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MEANS FOR TRANSFERRING AND HANDLING METAL PLATES OR THE LIKE.

APPLICATION FILED SEPT. 24, 1918.

1,329,962.

Patented Feb. 3, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

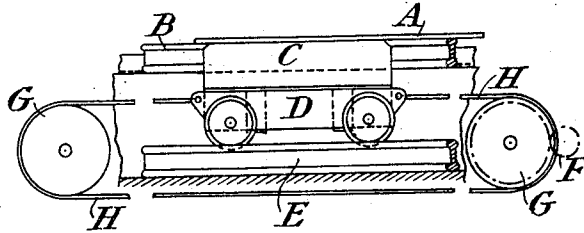


Fig. 2.

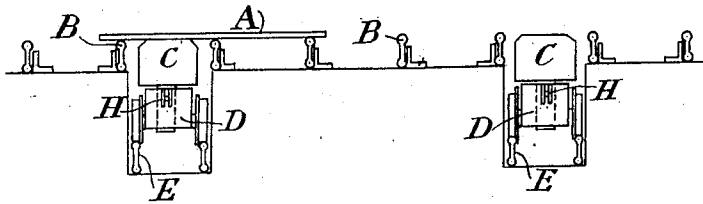


Fig. 3.

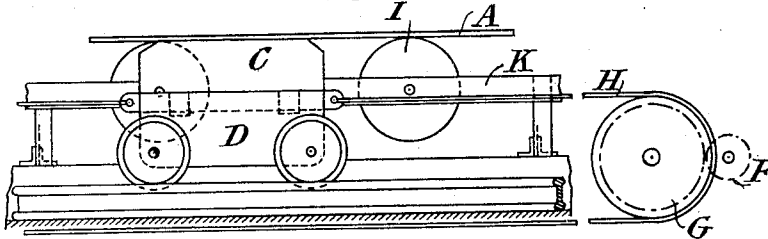
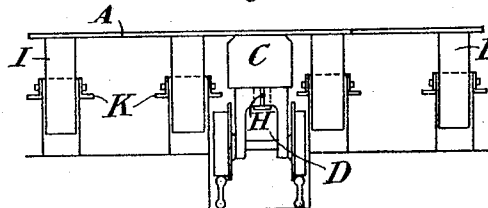


Fig. 4.



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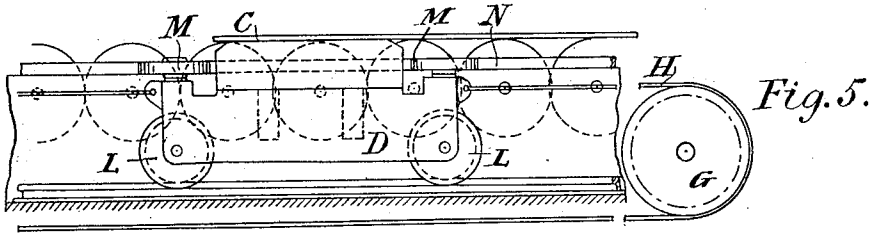
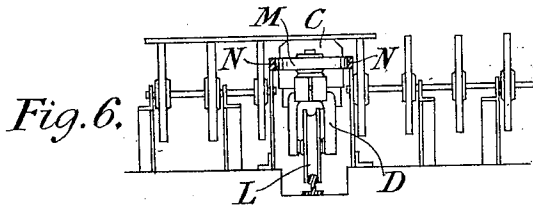
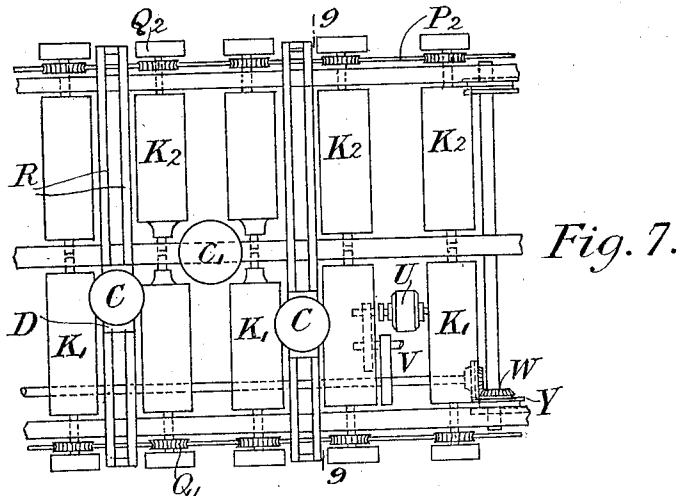
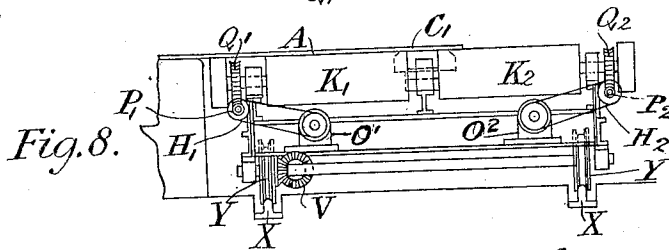
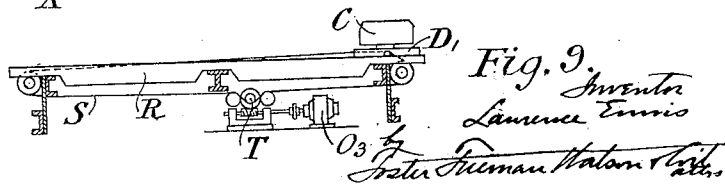
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UNITED STATES PATENT OFFICE.

