

Sept. 4, 1951

D. A. WALLACE

2,567,163

APPARATUS FOR POLISHING CONTINUOUS STRIP METAL

Filed July 18, 1947

6 Sheets-Sheet 1

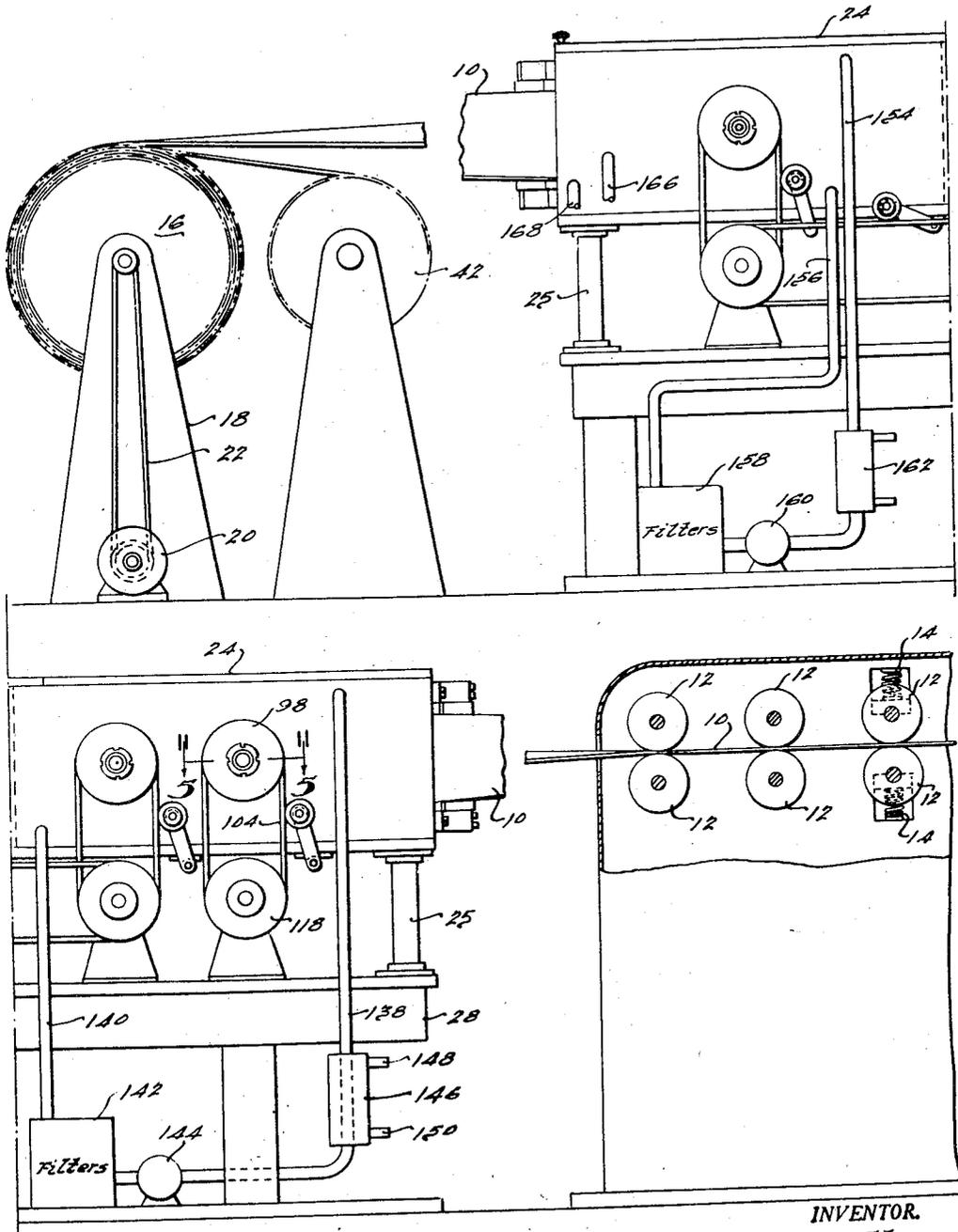


FIG. 1.

INVENTOR.  
David A. Wallace.  
BY  
Harness and Harris  
ATTORNEYS.

