E. R. BIERMAN & G. H. KEAST.

GUIDING APPARATUS FOR PLATE TRIMMING SHEARS.

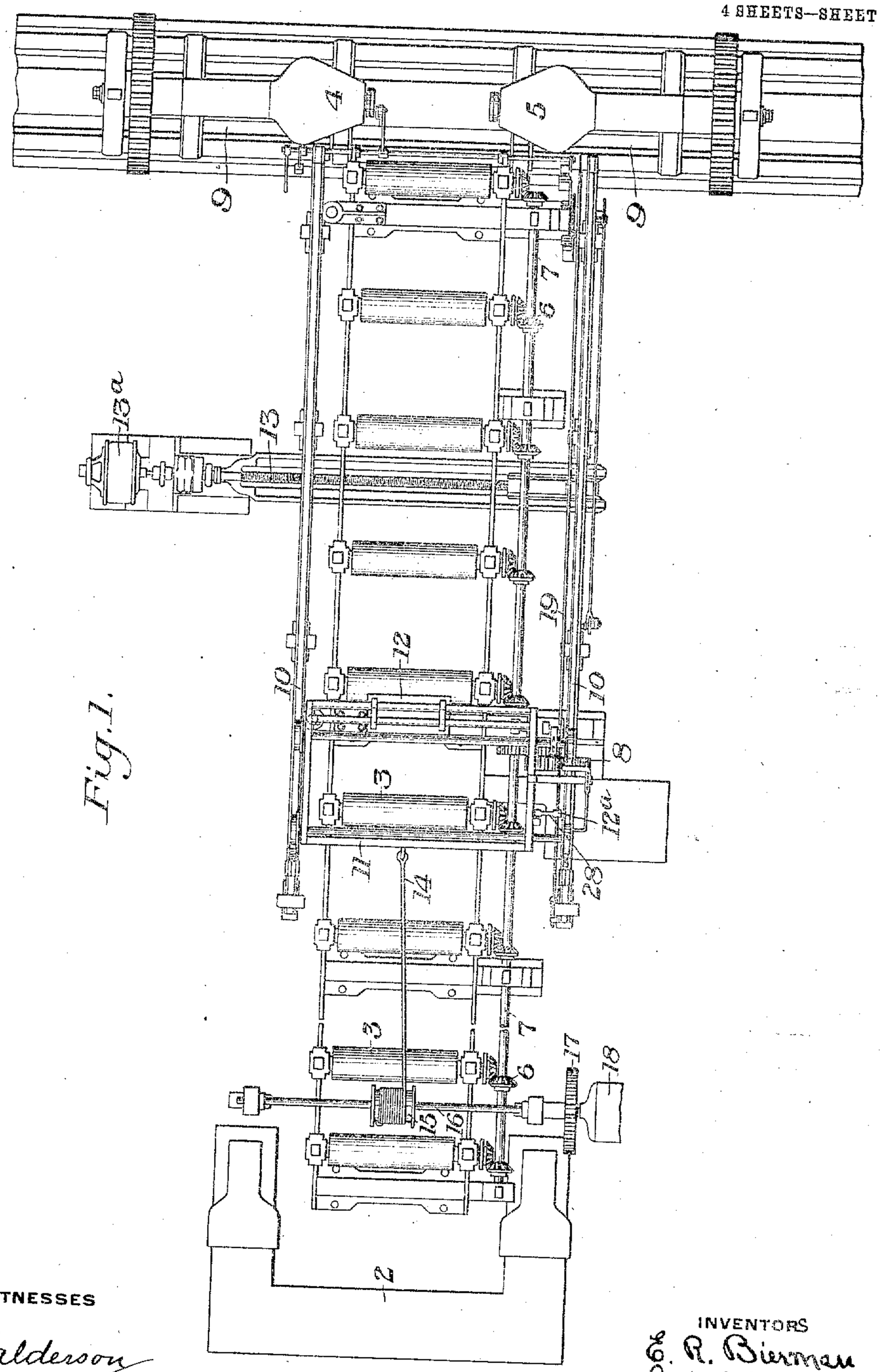
APPLICATION FILED MAY 26, 1909.

