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METAL SHEET TREATING MACHINE

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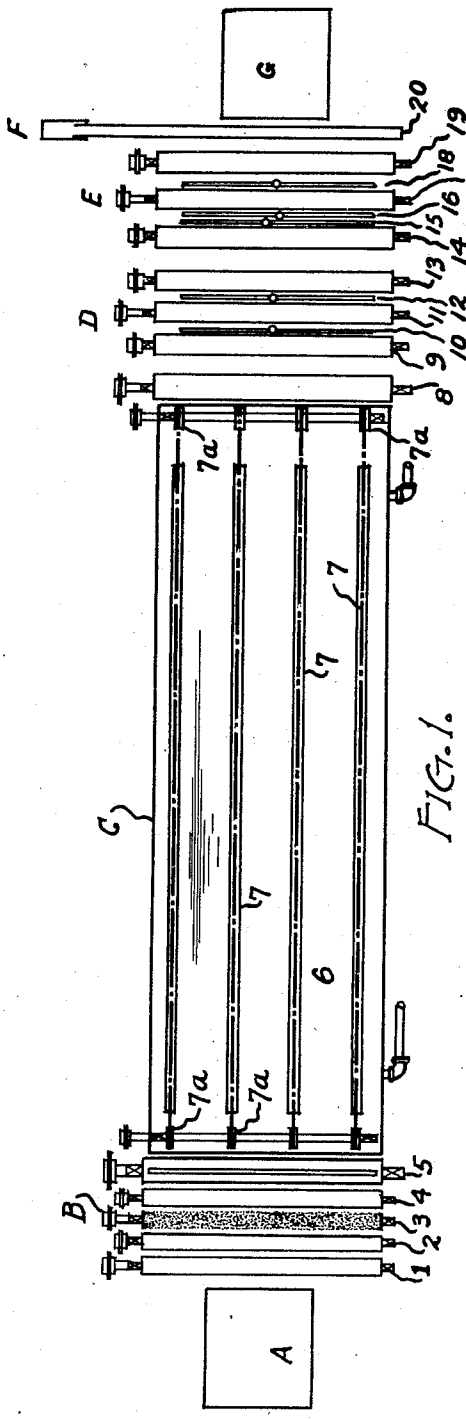


FIG. 1.

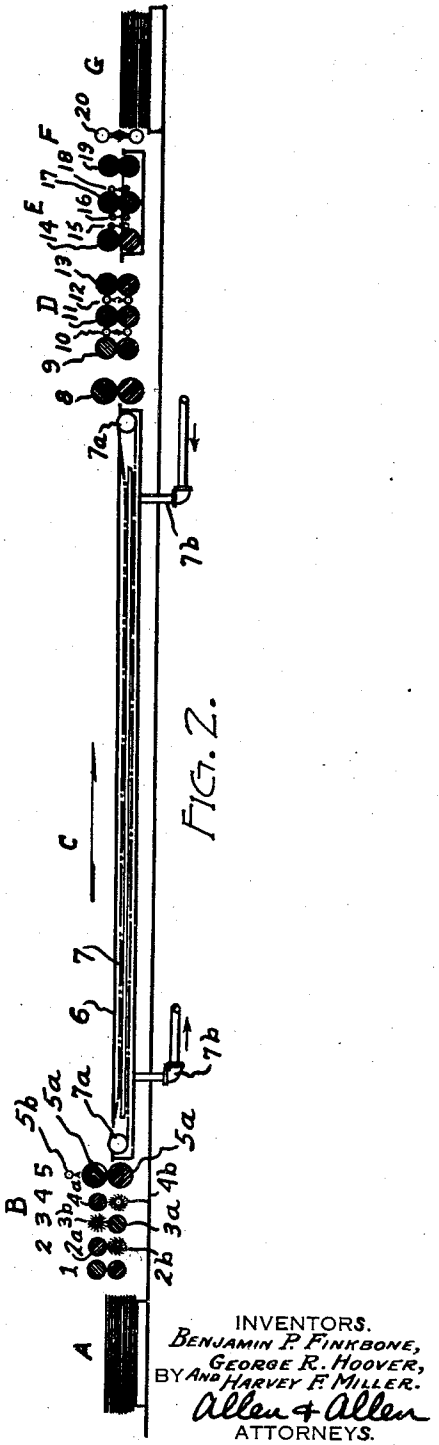


FIG. 2.