Sept. 4, 1951

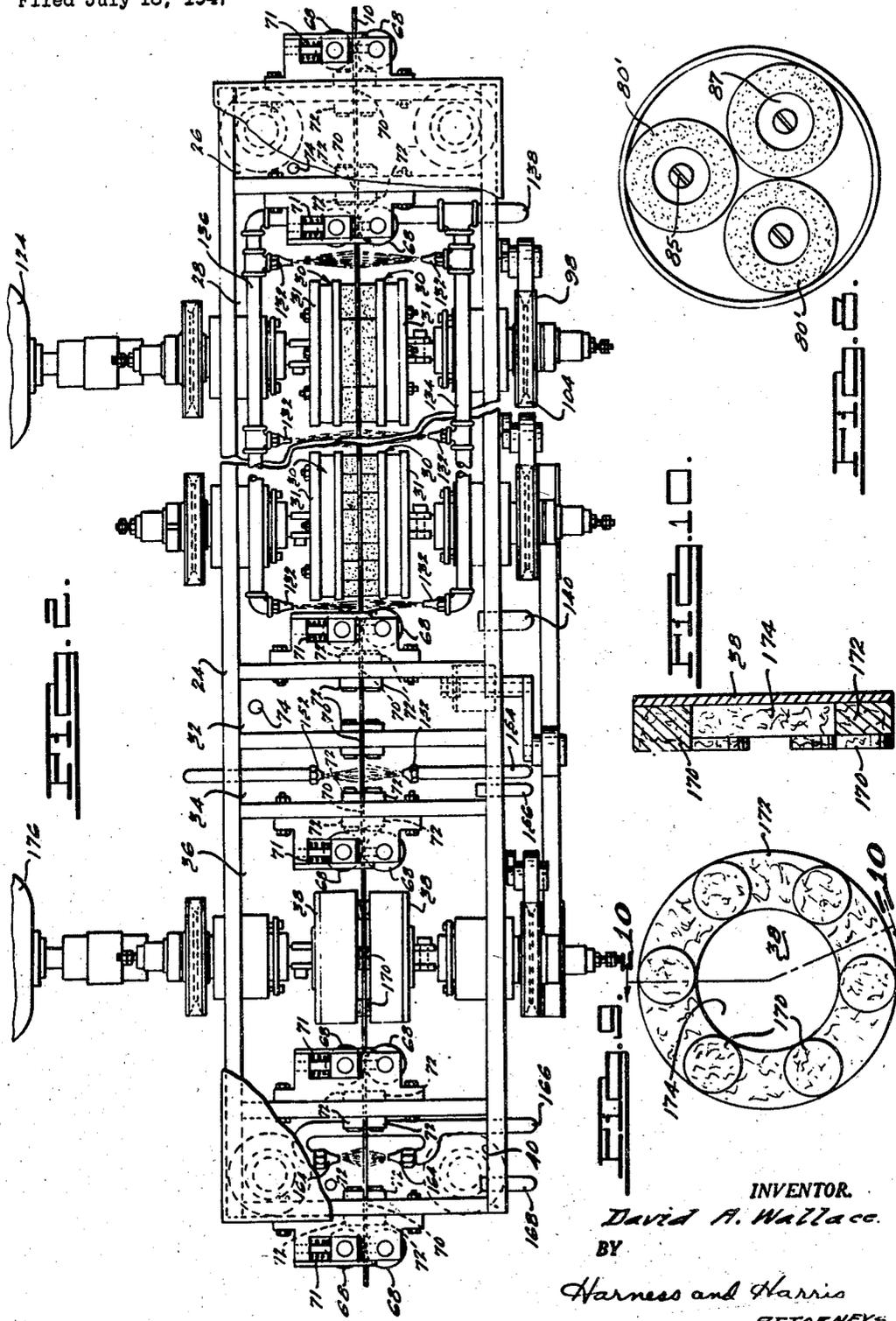
D. A. WALLACE

2,567,163

APPARATUS FOR POLISHING CONTINUOUS STRIP METAL

Filed July 18, 1947

6 Sheets-Sheet 2



INVENTOR.  
David A. Wallace.  
BY  
Harness and Harris  
ATTORNEYS.





Sept. 4, 1951

D. A. WALLACE

2,567,163

APPARATUS FOR POLISHING CONTINUOUS STRIP METAL

Filed July 18, 1947

6 Sheets-Sheet 5

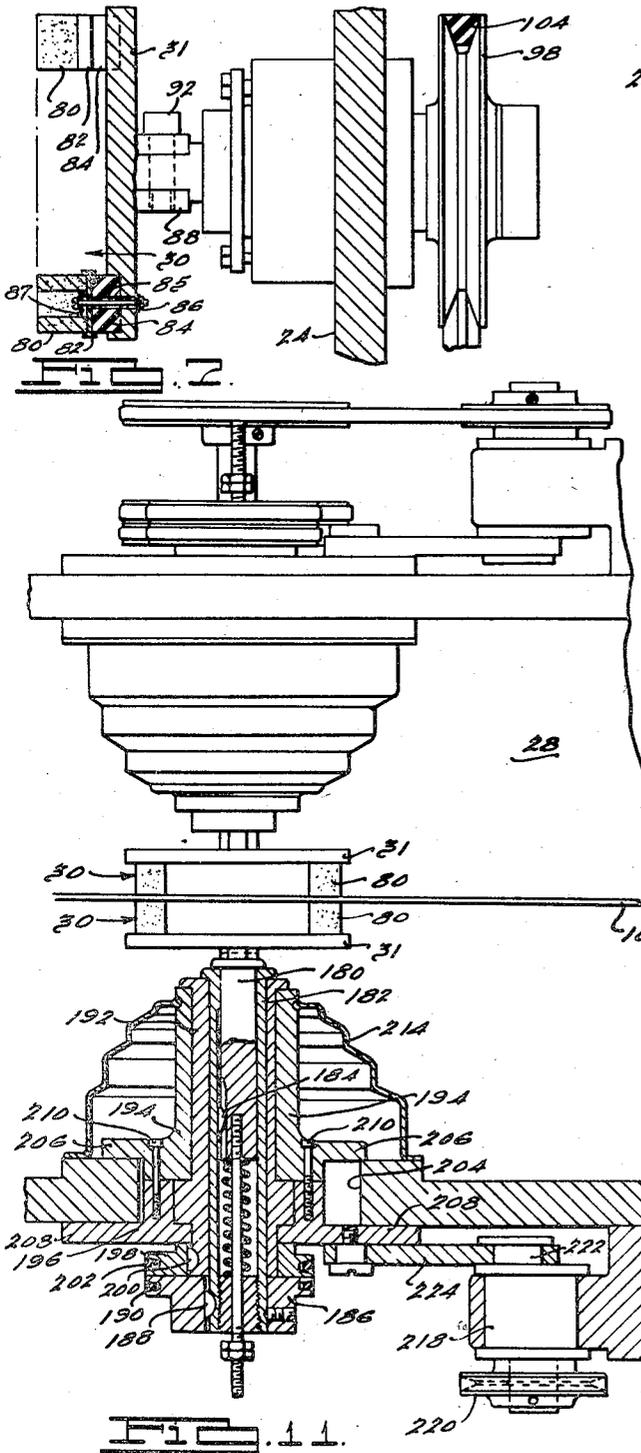


FIG. 11.