962,191.

Patented June 21, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 2.

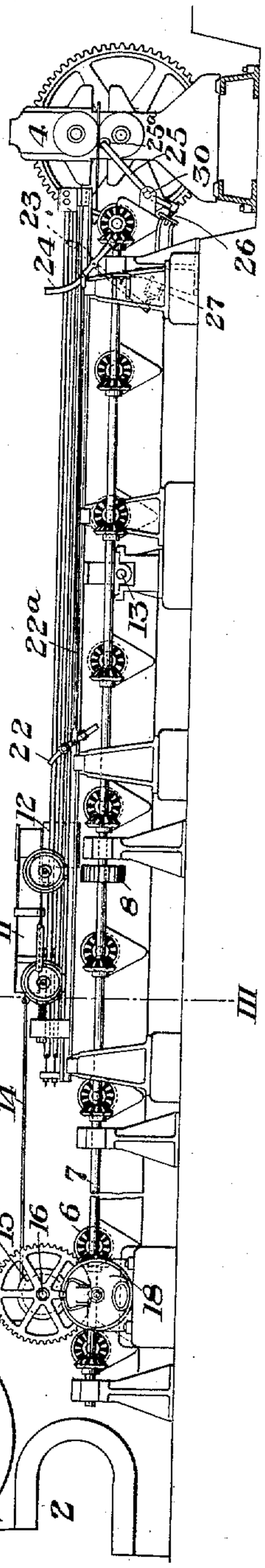
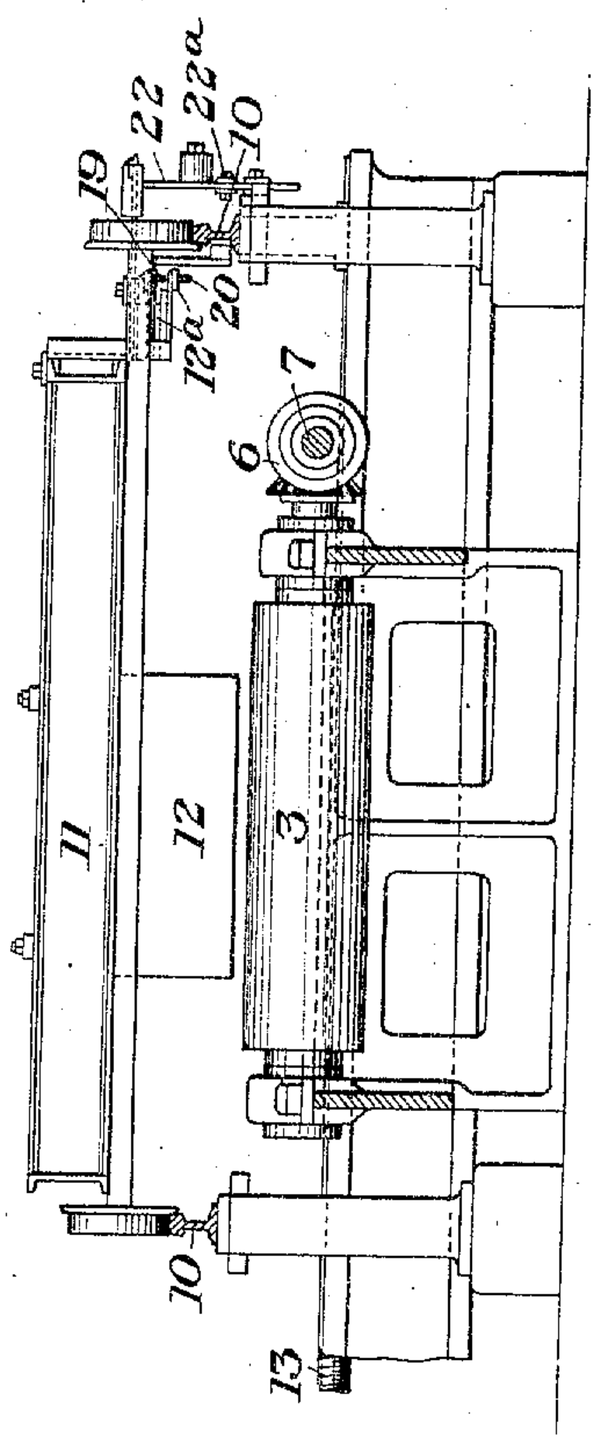


Fig. 3.



