electric circuit 71 comprising a switch 72 is provided for energizing the solenoid to withdraw the pin and roller from engagement with the clutch.

In the drawings, the eccentric is shown in the rail clamping position. To unclamp the same, the operator momentarily closes the switch 72 whereupon the pin 67 and roller 69 are withdrawn from engagement with the clutch and cam path. The spring 65 forces the clutch element 64 into driving engagement with the eccentric. The switch 72 being released, the spring 70 forces the pin and roller toward the clutch, the roller entering the clutch upon the low portion 32^a (Fig. 4) of the cam path when the shoulder 34 has passed the roller. In this manner the clutch will be disengaged and the clamping mechanism left in the unclamped position as heretofore described. To again clamp the rail, it is only necessary to momentarily close the switch 72.

A spring pressed detent 73 is preferably mounted in the bracket 58 and is adapted to engage either of two depressions 74 or 75 in the eccentric member, engagement of the detent in depression 74 serving to hold the eccentric in its rail clamping position and engagement of the detent in the depression 75 serving to hold the eccentric in its unclamping position.

What I claim is:

1. In a machine of the class described, the combination of a base, a work table mounted

thereon, an upright adjacent the table, a cross rail mounted to slide vertically on the upright, clamping means on the rail for securing the rail to the upright, power means for operating the machine, and an operative connection from the power means to the clamping means for effecting the clamping operation.

2. In a machine of the class described, the combination of a base, a work table mounted thereon, an upright adjacent the table, a cross rail mounted to slide vertically on the upright, power means to move the rail vertically, clamping means on the rail for securing the rail to the upright, and an operative connection from the power means to the clamping means for effecting the clamping operation.

3. In a machine of the class described, the combination of a base, a work table mounted thereon, two uprights adjacent the table, a cross rail mounted to slide vertically on the uprights, a motor mounted on the uprights, clamping means on the rail adapted to engage both uprights to secure the rail thereto, and an operative connection from the motor to the clamping means for effecting the clamping operation.

4. In a machine of the class described, the combination of a base, a work table mounted thereon, an upright adjacent the table, a cross rail mounted to slide vertically on the upright, clamping means on the rail for securing the rail to the upright, a vertical shaft adjacent the upright, power means for intermittently rotating the shaft through a definite angle, and an operative connection from the shaft to the clamping means for effecting the clamping operation.

5. In a machine of the class described, the combination of a base, a work table mounted thereon, two uprights adjacent the table, a cross rail mounted to slide vertically on the uprights, clamping means on the rail adapted to engage both uprights to secure the rail thereto, a vertical shaft adjacent each upright, power means for intermittently rotating the shafts through 180°, and an operative connection from the shafts to the clamping means for effecting the clamping operation.

6. In a machine of the class described, the combination of a base, a work table mounted thereon, power means for operating the table, two uprights adjacent the table, a cross rail mounted to slide vertically on the uprights, power means to move the rail vertically, clamping means on the rail adapted to engage both uprights to secure the rail thereto, and an operative connection from one of the said power means to the clamping means for effecting the clamping operation.

7. In a machine of the class described, the combination of a base, a work table mounted thereon, two uprights adjacent the table, a

cross rail mounted to slide vertically on the the uprights, power means to move the rail vertically, clamping means on the rail adapted to engage both uprights to secure the rail thereto, and an operative connection from the said power means to the clamping means for effecting the clamping operation, the said connection including a clamping shaft adjacent each upright and an eccentric on each shaft engaging the clamping means.

8. In a machine of the class described, the combination of a base, a work table mounted thereon, two uprights adjacent the table, a cross rail mounted to slide vertically on the uprights, an electric motor for moving the rail vertically, clamping means on the rail adapted to engage both uprights to secure the rail thereto, and an operative connection from the motor to the clamping means for effecting the clamping operation, the said connection including a clamping shaft adjacent each upright, an eccentric on each shaft engaging the clamping means and clutch means under the control of the operator for operatively connecting the motor with said eccentrics for effecting the clamping operation.