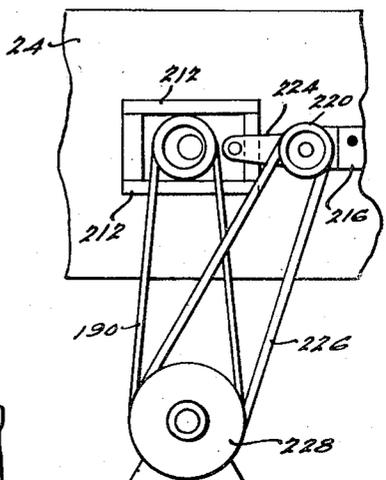


FIG. 12.

INVENTOR.  
David A. Wallace.  
BY  
Harness and Harris  
ATTORNEYS.

Sept. 4, 1951

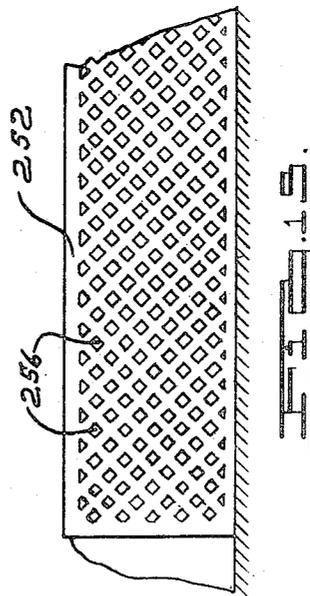
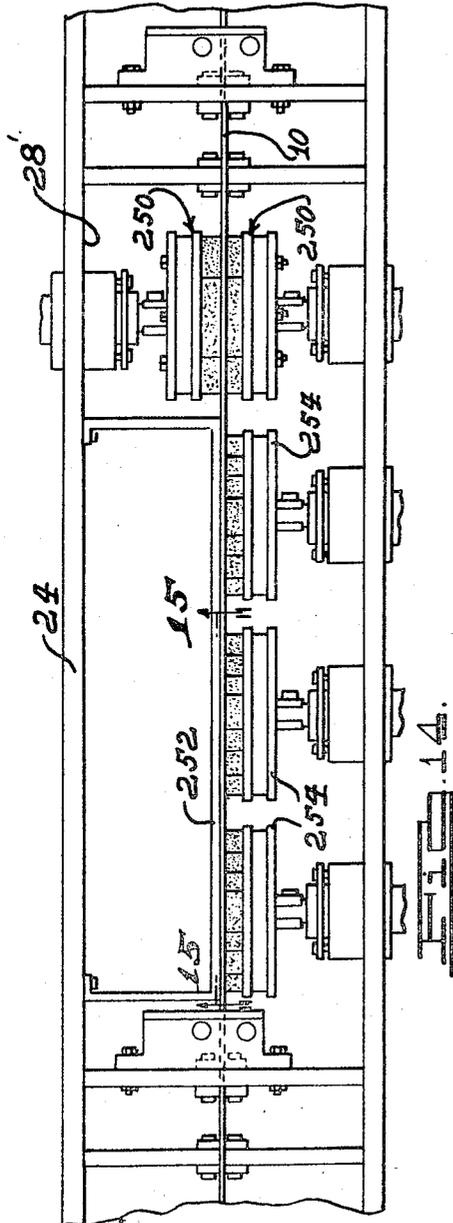
D. A. WALLACE

2,567,163

APPARATUS FOR POLISHING CONTINUOUS STRIP METAL

Filed July 18, 1947

6 Sheets-Sheet 6



INVENTOR.

David A. Wallace.

BY

Harness and Harris

ATTORNEYS.

# UNITED STATES PATENT OFFICE

2,567,163

## APPARATUS FOR POLISHING CONTINUOUS STRIP METAL

David A. Wallace, Grosse Pointe Farms, Mich.,  
assignor to Chrysler Corporation, Highland  
Park, Mich., a corporation of Delaware

Application July 18, 1947, Serial No. 761,915

4 Claims. (Cl. 51-56)

1

This invention relates to an improved apparatus for polishing a continuous strip of sheet metal stock such as sheet stainless steel.

More particularly the invention pertains to an apparatus of this character by which continuous sheet metal stock may be finished at a rate of a large number of feet per minute comparable with the speed at which such stock is produced by a rolling mill.

One of the main objects of the invention is to provide an apparatus of this character by which both sides of the sheet metal stock may be simultaneously finished to a high degree of smoothness.

Another object of the invention is to accelerate the removal of irregularities, scale and foreign matter from the surfaces of sheet metal by a simultaneous abrading and pickling action.

Another object of the invention is to provide in an abrading finishing operation of this kind a liquid pickling treatment which also serves as a lubricating coolant in the abrading operation.

A further object of the invention is to provide improved abrading finishing apparatus of this character which accommodates disposition and movement of the sheet metal in a vertical plane so as to expedite drainage of grit, removed metal and foreign matter from the surfaces of the sheet metal during abrading and combined abrading and pickling operations.

An additional object of the invention is to provide improved abrading units which have a plurality of independent abrading elements of small abrading area and which are yieldably supported for movement relative to each other and which are thus adapted to conform to and operate upon irregular surface portions of the sheet metal.

Another object of the invention is to provide means for mounting an abrading element on a backing plate where the means is adapted to accommodate a universal action of the abrading element relative to the backing plate so that the abrading element is adapted to conform to the surface of the sheet metal during abrading operations.

It is a further object of the invention to provide an improved mounting assembly for an abrading element and its associated yieldable support in which a flexible clip is utilized to engage the abrading element and to resist separation of the assembled components.

Another object of the invention is to provide in finishing apparatus of this kind means for

2

holding the sheet metal stock under tension longitudinally during the finishing operation in order to present to the abrading element as flat surfaces as possible and to prevent buckling and vibration of the sheet metal under the action of the sheet metal propelling and abrading mechanisms.

Other objects of the invention are to provide an improved abrading unit driving mechanism in finishing apparatus of this kind which produces relative movements between the sheet metal work and the abrading elements which is the resultant of a plurality of component movements of diverse speeds and directions; and to provide driving mechanism of this kind which may be so applied to the abrading units that operate upon respectively opposite sides of the metal as to maintain the same order and direction of movements of the abrading units on respectively opposite sides of the sheet metal in order that one abrading unit will provide resisting pressure for the other.