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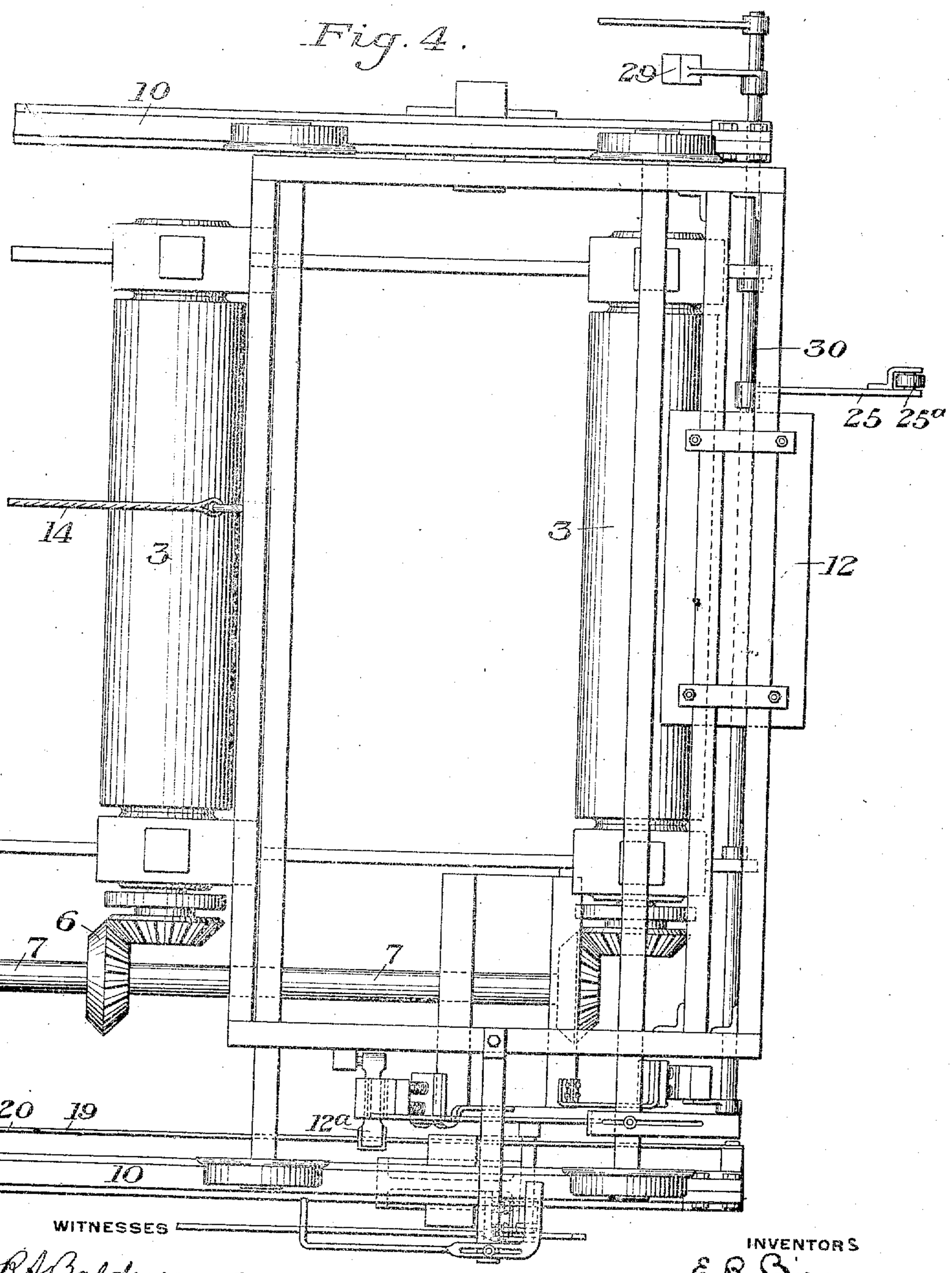
4 SHEETS—SHEET 3.

