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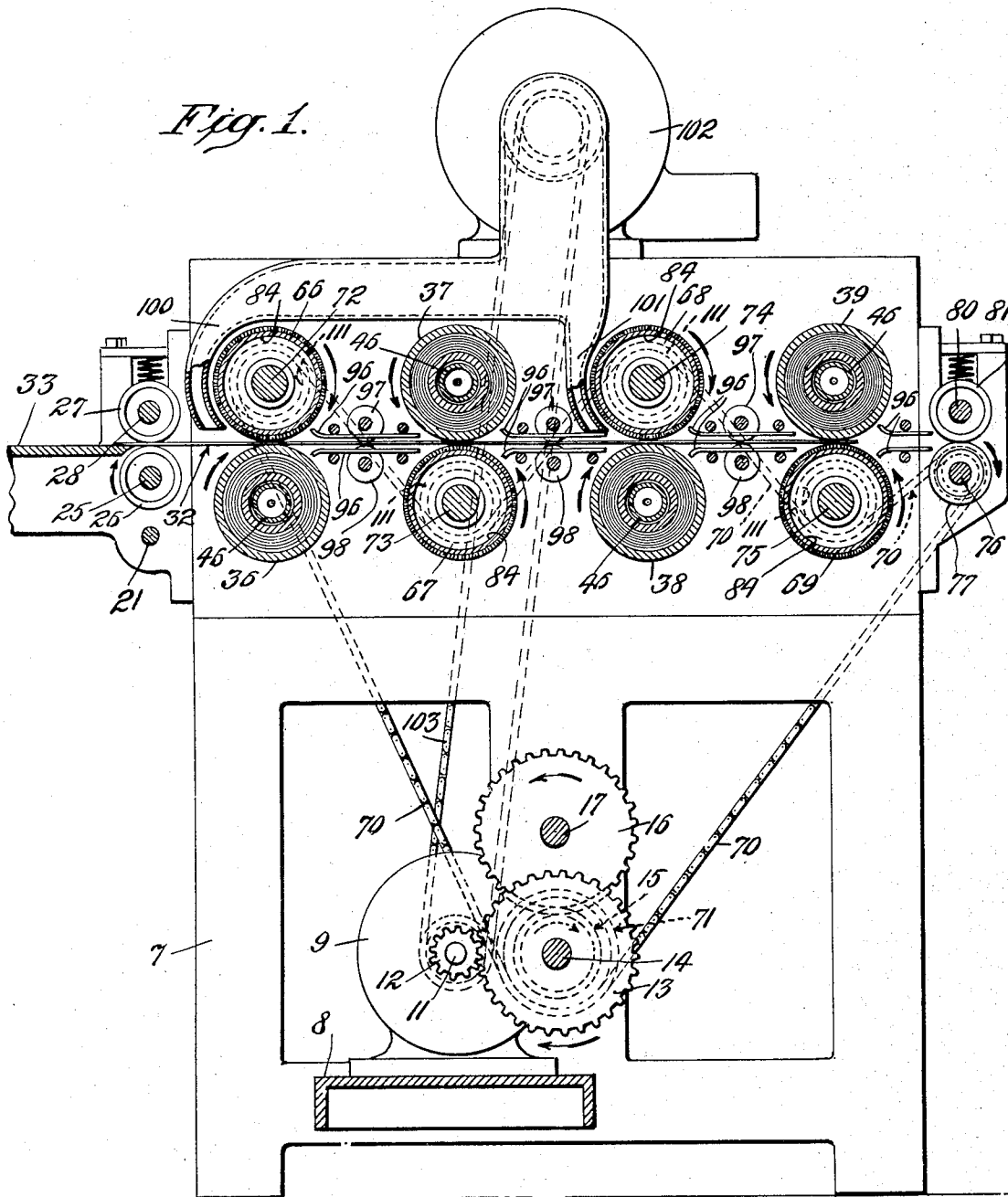
A. HORMEL

1,945,274

METAL PLATE CLEANING MACHINE

Filed June 15, 1932

3 Sheets-Sheet 1



INVENTOR
AUGUST HORMEL
BY Julius H. Hark
ATTORNEY

Jan. 30, 1934.

