Oct. 1, 1935. E. E. MOORE 2,015,809

MAGNETIC PILING AND UNPILING APPARATUS

Filed Nov. 10, 1933 2 Sheets-Sheet 1

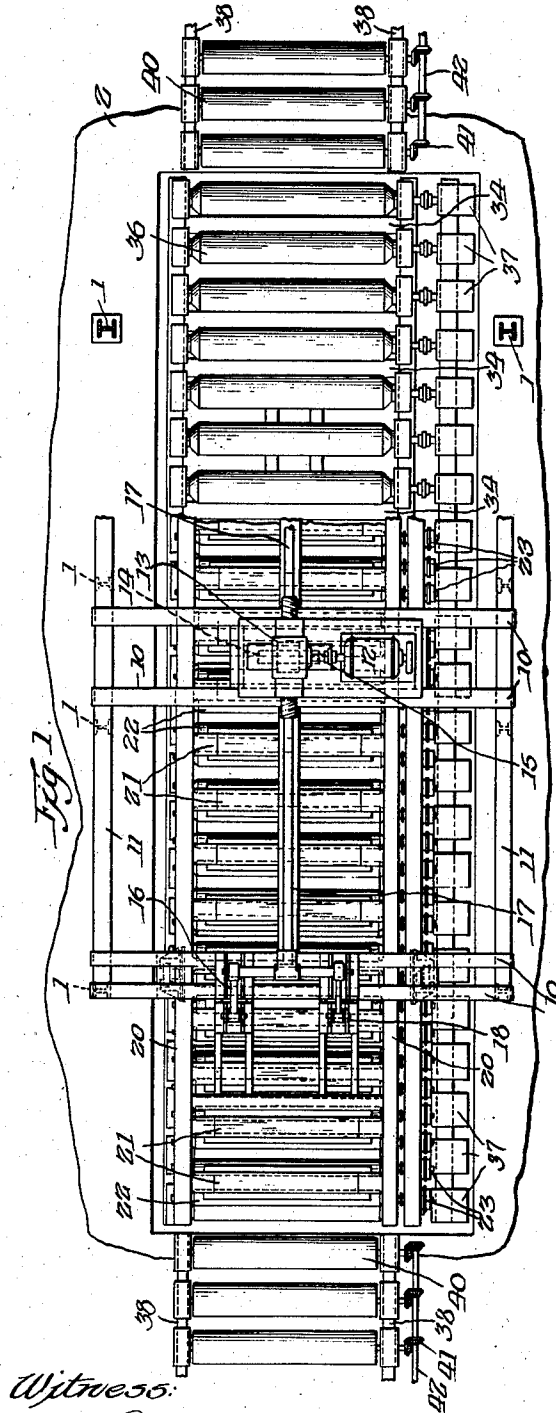


Fig. 1.