Fig. 4.



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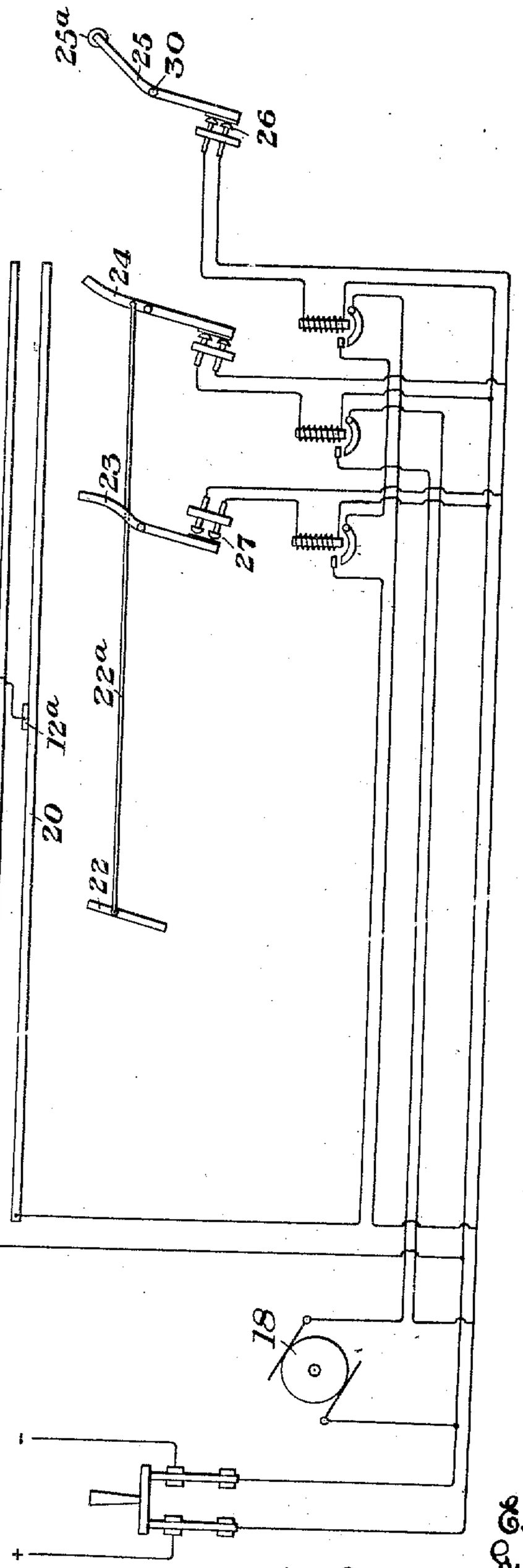
4 SHEETS—SHEET 4.

Fig. 5



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UNITED STATES PATENT OFFICE.

EDWARD R. BIERMAN, OF LORAIN, AND GEORGE H. KEAST, OF ELYRIA, OHIO, ASSIGNORS TO NATIONAL TUBE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

GUIDING APPARATUS FOR PLATE-TRIMMING SHEARS.

962,191. Specification of Letters Patent. **Patented June 21, 1910.**

Application filed May 26, 1909. Serial No. 498,494.

To all whom it may concern:

Be it known that we, EDWARD R. BIERMAN, of Lorain, Lorain county, Ohio, and GEORGE H. KEAST, of Elyria, Lorain county, Ohio, have invented a new and useful Guiding Apparatus for Plate-Trimming Shears, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan showing the shears, roller feed table and guiding mechanism, constructed and arranged in accordance with our invention. Fig. 2 is a longitudinal side elevation, partly in section, of the same. Fig. 3 is a sectional end elevation on the line III—III of Fig. 2. Fig. 4 is a detail plan, on a larger scale, showing the multi-pole magnet and the wheeled car on which the guiding magnet is secured when in use. Fig. 5 is a wiring diagram showing the electrical connections to the magnet and to the motor and automatic operating mechanism.