A. HORMEL

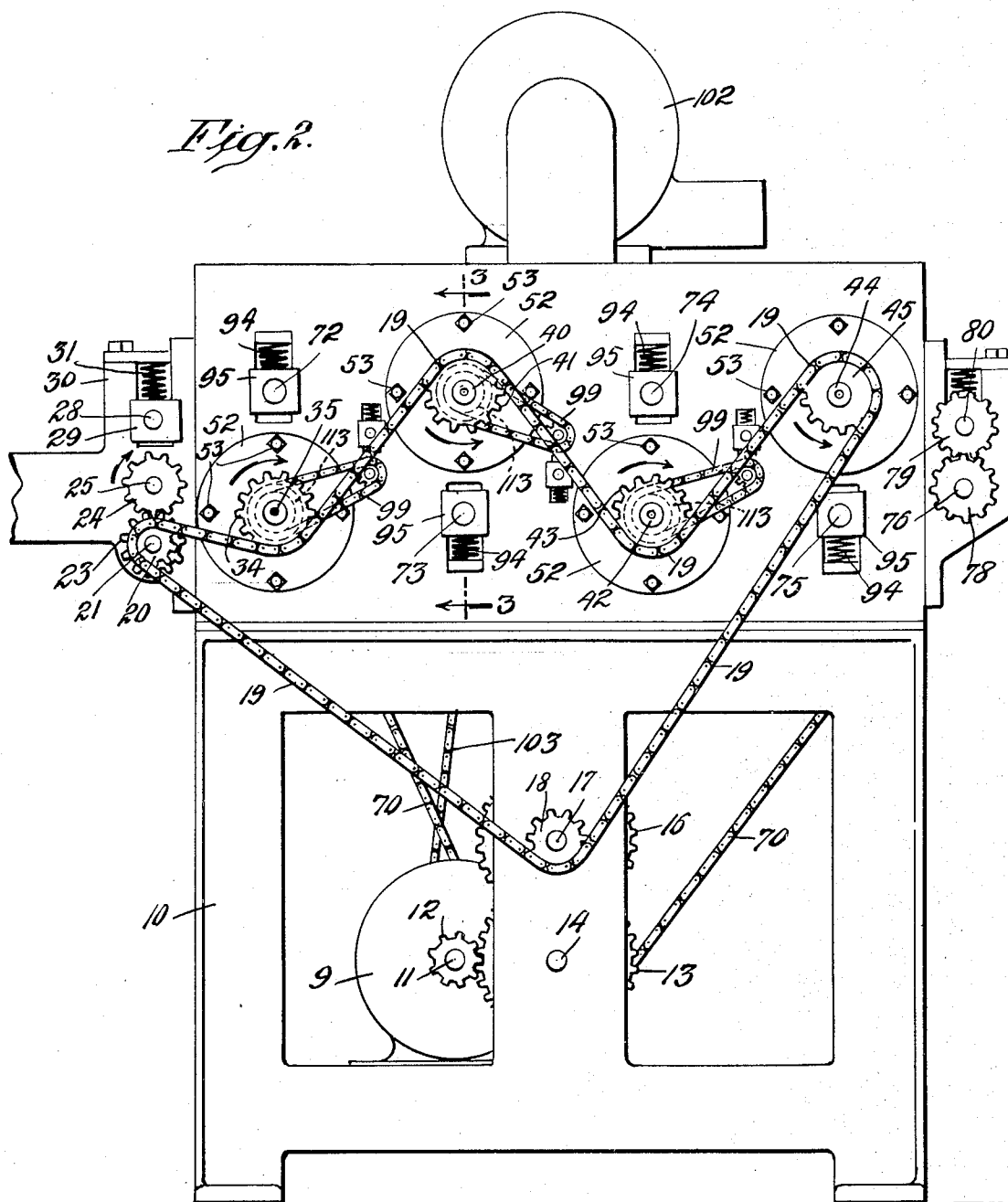
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Fig. 2.