Another object of the invention is to provide abrading units in apparatus of this kind which may be conveniently employed in diverse numbers in order to predetermine the rate of finishing of continuous sheet metal stock.

Another object of the invention is to provide an improved mounting for an abrading unit in apparatus of this kind which may be conveniently adjusted so that the pressure with which the unit engages the sheet metal stock may be preselected for the thickness and surface condition of the sheet metal stock.

It is a further object of the invention to provide compartments associated with the abrading units and adapted to handle solutions for pickling, neutralizing and washing operations of the strip during its travel through the improved abrading finishing apparatus and to provide an improved means for isolating the solutions so that they do not intermix as the strip progresses from one solution to another.

In the drawings:

Fig. 1 is an interrupted elevational view of an apparatus embodying my invention;

Fig. 2 is a plan view of a portion of the Fig. 1 apparatus;

Fig. 3 is an end elevation of the apparatus shown in Fig. 2;

Fig. 4 is a diagrammatic view showing various compartments that may be associated with the apparatus of Figs. 1 and 2;

Fig. 5 is a section on the line 5-5 of Fig. 1;

3

Fig. 6 is an elevation of a backing plate carrying a preferred form of abrading elements;

Fig. 7 is a side view of the Fig. 6 plate showing its mounting;

Fig. 8 is an elevation of a backing plate carrying the modified form of abrading elements shown in Fig. 5;

Fig. 9 is an elevation of a backing plate carrying felt polishing pads;

Fig. 10 is a section on the line 10—10 of Fig. 9;

Fig. 11 is a plan view partly in section showing a modified mounting and driving mechanism for a backing plate and its associated abrading elements;

Fig. 12 is an elevation of the Fig. 11 mechanism;

Fig. 13 is a diagrammatic showing in plan view of the Fig. 2 apparatus in association with related apparatus by means of which the invention may be adapted for use in combination with a continuous strip manufacturing process;

Fig. 14 is a diagrammatic showing in plan view of a modified form of the apparatus;

Fig. 15 is a section on the line 15—15 of Fig. 14.

Referring to Fig. 1, a strip of sheet metal stock 10 is illustrated as emerging from a series of rolls 12 arranged in pairs and disposed in cooperating relationship on opposite sides of the strip. At least some of the rolls 12 are preferably urged into engagement with the strip by means of springs 14 in order to assure that the rolls will provide a resistance to the passage of the strip therethrough. A reel 16 is provided for receiving the finished strip. The reel 16 is preferably rotatably mounted on a standard 18 and driven by any suitable means such as a motor 20 and a belt 22. The forced winding of the strip upon the reel 16 against the resistance offered by rolls 12 stretches and straightens the strip as it passes through the polishing apparatus located intermediate the rolls 12 and the reel 16.

Intermediate the rolls 12 and 16 the polishing apparatus has been illustrated as housed within a casing 24. The strip 10 is illustrated as penetrating the casing 24 and traveling therethrough in a vertical plane. The casing 24 has been illustrated as supported by legs 25 on a table 28. The components associated with the casing 24 are more clearly illustrated in Figs. 2, 3 and 4. The casing 24 is preferably divided into a plurality of compartments. The number of compartments and their size may be varied to suit individual installations of the apparatus. In Fig. 2, a representative showing has been made of the type of apparatus used in the respective compartments. In Fig. 4 a casing 24 is illustrated as incorporating a greater number of stations or compartments than that shown in Fig. 2 although the general operation of the apparatus is similar in the two figures.

Referring to Fig. 2, a compartment 26, referred to subsequently herein, is illustrated as the first compartment which is penetrated by the strip 10 as it enters the casing 24. The next compartment penetrated by the strip 10 is a polishing compartment 28. The compartment 28 contains a plurality of pairs of oppositely disposed abrading heads. Each head comprises a backing plate and a plurality of abrading elements. The strip progresses between each pair of abrading heads so that each side of the strip is contacted by abrading elements. In this compartment the moving strip is exposed to a cleaning or pickling

4

solution. This compartment may be of any desired length in order that it will accommodate a sufficient number of abrading heads. The greater the number of abrading heads provided for operation upon a strip the faster the strip may be moved. Therefore, in a practical commercial embodiment of my invention, it is contemplated that the compartment 28, or duplicates thereof accommodate a large number of abrading heads. By way of illustration, but no by way of limitation, 50 to 75 pairs of abrading heads is considered to be one example of a commercial embodiment of the invention. It should be understood that although these heads have been discussed as being carried in the compartment 28 it is not necessary that they all be contained in one compartment. For example, as will be explained with reference to Fig. 4, some of the heads may be positioned in a roughing compartment while others are carried in semi-roughing and finishing compartments with suitable cleaning and neutralizing solutions associated therewith. However, in Fig. 2 the compartment 28 has been illustrated as one compartment carrying a plurality of pairs of abrading heads 30.

The strip progresses from compartment 28 to a compartment 32 which is similar to the compartment 26 and referred to subsequently herein. The strip progresses from compartment 32 to a compartment 34. In the compartment 34 the strip is exposed to a solution adapted to neutralize the effects of the cleaning solution to which the strip was exposed in compartment 28.

The strip progresses from the compartment 34 to a compartment 36. Suitable apparatus is associated with compartment 36 so that the final polishing may be accomplished therein. Backing plates 38 have been illustrated as provided with felt pads. A powdered abrasive such as rouge may be used with the pads to produce a high lustre on the strip 10. The pads will be described in more detail herein. The strip 10 progresses from the compartment 36 to a compartment 40 in which the strip is sprayed with water to clean it thereby removing any neutralizer or powdered abrasive remaining thereon. In Fig. 1 the strip is illustrated as progressing from the compartment 40 to the roll 16. A roll of paper 42 is associated with the roll 16 so that a strip of paper is fed between successive layers of strip 10 as it is wound upon the roll 16. This is illustrated in Fig. 1.