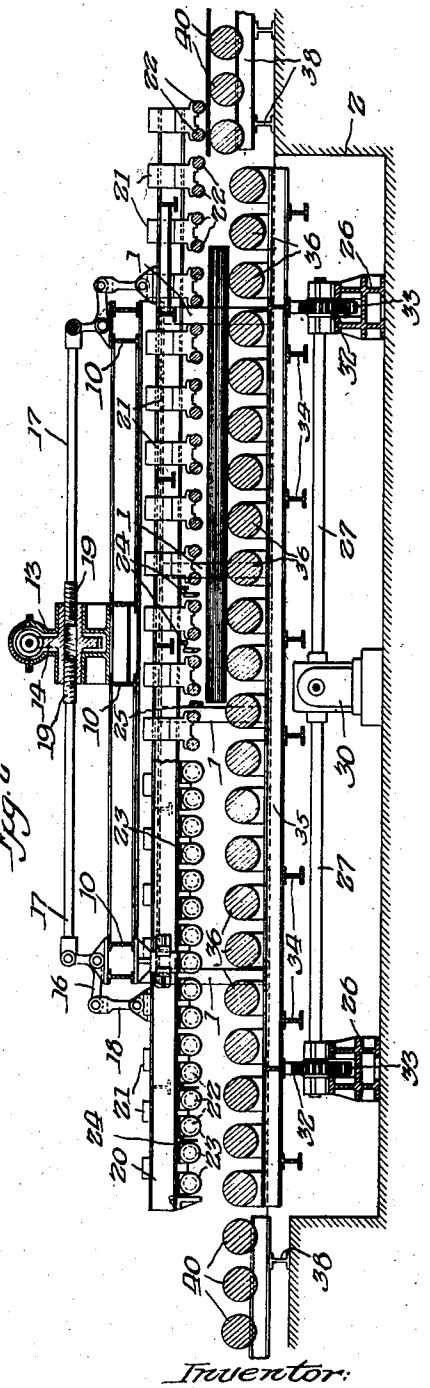


Fig. 6

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MAGNETIC PILING AND UNPILING APPARATUS

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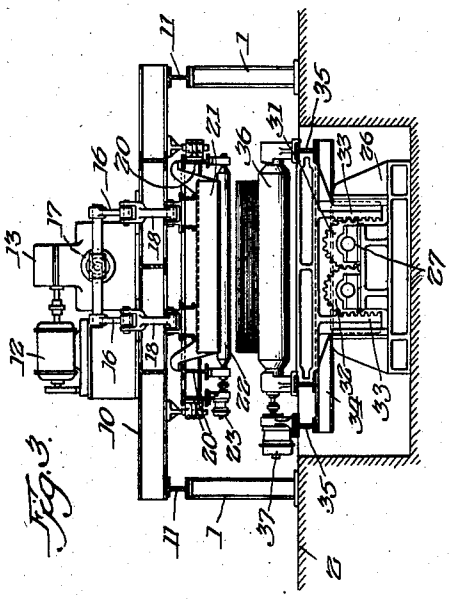


Fig. 3.

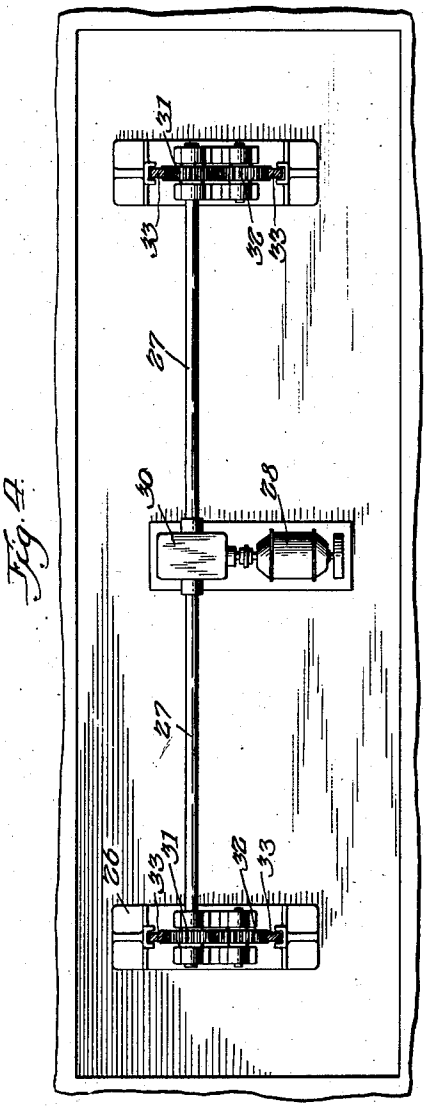


Fig. 4.

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UNITED STATES PATENT OFFICE

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MAGNETIC PILING AND UNPILING APPARATUS

Earl E. Moore, Chicago, Ill.

Application November 10, 1933, Serial No. 697,489

9 Claims. (Cl. 198—41)

The invention relates to conveying mechanism and has particular reference to a device for conveying relatively thin flat products of a magnetic character to a given point and for piling or unpiling such products without scratching or marring their surfaces.