INVENTOR
AUGUST HORMEL
BY *Julius H. H. H.*
ATTORNEY

Jan. 30, 1934.

A. HORMEL

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3 Sheets-Sheet 3

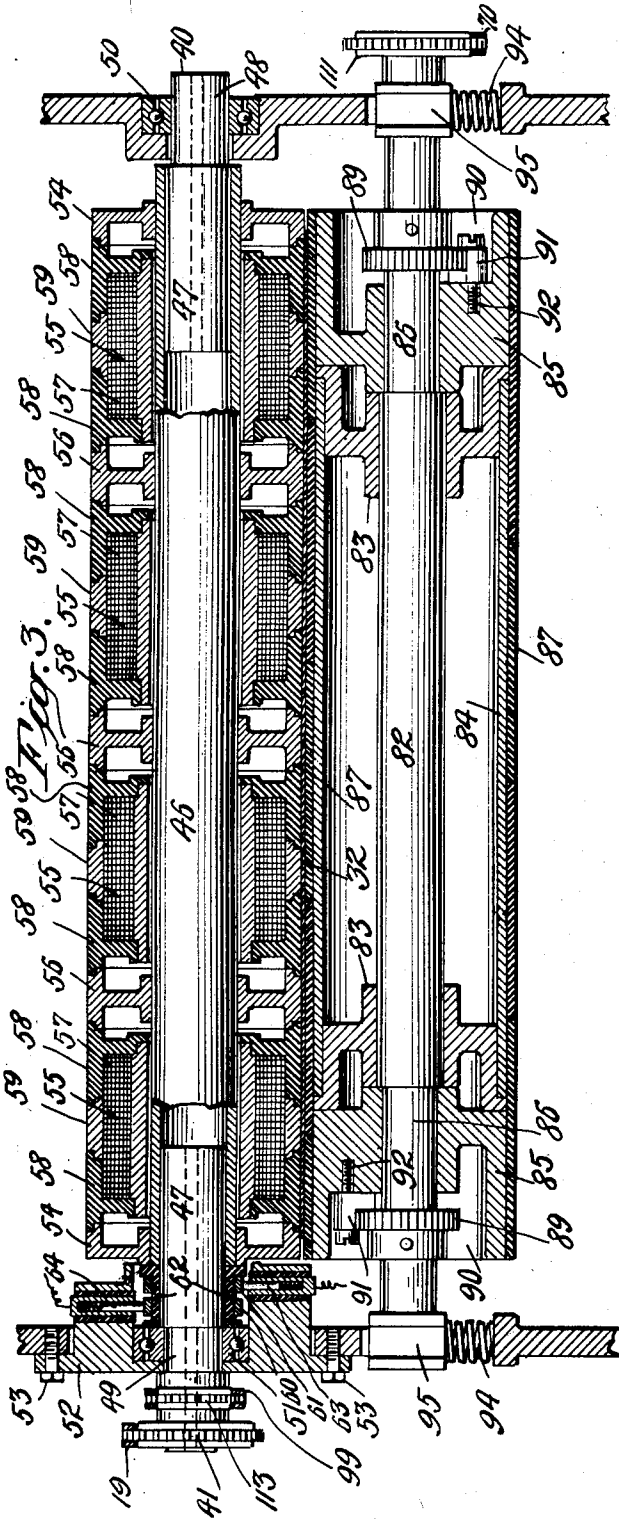


Fig. 4.