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MEANS FOR TRANSFERRING AND HANDLING METAL PLATES OR THE LIKE.

1,329,962.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, LAURENCE ENNIS, a subject of the King of Great Britain, residing in Linthorpe, England, have invented certain new and useful Improved Means for Transferring and Handling Metal Plates or the like, of which the following is a specification.

The invention relates to improved means for transferring and handling metal plates, rails and sections, or other magnetic materials.

In the usual operation of transferring plates, for example, from hot or cold banks to a shearing, punching or other machine, the plates are skidded along the bank by mechanically operated skids provided with tongue pieces projecting above the top of the bank, which have to be lowered by a mechanical operation when the bogie or skid is drawn in one direction and automatically rise again when the other side of the plate is reached. In the other direction of motion the tongue pieces engage with the side of the plate which is accordingly moved with the skid. As the skid will only operate in one direction, constant manually or mechanically effected changes are necessary, which involve time and labor, and a special disposition of the plates on the bank is required to allow the tongue pieces to engage with the sides of the plates.

According to the invention the process of transferring and handling the plates is very much facilitated by means of one or more electromagnets adapted, when energized, to engage the plate on its under surface and by means of motor driven gearing conveying the magnets on a track in the required direction, preferably by a rope or chain drive.

When the plate is lying on rollers, the upper surfaces of which are on the same level as the top of the bank, the magnets are arranged to pass between the rollers and when energized are lifted through a small vertical distance by the magnetic attraction between the plate and the magnets.

Where the plate has been transferred to a table and it is required to move the plate to a punching, shearing or other machine in a definite position for the operation of the machine, rollers are provided on the table, with the axes, for example, transversely disposed with relation to the length of the table, and electromagnets are adapted to

move the plates across the table. The rollers in this case, as well as the electromagnets, are independently driven by gearing, so that not only can a plate be moved either along or across the table, but by actuating the rollers at different speeds or by reversing the motion of some, the plate can be brought to any desired angle for presentation to the machine; the electromagnets holding the plate in the desired position.

Each magnet is free to revolve in its own bearings and can act independently. The plate can be rotated by magnetizing one magnet holding the plate near the center and revolving the rollers in opposite directions.

In certain cases it may be desirable to have an additional magnet fixed near the center of the table in order that the plate may be revolved about this point, such center magnet being mechanically revolved when assisting in turning the plate.

The accompanying drawings illustrate examples of arrangements according to the invention.

Figures 1 and 2 are respectively a side and end view of means for moving plates by electromagnets on a bank or bed composed of rails; Figs. 3 and 4 are respectively side and end views of means for moving plates by electromagnets on a track composed of idle rollers; Figs. 5 and 6 are views similar to Figs. 3 and 4, in which the carriages supporting the electromagnets run on a single track and are guided by horizontal rollers engaging with the upper ends of guide bars; Figs. 7 and 8 are respectively a plan and end view of a movable table on which the plates can be moved longitudinally and transversely and rotated into any required position; Fig. 9 is a section on the line 9-9 of Fig. 7.

In all the arrangements illustrated the magnets are mounted in bearings which allow each magnet to lift itself when energized into contact with the plate above it.

In the arrangement shown in Figs. 1 and 2, a plate A is supposed to be lying on a table composed of rails B to which it has been transferred from an adjacent roller track or on which it has been placed by a crane.

Electromagnets C supported on carriages D running on rails E are adapted to move the plate in the required direction along the table. The electromagnets C are caused to

traverse the track rails by motor-actuated gearing F driving through drums G ropes or chains H attached to the carriages D.

The faces of the magnets are, when de-energized, slightly below the tops of the rails and can pass underneath the plates. When the magnets are energized they are slightly lifted, adhere to the plate and are moved to transfer the plate to the shearing or other machine, where they hold the plate in position until the operation is completed, and finally carry the plate from the machine and are then moved back into position for dealing with another plate. These operations are rapidly performed under the control of one person.

No space is required between the plates as in the ordinary type of skid gear to enable the plates to be handled.

In the modification shown in Figs. 3 and 4, the plate A rests on idle rollers I supported by bearings in the rails K. The arrangement can be used to move plates from one part of the works to another, for example, from a rolling mill to a hot or cooling bank, or to a straightening, punching, shearing or other machine.

In the arrangement shown in Figs. 5 and 6 the carriages or trucks supporting the electromagnets run on a pair of wheels L disposed in tandem, roller wheels M forming guides for the trucks by frictional engagement with rails N.