Fig. 3 shows a cover 67 that may be positioned over casing 24 if desired. Fig. 2 shows a plurality of pairs of vertical rolls 68 which are positioned at spaced intervals along the casing 24. Each transverse partition in the casing 24 which defines a compartment wall is provided with a slot 70 therein located in the plane of the lines of intersection of the pairs of rolls. The rolls 68 serve to guide the strip for movement in a vertical plane. Springs 71 are associated with one roll of each pair so that the strip will be engaged with a predetermined pressure by the rolls to maintain it in a taut condition. In addition, rubber blocks 72 are provided in abutting relationship with the strip 10. The rubber blocks 72 serve as wipers to prevent solutions associated with individual compartments from being carried into adjacent compartments by the movement of the strip 10. The compartment 32 of Fig. 2 provides an assurance that the cleaning solution of compartment 28 will not through leakage intermingle with the neutralizing solution of compartment 34. Similarly compartment 26 provides a means for confining and disposing of any solution leaking from the

5

other end of compartment 28. Suitable drains 74 are provided for the disposal of any solution that accidentally penetrates either compartment 26 or 32.

The abrading heads are illustrated in Fig. 2 as associated with compartment 28. A plurality of backing plates 31 are arranged in pairs and rotatably carried by the casing 24 in the compartment 28. Each plate carries a plurality of abrading elements and the strip 10 is arranged to pass between each pair of heads so that the sides thereof are engaged by the abrading elements. Fig. 7 illustrates one form of mounting of a head 30. A plurality of abrading elements 80 are arranged to project normal to the face of the plate 31 and are spaced around the outer portion of the face of plate 31 (Fig. 6). The abrading elements 80 are preferably relatively small circular elements having an opening in the central portion thereof. In order that undue abrasive action will not occur at localized areas on the strip 10, the elements 80 are spaced from the center of the plate 31. Figures 6 and 7 illustrate a preferred form of mounting for abrasive elements on plate 31. Each abrading element 80 is illustrated as supported on a metallic element 82. Each metallic element 82 is separated from the disk 31 and supported thereon by a block 84 of resilient material such as rubber. The metallic element 82 is preferably cemented to the block 84. A bolt 85 and nut 86 are used to fasten the assembly together. A spring member 87 having an undulating contour is positioned within the central opening of the abrading element and adapted to expand radially and engage the side walls thereof when compressed by bolt 85. The spring member 87 is also adapted to place the bolt 85 and nut 86 under tension which tends to keep the nut from unscrewing on the bolt. The block 84 is preferably quite flexible so that during operation of the device the abrasive element 80 may yieldably follow the contour of the surface of the strip 10. It has been found that a rubber hardness of 35 points Shore durometer gives satisfactory results. It should be understood however that the invention is not limited to the use of rubber either natural or synthetic. Any resilient material possessing suitable physical characteristics may be used. For example, a coil spring may be substituted for block 84.

In Figs. 5 and 8 a modified form of abrading head is illustrated. Each element is larger and only three elements are mounted on the plate 31. The abrading elements in these figures have been designated by the numeral 80'. It is to be understood that other modifications in the size or number of abrading elements associated with a backing plate may be made without departing from the invention. The individual pairs of heads 30 may be different in any one installation. Thus, the coarseness of the abrasive in the abrading elements 80 or the number of abrading elements arranged on an individual plate 31 may vary between adjacent pairs of heads 30.

Each plate 31 is rotatably mounted in the casing 24 and driven by a suitable power means so that rotation thereof is effected. Each pair of heads 30 preferably rotate in the same direction although it is to be understood that certain pairs of heads may be rotated in different directions or even individual heads of a pair may be rotated in different directions if desired. The abrading heads of each pair are arranged in opposed relationship and adapted to cooperate to support the strip. The reaction on the strip from