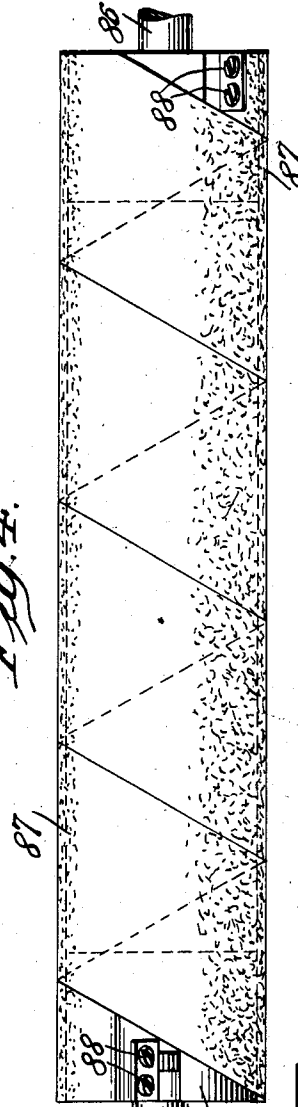


Fig. 5.

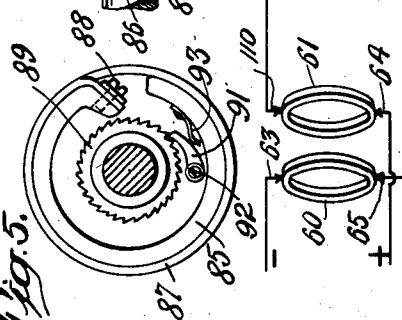
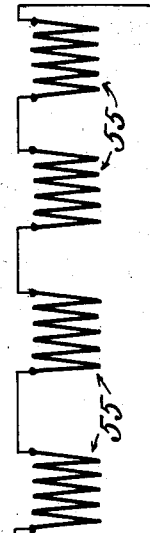


Fig. 6.



INVENTOR
AUGUST HORMEL
BY *Julius H. H. H.*
ATTORNEY

UNITED STATES PATENT OFFICE

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METAL PLATE CLEANING MACHINE

August Hormel, Hoboken, N. J.

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8 Claims. (Cl. 15—102)

This invention relates to an apparatus for cleaning metallic sheets, and particularly sheets of magnetizable metal. In the manufacture of these metal sheets, and especially those which are to be subsequently printed or lithographed, it is found desirable to clean the sheets before subjecting them to the printing or lithographing processes. My invention relates to a mechanism for giving the sheets this required cleaning.

A shaft 25 carrying a feeding roller 26. A co-operating upper feeding roller 27 is mounted on a shaft 28, said shaft having its ends supported in bearing blocks 29 which are movable vertically in the supports 30, the springs 31 acting to force the upper feed roller 27 toward the lower driven roller 26 to co-operate with it in feeding the metal plates 32 from the table or support 33 to the right of Fig. 1.

The object of the invention is to provide a relatively simple apparatus in which rotated cleaning rollers are used for cleaning both faces of the sheets of metal and which effectively perform the desired cleaning functions. Specifically, the invention comprises a plurality of magnetic rollers which act to magnetically grip the surface of the metal sheets and positively feed the sheets relative to cleaning rollers rotated in a direction opposite to the direction of travel of the sheets under the propulsion of the magnetic rollers. With this improved construction a positive feed of the plates occurs, any tendency toward rearward slipping of the plates under the rotative pressure of the cleaning rollers being prevented.

In the embodiment of the invention shown in the accompanying drawings, Fig. 1 is a vertical sectional view through a metal plate cleaning machine constructed in accordance with the invention; Fig. 2 is a side view of the machine; Fig. 3 is a sectional view on the line 3—3 of Fig. 2, looking in the direction of the arrows; Fig. 4 is a front elevation of one of the cleaning rollers; Fig. 5 is an end view of the roller shown in Fig. 4, and Fig. 6 is a diagram showing the wiring of the electro-magnets located within the gripping rollers.

The machine frame is composed primarily of two substantially similar side members 7 and 10, these members being connected and braced by suitable crossings, one of which is located near the base of the frame and shown at 8. This support constitutes a shelf 8 and holds an electric motor 9 which constitutes the driving means for the various rollers in the machine. The motor shaft 11 carries a pinion 12 which meshes with a gear 13 secured on a shaft 14 rotatably mounted between the side frames 7 and 10.