Our invention relates to the handling of rolled metal plates during the shearing operation, and more particularly relates to the handling and controlling of such plates while being sheared to the desired width.

The object of the invention is to provide improved means for controlling and guiding the passage of the plates lengthwise through the trimming shears while their longitudinal edges are being cut or trimmed to width, and to means for adjusting the plates transversely relative to the trimming shears.

Another object of our invention is to provide improved means for mechanically handling the plates during the shearing operation. and for actuating the guiding mechanism during and after the shearing operation is completed.

In the drawings, 2 represents a cropping shear by which the ends of the plates are sheared in cutting the plates to length. In front of the shear 2, is a roller feed table 3, on which the plates are delivered forwardly from the cropping shear to the rotary trimming shears 4 and 5, which are located opposite each other at the forward end of the roller table 3. The feed rollers of the table 3 are driven through the bevel gears 6, line shaft 7 and the slow down gearing 8 by any desired type of motor, (not shown). The shears 4 and 5 are movably mounted on the shoes 9 so as to be adjustable toward and away from each other in order to cut plates of varying widths. The shear 2 and the rotary shears 4 and 5 are of standard make and their construction, not forming part of our invention, need not be further described. Mounted on the track rails 10 which extend parallel with and on opposite sides of the roller table 3 is the wheeled car 11, which travels lengthwise of and above the roller table 3, and secured on this car is a multi-pole magnet 12, arranged so that the lower faces of the magnet cores will clear the top of the feed rollers on the roller table 3 by an amount slightly greater than the thickest plate that is cut by the shears. The track rails 10 are secured on standards so as to be movable transversely, being shifted sidewise and held in their adjusted position by the adjusting screw 13 which is actuated by the motor 13ª.

Secured to one end of the car 11, is the rope or cable 14, the other end of which is secured to the drum 15 which is mounted on the shaft 16. The shaft 16 is connected by slow down gearing 17 to a motor 18, by which the shaft and drum are rotated to wind up the cable 14, and draw the car 11 from the front or trimming shear end of the table 3 back into the position shown in Fig. 1.

The coils of the magnet 12 are connected to terminals 12ª which are arranged to form a sliding contact with the bars 19 and 20 to close and form a circuit to the magnet while it is being moved with the car 11 on the track rails, the bars 19 and 20 being mounted to one side of, and parallel with the roller table 3. In order to prevent excessive heating of the magnet coils, resistance 21 is cut into the magnet circuit at the rear end of the rod or bar 19, the resistance forming a connection across the gap between the adjoining ends of the bars 19 and 19ª.

Located at suitable points in the length of the roller table, are the mechanically operated levers 22, 23, 24 and 25, these levers being connected to suitable magnetic switches, by which the circuits for operating the motor 18 and for the magnet 12 are con-

trolled. The lever 25 at the forward end of the roller table 3 is arranged so as to bring the anti-friction roller 25ª into the path of the moving plate while the plate is being sheared to width by the rotary shears 4 and 5. When the lever 25 is depressed by contact with the plate being sheared, the circuit through the switch 26 is closed so as to supply current to the magnet, and when the magnet is energized, the rear end of the plate is lifted by and is brought into contact with the cores of the magnet. The plate, by engagement of its forward end with the rotary shear knives on the shears 4 and 5, and by the action of the rollers of the feed table 3, is fed forwardly and is gradually sheared to width along its entire length. The attraction of the magnet when energized to the plate being sheared causes it to be moved forwardly with the car 11 traveling on the track rails 10, in a direction parallel to the line of cutting of the shear blades. When the magnet has traveled forwardly with the plate until within a short distance of the rotary shear knives, a second lever 24 is operated by the car which operation closes the circuit to the motor 18, causing the haulage drum 15 to rotate, and return the car to its starting position at the opposite end of the roller table 3. Just before the lever 24 engages with the car 11, the lever 23 is engaged by the car, and its movement actuates the magnetic switch 27 to open and break the electric circuit to the magnet, thereby releasing the rear end of the plate from engagement with the magnet. When the car 11 is returned to its starting position by the haulage drum 15, it engages with the lever 22, which is operated so as to actuate the link 22ª to open the circuit to the motor 18 and stop further movement of the car striking against the buffer 28 provided for that purpose.

