Jan. 7, 1930. C. W. OWSTON 1,742,214

METAL COATING APPARATUS AND METHOD

Filed Feb. 19, 1925 2 Sheets-Sheet 1

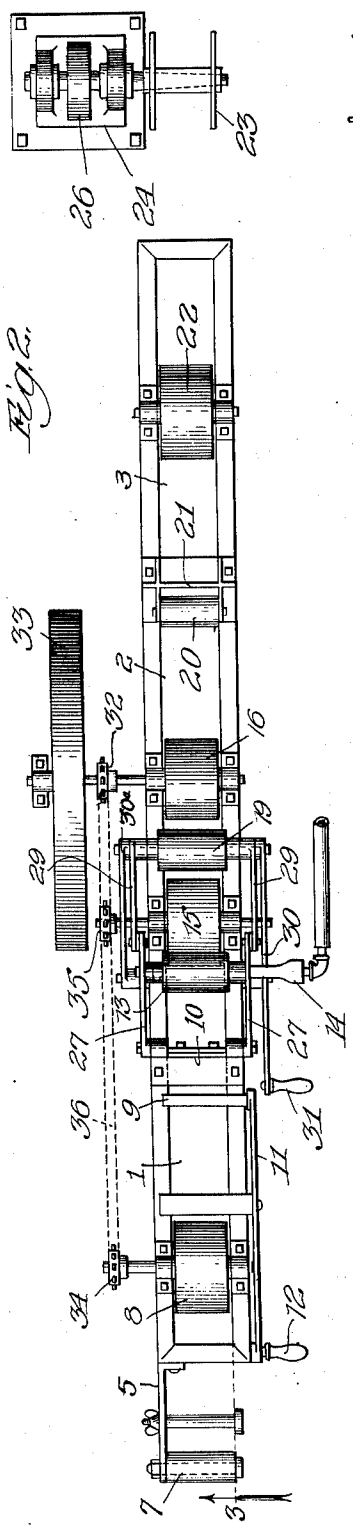


Fig. 2.