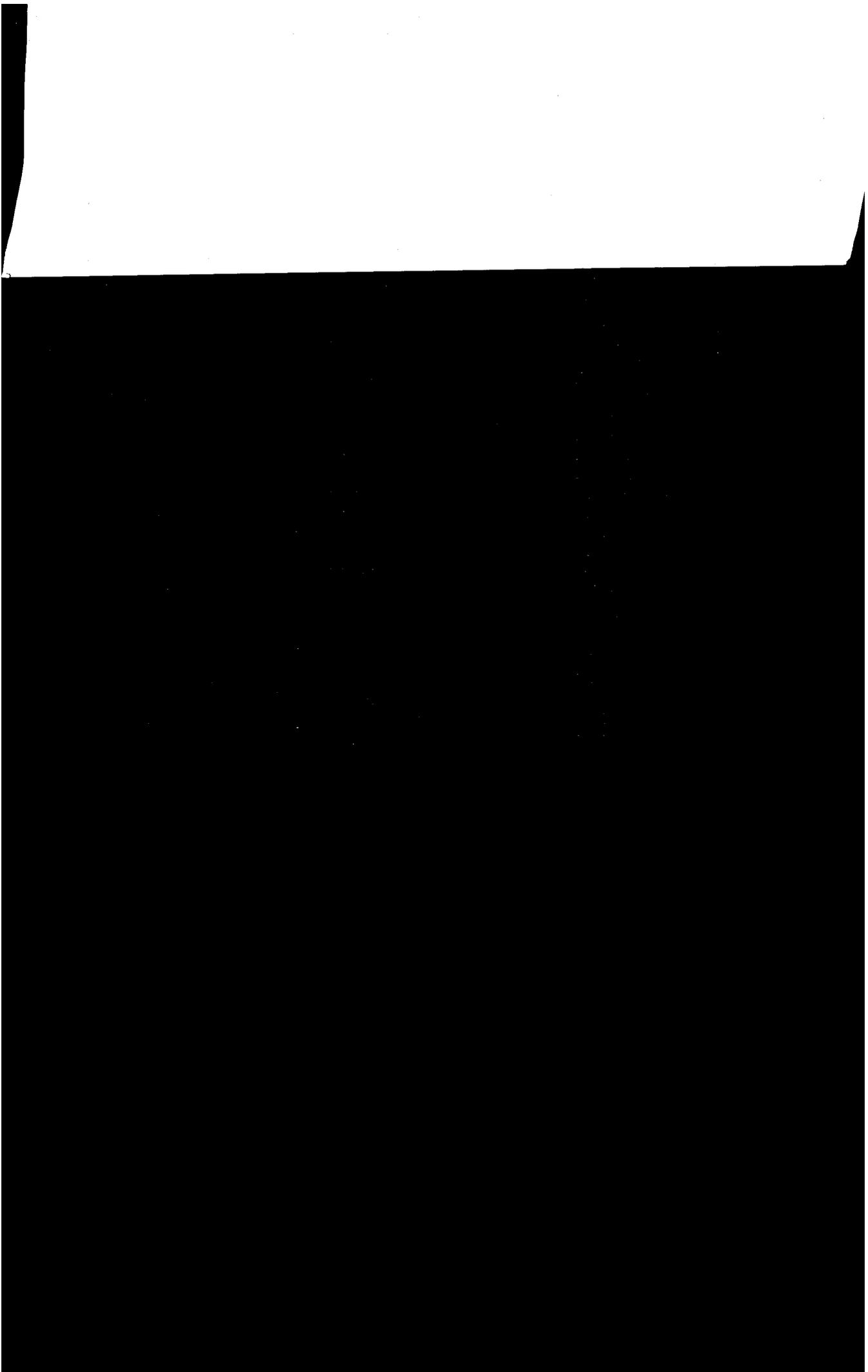
6

one of the heads is taken by the head disposed opposite thereto. Referring to Fig. 5 the plate 31 is provided with a pair of studs 88 which are bolted to a shaft 90 by a bolt 92. Removal of the bolt 92 makes plate 31 readily interchangeable. The shaft 90 is keyed by key 94 to the collar 96 which has a pulley wheel keyed thereto. The collar 96 is rotatably mounted in a bearing member 100 which is bolted to the casing 24 in an opening 102 provided therein. Suitable packing glands and sealing elements may be provided for the collar 96 and will not be discussed in detail herein. The wheel 98 is adapted to receive a belt 104 which may be operatively connected to a motor to be described herein. Rotation of the wheel 98 by means of the belt 104 rotates collar 96 through key 97. Rotation of the collar 96 is imparted to the shaft 90 through the key 94. Rotation of the shaft 90 induces rotation of the plate 31. If desired each pair of abrading heads may be rotated by a separate electric motor so that the speed of rotation of individual pairs of heads may be preselected by the choice of motor and controls therefor.

It is desirable to provide means for varying the pressure with which the abrading elements engage the strip 10. Such factors as the thickness of the strip 10, its height, the diameter of plate 31, the type of abrasive being used, and the surface condition of the strip 10 make adjustment of the pressure desirable. Referring to Fig. 5 it is seen that the collar 96 is secured against axial movement relative to the bearing member 100. This is accomplished by the cooperation of a flange 106 and thrust collar 108 with the bearing member 100. A plug 110 is threaded into the end of the collar 96. A spring 112 is provided to react against the plug 110 and the shaft 90 to urge the shaft 90 to move axially relative to the collar 96. Adjustment of the plug 110 in the collar 96 determines the compression of spring 112 and the pressure with which the abrading elements engage the strip 10. A rod 114 is preferably secured to the shaft 90 and adapted to penetrate an opening provided in the plug 110. A nut 116 cooperates with a threaded exterior portion of the rod 114 and by engagement with the plug 110 limits relative axial movement between shaft 90 and collar 96.

In Fig. 6 the strip 10 is illustrated in phantom lines. The diameter of the plate 31 is predetermined within limits by the height of the strip 10. It is necessary that the centers of diametrically opposed abrading elements be separated by a distance which is less than the height of the strip 10. Otherwise the abrading elements would tilt and destroy the edge on the strip 10. Therefore the relation between strip height and abrasive element positions is preferably as illustrated in Fig. 6. The maximum height of a strip which could be used with a head 30 is one whose height does not exceed the outside diameter of a path defined by the abrading elements during rotation of the head 30.

The belt 104 referred to with reference to Fig. 5 has been illustrated in Figs. 1 and 3 as engaging a wheel 118. The wheel 118 is keyed to a shaft 120. The shaft 120 is rotatably mounted in supports 122 and operatively connected to and driven by an electric motor 124. The motor 124 therefore drives wheel 118, belt 104 and wheel 98. The abrading head 30 which is positioned on the opposite side of the strip from the head associated with the wheel 98 may be similarly driven by a wheel 126, belt 128 and wheel 130 keyed to the



gresses to a rough polishing compartment 44 in which a plurality of pairs of abrading heads are adapted to perform a rough finishing operation on the strip. Compartment 44 contains a cleaning solution. The strip then progresses through a dry compartment 46 to a rinsing compartment 47 in which the strip is washed by clear water. The strip then progresses through a dry compartment 45 to a neutralizing compartment 48 and through a dry compartment 49 to a compartment 50. The compartment 50 contains a plurality of pairs of abrading heads which perform a semi-rough polishing operation on the strip. If desired, the grade of abrasive may be varied between compartments 50 and 44 and in fact individual heads may differ in the coarseness of abrasive used within the compartments. In addition, the speed of rotation of the heads and the pressure with which they engage the strip may vary. The strip then progresses from compartment 50 to a dry compartment 51 and a rinsing compartment 52 and then through a dry compartment 53, a neutralizing compartment 54, dry compartment 55 and into a compartment 56. The compartment 56 contains apparatus for performing a finishing operation on the strip. This apparatus includes abrading heads and a cleaning solution. The nature of the cleaning solution, the coarseness of the abrading elements, the speed of rotation of the heads and the pressure of the abrading heads upon the strip may be different in compartment 56 than in compartments 44 or 50. The strip then progresses through a dry compartment 57, rinsing compartment 58, dry compartment 59 to a neutralizing compartment 60. A dry compartment 62 and a polishing compartment 64 are positioned after the compartment 60. The polishing compartment 64 corresponds to compartment 36 of Fig. 2. This illustrates the fact that the arrangement of the compartments may be varied to suit individual requirements with regard to the physical characteristics of the strip, the surface condition thereof, the speed of movement of the strip and the polish required on the strip. However, reference should be made to Fig. 2 for a more complete description of the apparatus contained in the compartments with the understanding that the arrangement of the compartments may be varied as has been explained with reference to Fig. 4.