In the operation of our improved apparatus, the front end of the plate is sheared by the cropping shears 2, and the plate is then fed forwardly through these shears on to the rollers of the feed table 3. The plate is then sheared to length by cropping its rear end between the shear knives of the shear 2, after which operation it is fed forwardly until the front end of the plate is in proximity to the rotary knives of the shears 4 and 5. Meanwhile, the shears 4 and 5 have been adjusted toward or away from each other the required distance to shear the plate to the desired width. When the front end of the plate approaches the shears 4 and 5, it engages with the anti-friction roller 25ª on the upper end of the pivoted lever 25, which contact depresses the lever and closes the circuit through the switch 26, and energizes the magnet. A counterweight 29 on the shaft 30 on which the lever 25 is secured is provided to raise the upper end of this lever after the plate has been sheared. The energized magnet attracts the rear end of the plate and prevents its movement relative to the magnet in a sidewise direction. When the magnet 12 is energized and engages with the rear end of the plate, the edges of the plate may not be parallel with the line of movement of the car 11 on the track rails 10, or centrally located with regard to the shears. In such case the track rails are moved on their supports through the adjusting screw 13 by the motor 13ª so as to bring the plate into position, the feed rollers on the table 3 being rotated to assist in this operation when necessary. The rollers of the feed table 3 are then actuated to feed the front end of the plate between the shear knives, and as this movement is continued, the plate is gradually sheared or trimmed along its longitudinal edges on parallel lines to the desired width. When the car has advanced on its track rails 10, so as to engage with the lever 23, the major portion of the length of the plate has been cut to width, and the circuit to the magnet being broken by contact of the car with this lever, the magnet is released from engagement with the rear end of the plate. On further continuing the forward movement of the car for a slight distance, the lever 24 is actuated by contact with the car, so as to close the circuit, and energize the motor 18, which operation causes the haulage drum 15 to be rotated and brings the car back into its starting position on the rear end of the feed table 3. As the car approaches the rear end of the table it contacts with the lever 22 which is connected by the rod 22ª with the lever 24, and through the rod or link 22ª and lever 22 breaks the circuit leading to and stops the operation of the motor 18. The above described movements are then repeated on each successive plate in operating our improved mechanism.

The advantages of our invention will be apparent to those skilled in the art. By means of our improved mechanism the plates are guided and controlled throughout the shearing operation. The apparatus is arranged to automatically engage with the plate, and is mechanically released and returned to its starting position upon the completion of each shearing operation in readiness to be again operated. The apparatus is simple and easily kept in repair.

Modifications in the construction and arrangement of the parts may be made without departing from our invention. The car may have means moving with the car for causing it to travel on its track rails instead of the cable and drum as shown. But one side of the plate may be cut instead of both as shown and other changes may be made within the scope of the claims.

We claim:

1. In apparatus for cutting metal plates, the combination with a shear and means on which plates are delivered to said shear, of guiding means engaging with and controlling the plate in its forward movement to the shear and mechanism on which said guiding means is transversely movable; substantially as described.

2. In apparatus for cutting metal plates, the combination with opposing shears and means on which plates are delivered endwise to said shears, of guiding means engaging with and controlling the plate in its forward movement to the shears said guiding means being transversely adjustable; substantially as described.

3. In apparatus for shearing plates, plate guiding mechanism comprising a magnet arranged to engage with the plate being sheared a transversely adjustable support on which the magnet is movably mounted, said magnet being adapted to move forwardly with and control the movement of the plate during said shearing operation and means for transversely adjusting said support; substantially as described.

4. In apparatus for shearing metal plates, plate delivering mechanism comprising means on which the plates are fed forwardly to the shearing mechanism, guiding mechanism detachably engaging with the plates adapted to move with and guide the plates moving forwardly during the shearing operation and means for adjusting the guiding mechanism transversely relative to said shear; substantially as described.