An object of the invention is to provide apparatus of simple construction for magnetically suspending a metal plate or strip and for conveying the same while suspended to receiving equipment consisting of a vertically adjustable roller table designed to receive the plate and others suspended and conveyed in a similar manner.

An object of the invention is to provide a roller or receiving table for apparatus of the character described with adjusting means of improved construction for permitting raising and lowering of the table as conditions may require in the piling or unpiling of the plates.

Another object is to provide mechanism for piling or stacking metal plates expeditiously and without scratching or marring their surfaces and which can also be operated as a charger to separate the top plate from the pile and deliver the same for other operations as for example to a normalizing furnace.

A further object is to provide equipment of the character described which can be adapted for operation on metal plates or strips of various lengths.

With these and other objects in view, the invention may consist of certain novel features of construction and operation as will be more fully described and particularly pointed out in the specification, drawings and claims appended hereto.

In the drawings which illustrate an embodiment of the device and wherein like reference characters are used to designate like parts—

Figure 1 is a plan view of a preferred form of the invention showing parts of the supporting mechanism for the magnetic conveyor broken away to more clearly illustrate the construction of the receiving table;

Figure 2 is a vertical sectional view taken substantially along the longitudinal center line of Figure 1;

Figure 3 is an end elevational view of the mechanism of Figure 1; and

Figure 4 is a horizontal sectional view taken below the receiving table and showing the vertical adjusting means therefor.

The mechanism of the invention consists essentially of two roller tables, both having power driven rolls and each being arranged for vertical movement. The upper table is of the inverted type and carries magnetic rollers for suspending a metal plate or strip and which are power driven to convey the metal plate to the receiving and lowering table. This latter table is provided with vertical adjusting means permitting gradual raising and lowering of the table as conditions require in the piling or unpiling of the plates supported thereon.

Referring more particularly to Figures 1, 2 and 3 of the drawings the upper table is shown suspended from framework supported by the uprights 1 suitably embedded at their base in the foundation 2. The framework is formed of a plurality of beams consisting of transverse beams 10 and longitudinal beams 11, certain of the transverse beams supporting an electric motor 12 and housing 13, the latter rotatably mounting the gear 14 connecting through drive shaft 15 with motor 12. The transverse beams at the end of the supporting structure support the levers 16 which operatively connect through rods 17 with the gear and through the links 18 with the longitudinal beams 20 forming the supporting members for the magnetic conveyor to be presently described. Through the provision of the levers 16 which are mounted on beams 10 for pivotal movement, the longitudinal beams 20 and the magnetic conveying mechanism supported thereby can be raised or lowered, depending on the direction of rotation of gear 14, the hubs of which have threaded engagement respectively with the threaded ends 19 of the rods 17.

Supported on the beams 20 in spaced relation longitudinally thereof are magnetic units 21 equipped with rollers 22, each roller being suitably driven by its respective motors 23. The rollers are magnetized by means of the units 21 and are rotated by their respective motors so that they operate to suspend a product of magnetic character such as a metal plate or metal strip and to convey the same from one end of the conveyor to the other end. Demagnetizing levers 24 are located at different points along the table, namely, in the vicinity of the center, and to the left end of the table, Figure 2, for actuation by the plate being conveyed to demagnetize the rollers when it is desired to drop the plate. The levers are adjustable so that only the one required to demagnetize the rollers, when the plate is in the desired position, will contact with the plate. Also located between the rollers and spaced with respect to the demagnetizing levers are disappearing stops 25 which act as an abutment for the plate being conveyed to limit its travel in order to properly locate the plate

on the receiving table to be presently described in detail. It is to be understood that demagnetizing levers 24 and stops 25 are located at intervals along the length of the magnetic conveyor in order to adapt the same to the handling of plates of various lengths and the positions selected for the demagnetizing levers and stops as illustrated in Figure 2 of the drawings are to be considered illustrative only.