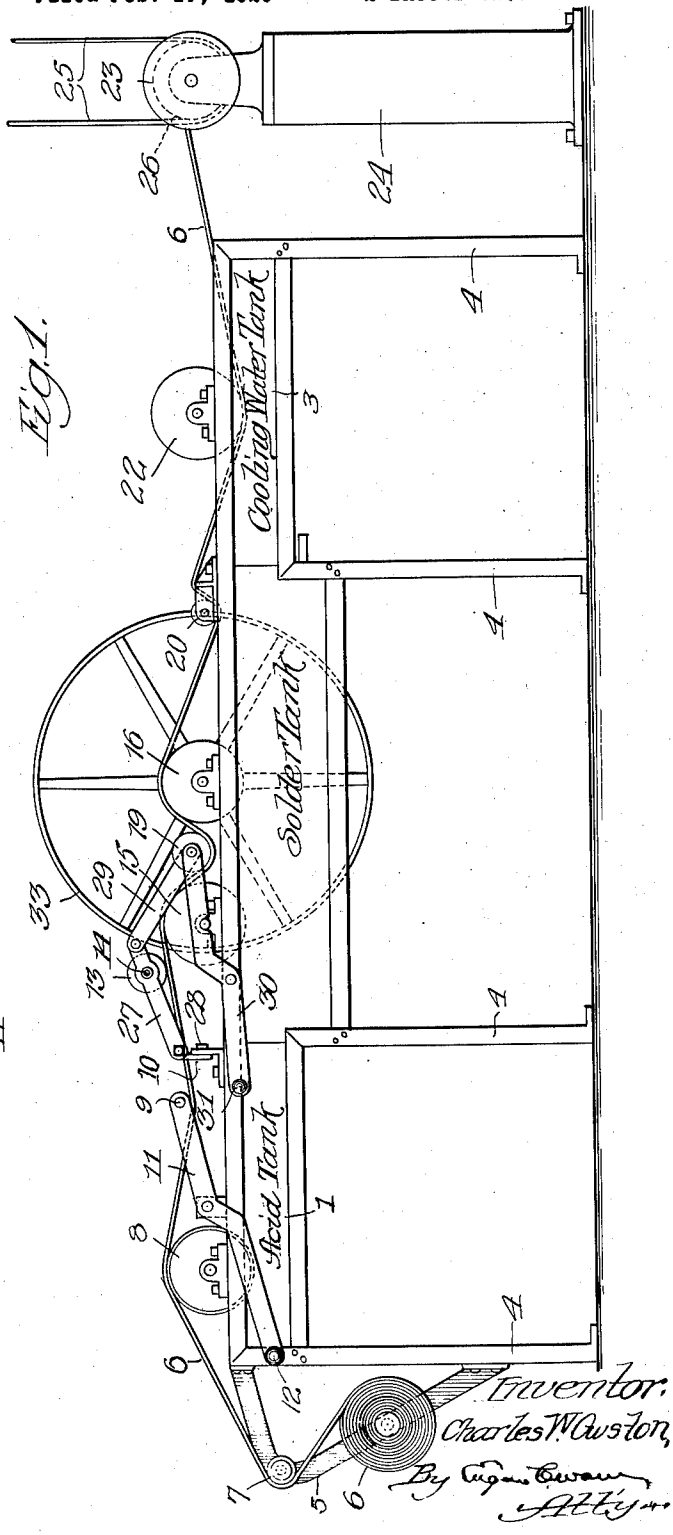


Fig. 1.

Inventor:
Charles W. Owston,
By Eugene Owen
Atty

Jan. 7, 1930. C. W. OWSTON 1,742,214

METAL COATING APPARATUS AND METHOD

Filed Feb. 19, 1925 2 Sheets-Sheet 2

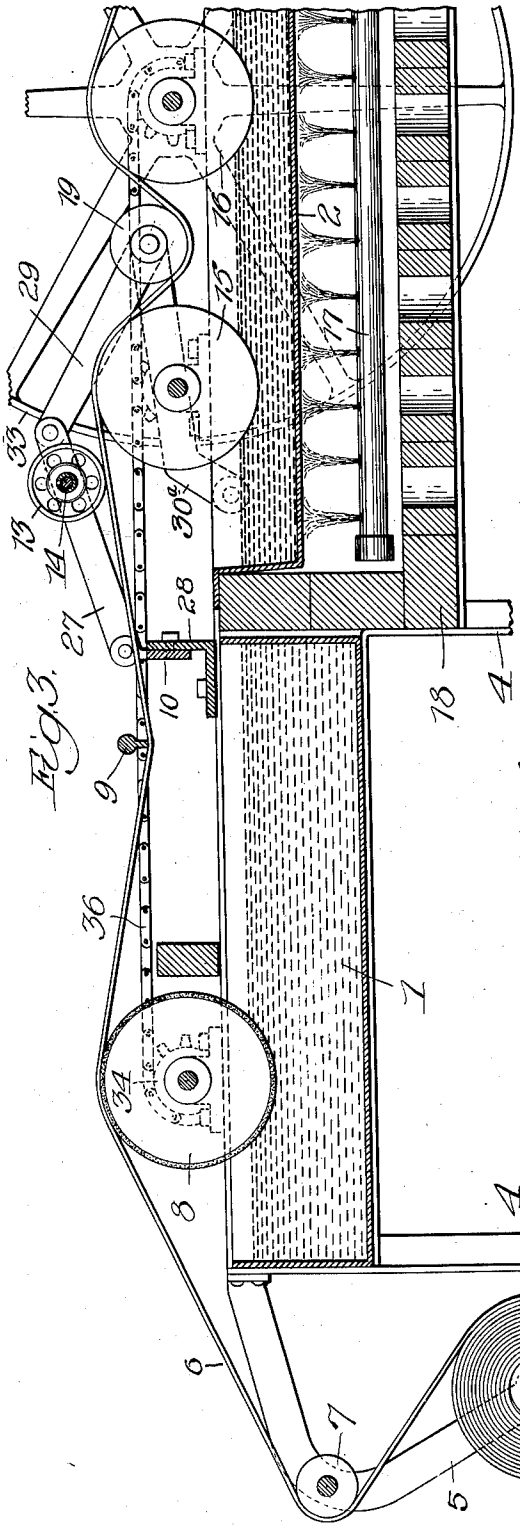


Fig. 3.