5. In apparatus for shearing plates, plate delivering mechanism comprising means on which the plate is fed forwardly to the shear, mechanism detachably engaged with the plate adapted to move forwardly with and guide the plate during the shearing operation and means on which said guiding mechanism is mounted, said means being movable sidewise; substantially as described.

6. In apparatus for shearing plates, plate delivering mechanism comprising means on which the plates are fed forwardly to the shear, mechanism engaging with the plates arranged to move forwardly with and guide the plates during their movement toward the shear, said mechanism being transversely movable and means for moving said mechanism; substantially as described.

7. In apparatus for shearing plates, a shear, means upon which the plate is fed forwardly to said shear, a movable guide for controlling the forward movement of the plate to the shear, and means on which said guide is movably mounted; substantially as described.

8. In apparatus for shearing plates, a shear, means on which the plate is fed forwardly, a guide for controlling the forward movement of the plate to the shear, means on which the guide is movably mounted, and means contacting with the plate and arranged to cause engagement of said guide and plate; substantially as described.

9. In apparatus for shearing plates, a shear, means on which the plate is fed forwardly to said shear, a guide for controlling the forward movement of the plate, means on which the guide is movably mounted, mechanism for moving the guide on its support and means arranged to contact with said guide and actuate said guide moving mechanism; substantially as described.

10. In apparatus for shearing plates, a shear, means on which the plate is fed forwardly to said shear, a guide for controlling the forward movement of plates means on which the guide is movably mounted, means for moving the guide on its support, and means contacting with said guide arranged to actuate and stop said guide moving mechanism; substantially as described.

11. In apparatus for shearing plates, a shear, means on which the plate is fed forwardly to said shear, a guide for controlling the forward movement of the plate, means on which the guide is movably mounted, mechanism for moving the guide on its support, and means contacting with said guide arranged to release said guide from the plate; substantially as described.

12. In apparatus for shearing plates, a shear, means on which the plate is fed forwardly to said shear, a guide for controlling the forward movement of the plate, means on which the guide is movably mounted, means contacting with the plate to cause the engagement of said guide and plate, mechanism for moving the guide on its support, means contacting with said guide arranged to actuate and stop said guide moving mechanism, and mechanism contacting with said guide arranged to release the guide from said plate; substantially as described.

13. In apparatus for shearing plates, a shear, means on which the plate is fed forwardly to said shear, a guide for controlling the forward movement of the plate, means on which the guide is movably mounted, means contacting with the plate arranged to cause engagement of said guide and plate, said guide supporting means being arranged to move transversely to shift the plate in engagement with said guide; substantially as described.

14. Apparatus for shearing plates comprising opposite shears, means on which the plates are fed forwardly to said shears and independent guiding means detachably engaging with the rear end of the plate during the shearing operation, said independent means being movable forwardly with the plate and mechanism arranged to adjust

said guiding means transversely relative to said shears; substantially as described.

15. In apparatus for shearing metal plates, a shear, means on which the plates are fed forwardly in being sheared, a guide having means detachably engaging with said plates for controlling the forward movement of the plates and means for adjusting said guide transversely; substantially as described.

16. Apparatus for shearing metal plates comprising a shear, means on which the plates are fed forwardly to the shear, an electric magnet adapted to engage with the plates being sheared, a carriage on which said magnet is mounted, a track on which said carriage moves toward and away from said shear, and means for transversely adjusting said track relative to the shear; substantially as described.

17. Apparatus for shearing metal plates comprising a shear, means on which the plates are delivered to said shear, a guide movable toward and away from said shear adapted to engage with and control the forward movement of the plates being sheared, means on which said guide is movably mounted and means for transversely adjusting said guide supporting means relative to said shear; substantially as described.

18. Apparatus for shearing plates comprising a shear, means for feeding the plates to said shear and electric means engaging with one end of said plates adapted to move with and guide said plates in their forward movement to the shear said means being transversely adjustable; substantially as described.

In testimony whereof, we have hereunto set our hands.

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GEORGE H. KEAST.

Witnesses:
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