The shaft 14 carries a gear 15 which meshes with and drives a gear 16 secured on a shaft 17 mounted to rotate in the frame. Secured on the shaft 17 is a sprocket 18 which engages and drives a chain 19, said chain extending upward and passing over a sprocket 20 fixed on a shaft 21. A gear 23 is secured on the shaft 21, said gear 23 meshing with and driving a gear 24 secured on

The chain 19 engages under and drives a sprocket 34 fixed on a shaft 35 carrying a magnetic roller 36, the construction of which is shown in detail in Fig. 3 and which will be later described. Other magnetic rollers are shown at 37, 38 and 39, all of these rollers being of like construction. These magnetic rollers are all driven by the chain 19, the direction of rotation of each roller being shown by the arrows located adjacent to it in Fig. 1, the direction of rotation of these rollers being such as to cause the metal plate 32 to be fed to the right of Fig. 1. The magnetic roller 37 is secured on the shaft 40 which carries a sprocket 41 over which the drive chain 19 passes. Similarly, the magnetic roller 38 is mounted on the shaft 42 carrying the sprocket 43 under which the chain 19 extends. The roller 39 is mounted on the shaft 44 carrying the sprocket 45 also driven by the chain 19. In the manner described, the chain 19 drives the four magnetic rollers, the two upper magnetic rollers 37 and 39 being operative upon the top face of the metal sheet 32, are driven in a counter-clockwise direction, while the rollers 36 and 38, operative upon the under face of the sheet, are driven clockwise so that all four rollers co-operate to feed the metal sheet toward the delivery end of the machine shown at the right in Figs. 1 and 2.

The structure of the magnetic rollers is shown in detail in Fig. 3, where the roller 37 is shown in longitudinal section. The shaft 40 thereof comprises a central hollow or tubular portion 46 provided with the attached end portions 47 formed with reduced parts 48 and 49. The end portions 47 and their attached extensions 48 and 49 are provided with a longitudinal air vent, shown in dotted lines in Fig. 3. The end portion 48 is mounted to rotate in a ball bearing 50 held in the frame 7. Similarly, the end part 49 is mounted to rotate in a ball bearing 51 located in a boss 52 removably held in the frame member 10 by the screws 53. Fixed on the tubular portion 46 of the shaft 40 are spaced annular members 54 which form the end portions of the body of the roller. Located between these members

54, and co-operating therewith to form the body of the roller are a number of electro-magnets 55 held in spaced relationship by annular spacers 56 composed of brass or other non-magnetic material and secured on the tubular portion 46 of the shaft. These magnets have conventional windings 57 and pole-pieces 59, the pole-pieces being of annular shape and being separated by annular brass separators 59.

10 The manner in which the magnets are energized is shown in the diagram in Fig. 6, where it will be seen that a source of electric current is connected to the spaced metal rings 60 and 61 by means of brushes 63 and 64, these rings being
15 mounted upon a bushing 62 of insulating material carried on one of the parts 47 of the shaft 40. The windings of the magnets are connected together in series, one end of the windings being connected to the ring 61, as at 110, the other end being connected to the ring 60 as indicated at 65.
20 As will be clear from Fig. 3, the pole pieces of the magnets, and the various non-magnetic separators 54, 56 and 59 are all of uniform diameter, so that when the same are placed together in the manner shown, the outer face or periphery of the
25 magnetic roll is substantially smooth and unbroken. All of the four magnetic rollers are constructed as described.