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METAL SHEET TREATING MACHINE

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2 Claims. (Cl. 266—6)

Our invention relates to a machine for treating metal sheets in order to give them qualities which are advantageous when the sheets are subsequently painted. A treatment which gives to metal sheets such advantageous qualities consists essentially in using a hot dipped galvanized sheet and treating it chemically with a solution containing phosphoric acid and phosphates, together with metallic salts. The metallic salts which may include salts of iron, copper, sodium and the like, function as activators and deoxidizers and thus increase the rate of the chemical reaction. This treatment results in a continuous phosphate coating over the surface of the galvanized sheet. After the phosphate coating has been applied and immediately after the sheets come from the phosphate bath they are thoroughly rinsed first in cold water (50 to 70° F.) and then in hot water (140 to 180° F.). The sheets are then rinsed with a dilute solution of chromic acid.

A number of considerations enter into the treatment. In order that uniform treatment over the entire sheet surface may be obtained, the sheet must be thoroughly cleaned before entering the phosphate bath. Another important consideration is that the sheet must be wetted prior to entering the phosphate bath. The wetting of the sheet has been a source of considerable trouble. Attempts have been made in the past to feed the sheets into a treating tank by means of hard rolls. Further attempts involve wrapping the rolls with cotton felt or fabric. This was of some advantage but was not satisfactory on account of wrinkling and unevenness of the cotton. The addition of water which has been found to be necessary is a delicate matter for the reason that the water must be very uniformly applied and the amount of water which must be applied is rather critical. If insufficient water is used, the wetting action is not uniform and thus the reaction in the treating bath will not be uniform. If too much water is used it is thought that this excess of water on the surface of the sheets dilutes the solution at the wetted surface wherefore again the reaction is improper.

With the above mentioned facts in mind, it is the principal object of our invention to provide a machine which is particularly advantageous in carrying out the above mentioned process of treating sheets.

Another object of our invention is in the provision of wetting means which will thoroughly and adequately wet the sheets so that a complete and uniform reaction is obtained in the treating bath.

Ancillary objects of our invention include the provision of scrubbing devices, rinsing devices and drying devices which cooperate to produce a perfectly treated sheet.

These and other objects of our invention which will be pointed out hereinafter or which will be apparent to one skilled in the art upon reading these specifications, we accomplish by that certain construction and arrangement of parts of which we shall now describe an exemplary embodiment. Reference is made to the drawing which forms a part hereof and in which

Figure 1 is a plan view in somewhat diagrammatic form of our machine.

Figure 2 is a longitudinal vertical cross sectional view of the same.

Briefly in the practice of our invention we provide a movable feed table indicated generally at A. By means of this feed table the sheets may be maintained at a convenient elevation for feeding into the machine. B indicates generally a scrubber which prepares the sheets for their entry into the treating tank which is indicated generally at C. As the sheets emerge from the treating tank they pass through a scrubber D and an acid rinsing device E and a drying device F and are subsequently stacked on the table G.

Coming now to a more detailed description of the various elements of our machine the device B consists of a set of feed rolls 1 which serve to feed the sheets into the machine. From the rolls 1 the sheets pass through the actual scrubbing device which consists in the present embodiment of the sets of rolls 2, 3 and 4. The rolls 2*a*, 3*a* and 4*a* are solid rolls which serve to back up the brush rolls 2*b*, 3*b* and 4*b*. Thus the rolls 2*b* and 4*b* brush the bottom of the sheets and the roll 3*b* brushes the top of the sheets. It is to be understood, of course, that a greater number of brush rolls may be used if desired, although, of course, one upper and lower brush roll would be a minimum.

From the brush rolls the sheets pass through the wetting device indicated generally at 5, which consists of a set of rubber rolls 5*a* and a water spray 5*b*. The member 5*b* may be a long pipe extending the length of the rolls 5*a* and provided with a number of fine holes so as to maintain a thin spray of water upon the rolls 5*a*. The lower side of the sheets is wetted by liquid transferred to the lower roll from the upper roll between succeeding sheets.