The arrangement shown in Figs. 7, 8 and 9 illustrates an example of a movable table on which the plates can be placed from a track or by a crane and can be moved into any required position for operation at a shearing or other machine.

The plates A rest on two sets of rollers K' and K², the sets being independently driven by motors O' and O², through chain drives H' and H², shafts P' and P² and worm or other gearing Q' and Q².

Magnets C mounted on carriages D are moved on rails R by sprocket chains S through gearing T actuated by motors O³ so as to take up any required position in a direction transverse to the length of the table. The magnets can rotate freely in their bearings about a vertical axis.

In the operation of the arrangement a plate A is firmly held by one or more electromagnets C energized by cables from a source of electric power and is carried into the required transverse position by the movement of the carriage or carriages D on the rails R by the motors O³.

To slue the plate into any required angular position a magnet C' disposed at the center of the table and rotatable about its vertical axis is energized and adheres to the plate A near the center of the latter; the roller gears K' and K² are then rotated in opposite directions, and cause the plate A

and the magnet C' to take up the required angular direction.

The plate is then moved longitudinally on the table by rotating the rollers K' and K² in the same direction until it is held near its edges by two or more magnets C.

The magnets are then energized and adhering to the plate are moved independently or together transversely until the plate is in the required position for the operation of the machine, for example, so that a shearing line on the plate is parallel to the line of the shear blade.

The table as a whole is moved to the machine by a motor U transmitting power through gearing V to bevel wheels W and wheels Y running on rails X.

The plate is securely held by the magnets during the machine operation and when this is completed the table carries the plate and delivers it to any suitably arranged part of the works. The magnets are deenergized, whereupon the rollers K', K² may be rotated in the direction to deliver the plate from the table to the shipping truck or otherwise as may be required.

All the operations can be rapidly performed under the control of one person.

Having thus described the nature of the said invention and the best means I know of carrying the same into practical effect, I claim:—

1. Apparatus for transporting steel or iron plates or the like magnetic material from one place or position to another, comprising in combination a carriage mounted to run on a track, mechanically operated means for traversing the carriage on the said track, supports for the plates to be transported situated above the level of the carriage, and electromagnets mounted with vertical freedom of movement on the carriage at a lower level than the plate supports and adapted when energized to engage the underside of the plates.

2. Apparatus for transporting steel or iron plates or the like magnetic material from one place or position to another, comprising in combination carriages mounted to run on tracks, mechanically operated means for traversing the carriages on the said tracks, two sets of roller supports for the plates to be transported having their axes parallel with the carriage tracks and their upper sides above the level of the carriages, mechanically operated means for rotating said rollers, electromagnets mounted on the carriages at a lower level than the top of the rollers and adapted when energized to engage the underside of the plates, and an electromagnet situated intermediate of the two sets of rollers and rotatable about a vertical axis and adapted when energized to engage the underside of the plates.

3. Apparatus for transporting steel or

iron plates or the like magnetic material from one place or position to another, comprising in combination carriages mounted to run on tracks, mechanically operated means for traversing the carriages on the said tracks, roller supports for the plates to be transported having their axes parallel with the carriage tracks and their upper sides above the level of the carriages, mechanically operated means for rotating said rollers, electromagnets mounted on the carriages at a lower level than the top of the rollers and adapted when energized to engage the underside of the plates, and mechanically actuated means for moving the structure as a whole, substantially as and for the purpose set forth.

4. Apparatus for transporting steel or iron plates or the like magnetic material from one place or position to another, comprising in combination carriages mounted to run on tracks, mechanically operated means for traversing the carriages on the said tracks, two sets of roller supports for the plates to be transported having their axes parallel with the carriage tracks and their upper sides above the level of the carriages, mechanically operated means for rotating said rollers, electromagnets mounted on the carriages at a lower level than the top of the rollers and adapted when energized to engage the underside of the plates, an electro-magnet situated intermediate of the two sets of rollers and rotatable about a vertical axis and adapted when energized to engage the underside of the plates, and mechanically actuated means for moving the struc-

ture as a whole, substantially as and for the purpose set forth.

5. In apparatus of the class described, the combination with a work-support, of traveling means for moving the work over said support, said means including an electro-magnet arranged beneath the work on said support and adapted when energized to rise and adhere to the work.

6. In apparatus of the class described, the combination with two parallel rows of work-supporting rollers, of an electro-magnet arranged between said rows beneath the work and free for vertical movement into contact with the work, and means for moving said electro-magnet longitudinally between said rows.

7. In apparatus of the class described, the combination with a work-support, of flexible traveling means for moving the work over said support, and an electro-magnet connected to said flexible traveling means and adapted when energized to move into contact with and adhere to the work on said support.

8. In an apparatus of the class described, the combination with a plurality of work supporting members arranged in a plane, of an electro-magnet beneath the work and free for vertical movement into contact with the work, and means for moving said electro-magnet in the plane of the work supporting members, for the purpose set forth.

In testimony whereof I have signed my name to this specification.

LAURENCE ENNIS.