While the four magnetic rollers are magnetically engaging the tin sheet or plate 32 and moving it to the right of Figs. 1 and 2, the opposite faces of the sheet are being cleaned by rollers 66, 67, 68 and 69, the construction of which is shown in Fig. 4. These cleaning rollers are all
35 driven by a chain 70 which is driven from a sprocket 71 secured on the shaft 14. The chain 70 extends upward and over a sprocket secured on the shaft 72 on which the roller 66 is mounted, thence proceeding downwardly under a sprocket on the shaft 73 carrying the roller 67, then extending upwardly over a sprocket 111 (Fig. 3) on the shaft 74 carrying the roller 68 and then extending under a sprocket secured on the shaft 75 which carries the roller 69. The drive chain 70
45 for the cleaning rollers, also extends about a sprocket secured on a shaft 76 which carries a delivery roller 77. The end of the shaft 76 carries a gear 78, which drives a gear 79 on a shaft 80 carrying a delivery roller 81. Through the drive arrangement described, it will be seen that
50 the cleaning rollers 66, 67, 68 and 69 are each driven in a direction opposite to the direction of movement of the plate 32, the upper cleaning rollers 66 and 68 being rotated in an opposite direction to the upper magnetic rollers and in the same direction as the lower magnetic rollers 36 and 38, while the lower cleaning rollers 67 and 69 are rotated oppositely to the lower magnetic rollers and in the same direction as the upper magnetic rollers 37 and 39. Thus, the four magnetic rollers, through their positive magnetic surface grip on the plate, force it ahead against the frictional resistance of the cleaning rollers.

65 In Fig. 4, the construction of the cleaning rollers is shown. Each roller had a central shaft portion 82 on which end bosses 83 are secured, these bosses being connected by a tubular shell 84 constituting the body or cylinder of the roller.
70 Movable end portions 85 located on the reduced ends 86 of the central shaft portion 82 have a slight movement longitudinally of the shaft to aid in tightening a spiral strip of cleaning fabric 87 about the roller. The cleaning fabric may be made of any material suitable for the purpose,

as for instance a pile or chenille fabric. The strip of fabric is spirally wound about the roller body 84, its opposite ends being fastened by the screws 88 to the end members 85 of the roller as clearly seen in Figs. 4 and 5. Secured on the parts 86 of the shaft are ratchets 89 which are located within the recessed ends 90 of the members 85, these ratchets being each engaged by a pawl 91 pivotally mounted at 92 on the member 85 and held in engagement with the ratchet by the spring 93. When the end members 85 at the opposite ends of the cleaning roller, each of which is attached to an end of the fabric 87, are rotated in opposite directions, the fabric 87 is wound spirally and tightly about the roller, and since the end members 85 are capable of a slight movement longitudinally of the roller shaft, the adjacent meeting edges of the spiralled fabric are brought into very close contact so that the entire periphery of the roller is covered by the fabric without a perceptible break or gap in the covering, which, due to the manner in which it is attached to the roller, is capable of easy replacement when worn.

As will be clear from Figs. 1 and 2, each of the magnetic rollers 36, 37, 38 and 39 is opposed by one of the cleaning rollers rotated in the same direction as that of the magnetic roller. Each of the cleaning rollers is urged toward its companion magnetic roller by means of the springs 94 exerting pressure against the bearing blocks 95 in which the ends of the cleaning roller shafts are mounted.

Briefly, the operation of the machine is as follows:

The metal plates 32 are fed either manually or by mechanical means from the table 33 and inserted between the front feeding rollers 26 and 27 which move the plate between the first magnetic roller 36 and the first cleaning roller 66 which begins the cleaning operation on the upper face of the plate, the first magnetic roller providing a firm magnetic surface gripping action upon the plate and forcing it toward the next pair of rollers 37 and 67. Guide plates 96 are located between each pair of rollers to hold the moving plates in constant alignment. Supplemental feeding rollers 97 and 98, operative adjacent the side edges of the plate 32, may also be used between each pair of magnetic and cleaning rollers. One roller of each pair of the supplemental rollers is driven by chains 99 extending from sprockets 113 (Fig. 3) on the shafts of the magnetic rollers.