9. In a machine of the class described, the combination of a base, a work table mounted thereon, two uprights adjacent the table, a cross rail mounted to slide vertically on the uprights, power means to move the rail vertically, clamping means on the rail adapted to engage both uprights to secure the rail thereto, an operative connection from the power means to the clamping means for effecting the clamping operation, the said connection including a clamping shaft adjacent each upright, an eccentric on each shaft engaging the clamping means and a clutch under the control of the operator for operatively connecting the power means with the said eccentrics for effecting the clamping operation, a spring for normally closing the clutch, the clutch being provided with a cam path extending therearound and having a shoulder thereon, and means riding on the path and adapted to engage the shoulder to disengage the clutch against the action of the spring when the clamping mechanism has been moved to the desired position.

10. In a machine of the class described, the combination of a base, a work table mounted thereon, two uprights adjacent the table, a cross rail mounted to slide vertically on the uprights, power means to move the rail vertically, clamping means on the rail adapted to engage both uprights to secure the rail thereto, an operative connection from the said power means to the clamping means for effecting the clamping operation, the said connection including a clamping shaft adjacent each upright, an eccentric on each shaft engaging the clamping means and a clutch under the control of the operator for operatively connecting the power means with the said eccentrics for effecting the clamping operation, the clutch being provided with a cam path extending therearound and having a pair of shoulders thereon, and means riding on the path and adapted to alternately engage the shoulders to disengage the clutch and stop the rotation of the shaft with the clamping means in the clamped and unclamped positions respectively.

11. In a machine of the class described, the combination of a base, a work table mounted thereon, power means for operating the table, an upright adjacent the table, a cross rail mounted to slide vertically on the upright, power means to move the rail vertically, clamping means on the rail for securing the rail to the upright, a clutch always rotatable in the same direction from one of the said power means and adapted to operatively connect the clamping means with the power means for effecting the clamping of the rail through the clamping means, and means for controlling the clutch to clamp and unclamp the rail, the successive operations of the last mentioned means being adapted to alternately clamp and unclamp the rail.

12. In a machine of the class described, the combination of a base, a work table mounted thereon, an upright adjacent the table, a cross rail mounted to slide vertically on the upright, power means to move the rail vertically, clamping means on the rail for securing the rail to the upright, an operative connection from the power means to the clamping means for effecting the clamping operation, and electro-magnetic means for controlling the clamping operation.

13. In a machine of the class described, the combination of a base, a work table mounted thereon, two uprights adjacent the table, a cross rail mounted to slide vertically on the uprights, an electric motor for moving the rail vertically, clamping means on the rail adapted to engage both uprights to secure the rail thereto, an operative connection from the motor to the clamping means for effecting the clamping operation, the said connection including a clamping shaft adjacent each upright, an eccentric on each shaft engaging the clamping means and clutch means under the control of the operator for operatively connecting the motor with the said eccentrics for effecting the clamping operation, and electro-magnetic means for controlling the operation of the clutch means.

14. In a machine of the class described, the combination of a base, a work table mounted thereon, two uprights adjacent the table, a cross rail mounted to slide vertically

on the uprights, power means to move the rail vertically, clamping means on the rail adapted to engage both uprights to secure the rail thereto, an operative connection
5 from the said power means to the clamping means for effecting the clamping operation, electro-magnetic means for controlling the operation of the said connection, and a single switch for controlling the said electro-mag-
netic means to clamp and unclamp the rail. 10

In testimony whereof, I hereto affix my signature.

WILLARD T. SEARS.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,521,329, granted December 30, 1924, upon the application of Willard T. Sears, of Montclair, New Jersey, for an improvement in "Rail-Clamping Mechanism," an error appears in the printed specification requiring correction as follows: Page 4, line 115, claim 13, beginning with the article "the," second occurrence, strike out all to and including the syllable and comma "ation," line 118; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of March, A. D. 1925.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.