Within the excavation in the supporting foundation 2 are located supporting members 26 which journal the ends of the drive shaft 27 having connection at substantially its center with a driving motor 28 by means of suitable gears housed within the gear box 30. Each end of the shaft 27 is provided with a gear 31 meshing with a companion gear 32 and a rack bar 33, a similar bar also meshing with gear 32. The rack bars form a support for the receiving table consisting of supporting framework formed by the transverse beams 34 and longitudinal beams 35 connected therewith. Suitably journalled on the longitudinal beams 35 are spaced rollers 36, each roller having operative connection to a driving motor 37 likewise mounted on the supporting framework. Rotation of drive shaft 27 through operation of motor 28 will effect a raising or lowering of the receiving table and also the rollers 36 mounted thereon. In this manner the lower table can be vertically adjusted with respect to the magnetic conveyor and therefore the apparatus can be operated in a manner to pile or stack plates delivered by the conveyor on the receiving table.

To each end of the apparatus, Figure 2, and suitably supported on foundation 2 by the transverse and longitudinal beams 38 are sets of rollers 40, respectively, and which are driven by any suitable drive as by means of gears 41 and shaft 42. In the embodiment of the invention shown in the drawings the rollers 40 adjacent the right hand end of the receiving table are elevated so that they lie in a horizontal plane above the set of rollers located on the left hand end of the receiving table. This is a preferred constructional arrangement although not absolutely essential to the successful performance of the apparatus. When both sets of rollers are located in the same horizontal plane, as they will possibly be in some installations, the operation of the apparatus is not materially altered since the receiving table and conveying table are supported for movement vertically and can therefore be positioned to align their rollers with either set of rollers 40 when desired. Also in the structure shown in Figure 2 the conveying table is extended at one end to overlie at least one of the rollers of the right hand set and which are elevated as described to facilitate contact by the magnetized rolls of the conveyor table with the metal plate or strip supported by said set of rollers.

When the apparatus is used for piling or stacking a plurality of plates or strips the rollers 40 to the right end of the apparatus function as delivery rollers suitably supporting a single plate for movement thereover where the same may be located under the right hand end of the magnetic conveyor and through energization of the rollers 22 can be picked up by the conveyor where its travel in the same direction will be continued until the plate contacts with a demagnetizing lever and a stop at which point in its travel it will be located over the pile or stack of sheets on the receiving table. As the sheets are deposited upon the receiving table the same is lowered through actuation of the motor 28 to accommodate the increasing pile but at the same time maintain the top sheet thereof relatively close to the rollers of the magnetic conveyor so that the plate conveyed thereby will not have to fall a great distance, which would increase the chances of marring or scratching the surface of the underplates. When the pile has reached a proper height the same is run out on the rollers of the receiving table to the discharge rollers 40 on the left end of the apparatus.

A reverse of the above operation takes place when the invention is used as a charger for delivering the top sheet from the pile for operations as may be desired. When used in this manner a pile of plates resting on the set of rollers 40 to the left of the apparatus are moved on to the rollers 36 of the receiving table and raised thereby until the top plate contacts the magnetic conveyor. Energization of the conveyor rollers 22 will pick off the plate contacting therewith which can then be delivered through the rotation of the rollers for further operation as above mentioned. The apparatus of the invention has a number of uses in the handling of relatively thin flat products of a magnetic character and particularly where it is desired to stack such products in piles or for the purpose of performing unpiling operations in which case the apparatus functions as a charger. Large plates can be handled expeditiously, reducing the manual labor required and also in a manner to prevent scratching or marring the surfaces of the products.

It is to be understood that I do not wish to be limited by the exact embodiment of the device shown, which is merely by way of illustration and not limitation, as various and other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a conveyor of the class described, a conveying table including a plurality of rolls having magnetic means arranged to hold articles in suspended relation with said rolls, means rotating the rolls to convey the article suspended therefrom, a receiving table located beneath the conveying table and including a plurality of rolls, means supporting the receiving table and being vertically adjustable to effect a raising and lowering thereof, and sets of rolls disposed to the respective ends of the receiving table for delivering articles thereto and receiving articles therefrom.