From the wetting rolls 5 the sheets enter the treating tank 6 which is provided with a conveyor 7 passing over the wheels 7*a* at each end of the tank. The tank 6 is provided with heating coils 7*b*. These heating coils are traversed by steam of sufficient capacity to heat the solution within the tank 6 to about 180° F.

As the sheets leave the treating tank 6, they pass through a set of rubber rolls 8 which remove the excess solution therefrom. From the rolls 8 the sheets pass to the scrubber D. The

device D consists of a set of steel drive rolls 9 and another set of steel drive rolls 11 and a set of rag rolls 13. Between the two sets of steel rolls 9 and 11 are provided upper and lower cold water sprays indicated generally at 10 and between these steel rolls 11 and the rag rolls 13 are provided upper and lower hot water sprays 12. By these means the sheets are first washed on both sides in cold water and then in hot water and then are wiped by the rolls 13.

From the scrubbing device D the sheets pass into the acid rinsing device E. This device is similar to the device D except that the last set of rolls are rubber. Furthermore, between the first two sets of rolls of the device E we preferably provide two upper and two lower acid sprays with a third acid spray located between the second set of rolls 17 and the rubber rolls 19. In the device E, therefore, the sheet is sprayed on both sides with acid, preferably chromic acid in dilute solution and excess acid is removed by the rubber rolls 19.

From the rinsing device E the sheets pass between upper and lower air jets 20. These air jets provide a high velocity stream of air at room temperature which dry the chromic acid on the sheets. After passing from the air jets F the sheets are stacked in any desired manner on the table G.

The tank 6 may be of any convenient size depending upon the quantity and the size of the sheets to be treated. The tank of our particular embodiment is forty feet in length, and since the minimum treating time is thirty seconds, our tank is designed to treat the sheets at the rate of sixty feet per minute. Therefore, the feed rolls 1, the wetting rolls 5*a*, the conveyor 7 and the various elements through which the sheets pass after emerging from the tank 6 are driven in any desired manner to achieve a rate of sixty feet per minute for the sheets. Since the particular driving arrangement forms no part of our invention the drawing has been made diagrammatically.

In order to obtain a thorough brushing action, it is necessary that the rolls 2*b*, 3*b* and 4*b* be driven at some peripheral speed different from the linear speed of the sheets. They may be driven at a faster or slower speed or in an opposite direction depending upon individual circumstances, but they must be driven so that there is a differential between their peripheral speed and the speed of the strip.

It is to be understood that dimensions and speeds mentioned in this specification are exemplary and have not been inserted by way of limitation. We do not intend to limit ourselves in any manner other than as expressed in the claims which follow.

Having now fully described our invention what we claim as new and desire to secure by Letters Patent is:

1. In a machine for treating metal sheets for rust-proofing, a treating tank, a wetting device comprising a horizontally disposed pair of rubber rolls located at the entrance of said tank, means for feeding a sheet between said rubber rolls into said tank, and means providing a fine spray of water for said rolls disposed thereabove, the water being transferred to the lower roll by contact thereof with the upper roll between succeeding sheets.

2. In a machine for treating metal sheets for rust-proofing, a treating tank, a wetting device comprising a horizontally disposed pair of rubber rolls located at the entrance of said tank, means for feeding a sheet between said rubber rolls into said tank, and means providing a fine spray of water for said rolls disposed thereabove, the water being transferred to the lower roll by contact thereof with the upper roll between succeeding sheets, means for conducting the sheets through said tank, scrubbing means on the exit side of said tank, said scrubbing means comprising a plurality of pairs of rolls and spray devices through which the sheets pass, said rolls and devices including, in the order named, a pair of steel rolls, a cold water spray device, a pair of steel rolls, a hot water spray device, a pair of rag rolls, rinsing means, including a pair of steel rolls, an acid spray device, a pair of steel rolls, a second acid spray device, and a pair of rubber rolls, in the order named; and an air drying device.

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