In Fig. 2 the sequence of exposing the strip to solutions comprise first a cleaning solution, then a neutralizing solution and finally a rinse with clear water. It is to be understood that the variation introduced in Fig. 4 whereby the strip is successively exposed to a cleaning solution, a rinse and a neutralizing solution may be used with the Fig. 2 apparatus if desired.

Referring to Fig. 13, suitable supplemental apparatus has been illustrated as associated with the casing 24 and the polishing apparatus contained therein. A pair of rolls 230 have been illustrated to designate rolls of a strip finishing mill. These are preferably not the last set of rolls in the mill. The final mill rolls have been designated 232 in Fig. 13. The rolls 230 and 232 preferably have a smooth contour. The casing 24 and its associated polishing apparatus are interposed between rolls 230 and 232. A strip 10 is illustrated as penetrating the casing 24 and the rolls 232. A strip 10' is illustrated as emerging from the rolls 230. In order that the strip 10' will not have to be threaded through the polishing apparatus a welding apparatus 234 is pro-

vided to weld the trailing edge of the strip 10 to the leading edge of the strip 10'. A pair of grinding wheels 236 have been illustrated as adapted to grind the flash off the weld. Suitable sand or metal blasting apparatus 238 is interposed between the grinding wheels 236 and the casing 24. The sand blasting is effective to clean the surface of the strip preparatory to polishing thereof. As the strip 10 emerges from the casing 24 a pair of resistance heating coils 240 cooperate to dry any moisture from the surface of the strip. The strip 10 then progresses through the finishing rolls 232 of the mill which preferably have extremely smooth surfaces such as are provided by the apparatus and method shown in United States Patent No. 2,195,064. Means are provided at 242 to cut the strip at predetermined intervals. The strip is rolled upon a roll 16 and has a layer of paper from a roll 42 positioned between adjacent layers of the strip as described with reference to Fig. 1. It is to be understood that if desired the finish mill rolls 232 could precede the welding operation.

A modified form of the invention in which some abrading units are replaced by a backing plate is shown in Fig. 14. A casing 24' is provided with a compartment 28'. A pair of oppositely disposed abrading heads 250 are adapted to rough polish opposite sides of the strip 10 as it is fed longitudinally through the compartment 28' while it is maintained in a vertical plane. A stationary backing plate 252 is positioned in the compartment and has one face thereof which extends longitudinally of the casing 24' and is located in a vertical plane. A plurality of abrading heads 254 are mounted in the casing 24' and positioned so that the abrading surfaces thereof engage one side of the strip 10 and force it against the plate 252. The plate 252 serves as a backing which provides the reaction for the pressure with which the abrading heads engage the strip 10.

That portion of the backing plate 252 which is aligned with the strip 10 is provided with a plurality of openings 256. The openings provide a means by which the solution used in compartment 28' for cleaning the strip, neutralizing the strip, cooling it or lubricating it may reach the strip 10 to provide a film between the strip 10 and backing plate 252. The solution may be carried in the compartment as a bath or the spray nozzles illustrated in Fig. 2 may be used in the compartment 28'.

The means for moving the strip and other associated apparatus and compartmentation described herein may be used with the Fig. 14 type of compartment.

Although but several specific embodiments of the invention are herein shown and described, it will be understood that various changes in the sequence of operations, steps and materials employed may be made without departing from the spirit of the invention.

I claim:

1. An abrading head for use in combination with apparatus for polishing a strip of sheet-like material, said head comprising a backing plate having an opening therein, a resilient element having an opening therein, said element being positioned adjacent said plate with said openings aligned, a relatively stiff member resting on said resilient element and having an opening aligned with said other openings, a tubular abrasive element axially aligned with said openings, a flexible clip member having a diameter approximating the internal diameter of said tubular

11

abrasive element and having a dished contour, said clip member being located within said element coaxially thereof and having a central opening, a fastening device penetrating said openings to fasten said clip member, said stiff member, said resilient element and said backing plate together, said clip member expanding radially into engagement with the internal surface of said abrasive element to grip said abrasive element when compressed against said stiff member by said fastening device.

2. In a device for simultaneously polishing both sides of a sheet metal strip, a casing having walls defining an elongated tank having vertical slots in opposite end walls thereof to receive a portion of the metal strip so that the strip may extend through the tank in a vertical plane, a pair of coaxial horizontal shafts extending transversely of said casing, stones carried within said tank by each of said shafts, each of said stones having a flat abrading surface located substantially in the plane defined by said slots, said abrading surfaces thereby being adapted to cooperate to engage opposite sides of a sheet metal strip extending through the tank and between said abrading surfaces, a power driven reel located exteriorly of said casing adjacent one end wall thereof and operable to pull a sheet metal strip through said tank, a collar associated with each of said shafts, each of said collars circumscribing one of said shafts for relative rotation therebetween and having an outer cylindrical surface eccentric to its associated shaft, a bearing associated with each of said collars and in which the collar is journaled for rotation, power means drivingly connected with each of said shafts to rotate said shafts in said collars, power means drivingly connected with each of said collars to rotate said collars in said bearings, opposed walls of said casing being provided with elongated openings each penetrated by one of said bearings and in which said bearings are mounted for reciprocation, and a power means associated with each of said bearings including a power driven rotatably mounted eccentric element having a connecting rod connected to one of said bearings for reciprocation of said last-mentioned bearing in its associated opening so that as the sheet metal strip is pulled through said tank by said power driven roll means opposite sides of the strip are engaged by the abrading surfaces of said stones, each of which move in a path defined by rotation of its associated shaft, the revolving of its shaft induced by rotation of its associated collar and the reciprocation of its associated bearing.