2. In a conveyor of the class described, a conveying table including a plurality of rolls having magnetic means arranged to hold articles in suspended relation with said rolls, means rotating the rolls to convey the article suspended therefrom, a receiving table located beneath the conveying table and including a plurality of rolls, means supporting the receiving table and being vertically adjustable to effect a raising and lowering thereof, and sets of rolls disposed to the respective ends of the receiving table, one of said sets delivering and receiving articles from the conveying table.

3. In a conveyor of the class described, a conveying table including a plurality of rolls having magnetic means arranged to hold articles in suspended relation with said rolls, means rotating the rolls to convey the article suspended therefrom, a receiving table located beneath the conveying table and including a plurality of rolls, means supporting the receiving table and being vertically adjustable to effect a raising and lower-

ing thereof, and sets of rolls disposed to the respective ends of the receiving table, said sets of rolls lying in different horizontal planes.

4. In a conveyor of the class described, a conveying table including a plurality of rolls having magnetic means arranged to hold articles in suspended relation with said rolls, means rotating the rolls to convey the article suspended therefrom, a receiving table located beneath the conveying table and including a plurality of rolls, means supporting the receiving table and being vertically adjustable to effect a raising and lowering thereof, and sets of rolls disposed to the respective ends of the receiving table, one of said sets lying in a horizontal plane above the other set.

5. In a conveyor of the class described, a conveying table including a plurality of rolls having magnetic means arranged to hold articles in suspended relation with said rolls, means rotating the rolls to convey the article suspended therefrom, a receiving table located beneath the conveying table and including a plurality of rolls, means supporting the receiving table and being vertically adjustable to effect a raising and lowering thereof, sets of rolls disposed to the respective ends of the receiving table, and means for adjusting the conveying table vertically to raise and lower the magnetized rolls thereof with respect to one of said sets of rolls.

6. In a sheet piling mechanism, a conveying table including a plurality of rolls having magnetic means arranged to hold articles in suspended relation with said rolls, means rotating the rolls to convey the article suspended therefrom, a receiving table located beneath the conveying table, adjustable means supporting the receiving table to effect a raising and lowering thereof, and means located at the respective ends of the receiving table and disposed in different horizontal planes, one of said means being adapted for delivering to and receiving articles from the conveyor table, and the other of said means being adapted for delivering to and receiving articles from the receiving table.

7. In a sheet piling mechanism, a conveying table including a plurality of rolls having magnetic means arranged to hold articles in suspended relation with said rolls, means rotating the rolls to convey the article suspended therefrom, a receiving table including a plurality of rolls located beneath the conveying table, adjustable means supporting the receiving table to effect a raising and lowering thereof, and means located at the respective ends of the receiving table and disposed in different horizontal planes, one of said means being located under an end of the conveying table for delivering to and receiving articles from the conveying table, and the other of said means being adapted for delivering to and receiving articles from the receiving table.

8. In a sheet piling mechanism, the combination with a vertically adjustable roller table, of conveying means including a plurality of magnetized rollers disposed over said table, said rollers when energized operating to separate the top plate from a pile supported on the roller table and to convey said plate to other means, one end of said conveying means extending beyond the roller table, and mechanism located under said extending end of the conveying means for delivering to and receiving articles from the conveying means.

9. In a sheet piling mechanism, the combination with a vertically adjustable roller table, of a conveyor table disposed over the roller table and including a plurality of rolls having magnetic means arranged to hold articles in suspended relation with said rolls, means rotating the rolls to convey the articles suspended therefrom, and a set of rollers located at each end of the roller table for receiving and delivering articles, one set of rollers being disposed under and having cooperative association with one end of the conveying table, and said other set being adapted for cooperative association with the roller table.

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