When the plate 32 reaches the second pair of magnetic and cleaning rollers, this pair consisting of the magnetic roller 37 and cleaning roller 67, the cleaning operation is begun on the under side of the plate, and the cleaning is continued in this manner until the plate has passed between all of the rollers in the machine and finally emerges from between the delivery rollers 77 and 81. Suction pipes 100 and 101, through which suction is exerted by the suction fan 102, remove dirt loosened or dislodged by the cleaning rollers. The suction fan 102 is driven by the chain 103 from the motor 9.

While I have shown four pairs of magnetic and cleaning rollers, it will be understood that this number may be increased or decreased to suit the conditions under which the apparatus is intended to operate, and various other changes may be made in the structure without departing from the spirit of the invention.

What I claim is:—

1. In a machine for cleaning metal plates, a pair of rollers between which a plate to be cleaned is passed, one of said rollers being provided with a soft covering, the other roller being provided with magnetic areas in its peripheral face by which the plate is magnetically engaged, said rollers being rotated in the same direction during the cleaning operation.
2. In a machine for cleaning metal plates, a roller for cleaning a surface of the plate, a gripping roller opposed to the cleaning roller and arranged to rotate against the opposite face of the plate, and means carried by the gripping roller for magnetically engaging and moving the plate while it is being cleaned by the cleaning roller rotating in the same direction as the gripping roller.
3. In a machine for cleaning metal plates, a pair of rollers between which a plate to be cleaned is fed, one of said rollers being provided with a soft covering, the other roller containing a group of electromagnets having their pole-pieces constituting a part of the peripheral face of said roller and by which the plate is magnetically engaged, said rollers being rotated in the same direction during the cleaning operation.
4. In a machine for cleaning metal plates, a fabric-covered roller for cleaning a surface of the plate, a gripping roller opposed to the cleaning roller and rotated in the same direction of rotary movement as the cleaning roller and disposed on the opposite face of the plate, spaced electro-magnets carried by the gripping roller and provided with spaced annular pole-pieces rotatable as a part of the gripping roller for magnetically engaging and moving the plate while it is being cleaned by the cleaning roller.
5. In a machine for cleaning metal plates, a plurality of pairs of rollers between which the plates to be cleaned are passed, each of said pairs consisting of a fabric-covered roller and a magnetic roller, some of the magnetic rollers in the pairs being situated above the plates being cleaned and others situated below said plates, some of the cleaning rollers being disposed above the plates

and others below, the magnetic rollers rotating in a direction opposite to the direction of thrust exerted on the plates by the cleaning rollers, the magnetic rollers containing electro-magnets magnetically energizing a portion of the periphery of the magnetic rollers, and means for energizing the magnets.

6. In a machine for cleaning metal plates, a number of rollers arranged in groups of two, some of said rollers being magnetic rollers, the others being fabric-covered cleaning rollers, a motor, a single drive chain driven from the motor and driving all of the magnetic rollers, another single drive chain driven from the motor and driving all of the cleaning rollers, and suction means for carrying away dirt dislodged by the cleaning rollers.

7. In a machine for cleaning metal plates, a plurality of pairs of rollers between which the plates to be cleaned are passed, each of said pairs comprising a fabric-covered roller and a magnetic roller, some of the magnetic rollers in the pairs being disposed above the plates being cleaned and others disposed below said plates, some of the cleaning rollers being disposed above the plates and others below, the rollers of each pair rotating in the same direction each of the magnetic rollers containing electro-magnets magnetically energizing spaced portions of the body of the magnetic rollers, means for constantly energizing the magnets, guide rollers situated between the roller pairs and means carried by the magnetic rollers for driving the guide rollers.

8. In a machine for cleaning metal plates, a number of rollers arranged in groups of two, some of said rollers being magnetic rollers, the others being fabric-covered cleaning rollers, a motor, a single drive chain driven from the motor and driving all of the magnetic rollers, another single drive chain driven from the motor and driving all of the cleaning rollers, suction means driven by the motor for carrying away dirt dislodged by the cleaning rollers, guide rollers located between the roller groups, and chains driven from each of the magnetic rollers for driving the guide rollers.

AUGUST HORMEL.

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