3. In a device for simultaneously polishing both sides of a sheet metal strip, a casing having walls defining an elongated tank having vertical slots in opposite end walls thereof to receive a portion of the metal strip so that the strip may extend through the tank in a vertical plane, a pair of coaxial horizontal shafts extending transversely of said casing, stones carried within said tank by each of said shafts, each of said stones having a flat abrading surface located substantially in the plane defined by said slots, said abrading surfaces thereby being adapted to cooperate to engage opposite sides of a sheet metal strip extending through the tank and between said abrading surfaces, a power driven reel located exteriorly of said casing adjacent one end wall thereof and operable to pull a sheet metal strip through said tank, a collar associated with each of said shafts, each of said collars circumscribing one of said shafts for relative rotation

12

therebetween and having an outer cylindrical surface eccentric to its associated shaft, a bearing associated with each of said collars and in which the collar is journaled for rotation, power means drivingly connected with each of said shafts to rotate said shafts in said collars, power means drivingly connected with each of said collars to rotate said collars in said bearings, opposed walls of said casing being provided with elongated openings each penetrated by one of said bearings and in which said bearings are mounted for reciprocation, a power means associated with each of said bearings including a power driven rotatably mounted eccentric element having a connecting rod connected to one of said bearings for reciprocation of said last-mentioned bearing in its associated opening so that as the sheet metal strip is pulled through said tank by said power driven roll means opposite sides of the strip are engaged by the abrading surfaces of said stones each of which move in a path defined by rotation of its associated shaft, the revolving of its shaft induced by rotation of its associated collar and the reciprocation of its associated bearing and a hollow flexible seal associated with each of said openings and having an open base portion secured to the inside of the casing wall around the opening and having a second portion circumscribing one of said bearings and defining an opening through which a portion of said bearing projects.

4. In a device for simultaneously polishing both sides of a sheet metal strip, a casing having walls defining an elongated tank having vertical slots in opposite end walls thereof to receive a portion of the metal strip so that the strip may extend through the tank in a vertical plane, a pair of coaxial horizontal shafts extending transversely of said casing, stones carried within said tank by each of said shafts, each of said stones having a flat abrading surface located substantially in the plane defined by said slots, said abrading surfaces thereby being adapted to cooperate to engage opposite sides of a sheet metal strip extending through the tank and between said abrading surfaces, a power driven reel located exteriorly of said casing adjacent one end wall thereof and operable to pull a sheet metal strip through said tank, a sleeve surrounding each of said shafts and keyed thereto to accommodate relative longitudinal movement between the sleeve and its associated shaft, a spring acting upon each of said shafts and reacting upon the associated sleeve to urge the shaft to project out of the sleeve so that the abrading surface carried by the shaft will be urged against a sheet metal strip positioned between said stones, a collar associated with each of said sleeves, each of said collars circumscribing one of said sleeves for relative rotation therebetween and having an outer cylindrical surface eccentric to its associated sleeve, a bearing associated with each of said collars and in which the collar is journaled for rotation, power means drivingly connected with each of said sleeves to rotate said sleeves in said collars, power means drivingly connected with each of said collars to rotate said collars in said bearings, opposed walls of said casing being provided with elongated openings each penetrated by one of said bearings and in which said bearings are mounted for reciprocation, and a power means associated with each of said bearings and including a rotatably mounted eccentric element having a connecting rod connected to one of said bearings for reciprocation of said last-mentioned bearing in its associated opening so that as the sheet

## 13

metal strip is pulled through said tank by said power driven roll means opposite sides of the strip are engaged by the abrading surfaces of said stones each of which move in a path defined by rotation of its associated shaft and sleeve, the revolving of its shaft and sleeve induced by rotation of its associated collar and the reciprocation of its associated bearing.

DAVID A. WALLACE.

## REFERENCES CITED

The following references are of record in the file of this patent:

## UNITED STATES PATENTS

Number	Name	Date
451,263	Buckman	Apr. 28, 1891
542,529	Needham	July 9, 1895
721,191	Hoffman	Feb. 24, 1903
867,473	Brown	Oct. 1, 1907
965,981	Bach	Aug. 2, 1910
1,233,120	Patch	July 10, 1917

## Number

1,255,799
1,290,990
1,474,672
5 1,600,282
1,610,419
1,701,639
1,724,703
1,803,752
10 1,811,044
1,833,359
1,833,360
1,914,013
2,105,637
15 2,164,418
2,235,446
2,252,818
2,272,974
2,285,318
2,297,976
20 2,395,397
2,444,523

## 14

Name	Date
Schumacher	Feb. 5, 1918
Hickey	Jan. 14, 1919
Heuze	Nov. 20, 1923
Hays	Sept. 21, 1926
Brown	Dec. 14, 1926
Schulz	Feb. 12, 1929
Fox	Aug. 13, 1929
Ford	May 5, 1931
Drake	June 23, 1931
Fox et al.	Nov. 24, 1931
Fox et al.	Nov. 24, 1931
Gaisman	June 13, 1933
Davis	Jan. 18, 1938
Monnet	July 4, 1939
Birger	Mar. 18, 1941
Somes	Aug. 19, 1941
Indge	Feb. 10, 1942
Waldron	June 2, 1942
Nachtman	Oct. 6, 1942
Croft	Feb. 26, 1946
Ney	July 6, 1948