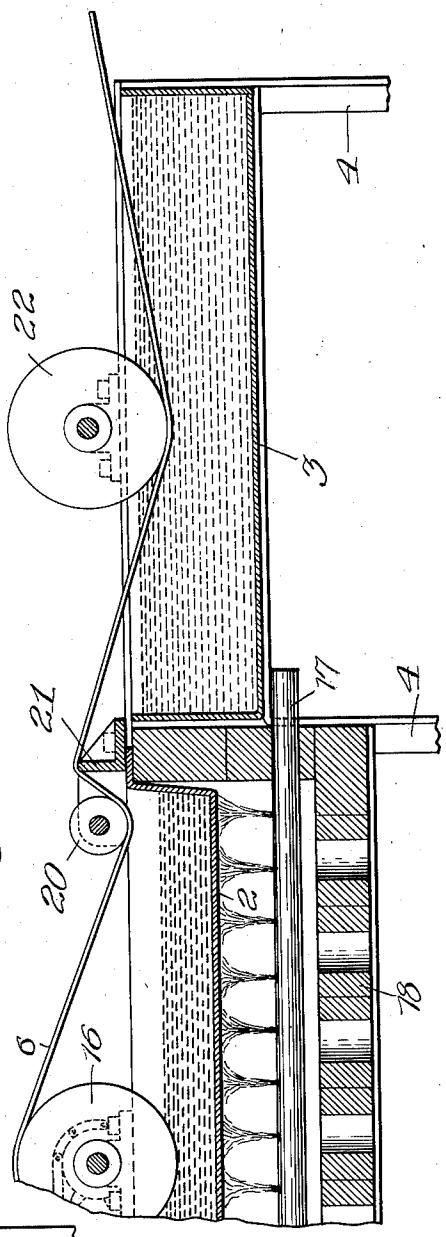


Fig. 4.

Inventor:
Charles W. Owston,
By Edgar Evans
Attorney

Patented Jan. 7, 1930 1,742,214

UNITED STATES PATENT OFFICE

CHARLES W. OWSTON, OF DETROIT, MICHIGAN, ASSIGNOR TO McCORD RADIATOR & MFG. CO., OF DETROIT, MICHIGAN, A CORPORATION OF MAINE

METAL-COATING APPARATUS AND METHOD

Application filed February 19, 1925. Serial No. 10,169.

This invention relates to a method and apparatus for coating with molten metal, as solder, one side only of sheet metal ribbon stock, such as used for making tubes for motor vehicle radiators of the fin and tube type. By coating the stock on one side only, the tubes may be formed with uncoated side of the stock inside the tubes and thus allow the water circulating through the tubes to have direct contact with the metal of the tubes for immediate transfer of heat from the water to the tubes. This increases the efficiency of the radiator, because it avoids having the water insulated from the metal of the tubes by a solder coating inside the tubes as provided with metal stock coated on both sides with solder, as heretofore.

In the accompanying drawings—

Fig. 1 is a side view of the apparatus of my invention;

Fig. 2 is a top plan view of the same;

Fig. 3 is an enlarged vertical longitudinal sectional view through the forward half of the device; and

Fig. 4 is a like view of the remaining half of the same.

The apparatus or machine shown in the drawings has three tanks, 1, 2, and 3 arranged one after the other in the order named and containing muriatic acid, a molten solder, and cooling water, respectively. These tanks are supported by a suitable framework having legs 4, 4, as shown.

The tank 1 is at the entrance end of the machine, and by a bracket structure 5 a supply roll of sheet metal band or ribbon stock 6 to be coated is carried at such end of the device. The band 6 is preferably of brass and is first run over a small guide roller 7 on the bracket 5 above the supply roll, and from there over and in contact with the upper side of a larger roller 8 having its lower portion dipping into the acid in the tank 1. The roller 8 is covered with a burlap or other pad to apply acid to the under side of the band 6 to clean the same preparatory to coating the band with molten solder.

The surplus acid is wiped off the band by two wipers 9, 10 arranged above and below the band, respectively, and in contact with the upper and lower surfaces thereof, as shown in Fig. 3. These wipers are positioned over the tank 1 so that the acid wiped from the band will run back into the tank. These wipers include strips of heavy canvas bearing edgewise against the strip 6, as shown. The canvas strip of the wiper 9 is carried by a rod secured to the free upper end of the lever 11 pivoted between its ends on a bracket rising upward from the framework of the machine, as shown in Fig. 2. The lower end of this lever carries a handle 12 for raising the wiper 9 above the roller 8 for inserting a band. The wiper 10 is fixed to the framework of the apparatus, as shown in Fig. 3.

From the wipers 9, 10 the band 6 passes under and in contact with the lower side of a roller 13 made hollow and heated from the inside by a gas or other fuel burner 14 extending into the roller, as shown in Fig. 2. The roller 13 rests against the upper surface of the band 6 and heats the same sufficiently to take a coating of solder on its under side.

From the roller 13 the band 6 passes over and in contact with the upper sides of two solder applying rollers 15, 16, both preferably of steel and having their lower portions dipping in the molten solder in tank 2. These rollers are spaced apart lengthwise of the machine, as shown in Fig. 3, and are journaled in bearings mounted on the framework of the machine. The tank 2 is heated, to maintain the solder bath molten, by a gas or other fuel burner 17 located beneath the tank, as shown in Fig. 3, and in a chamber formed by firebrick 18 on the supporting structure of the machine.

In the space between the rollers 15 and 16 there is a hold-down roller 19. This roller is much smaller in diameter than the rollers 15, 16, and has its axis down near a horizontal plane containing the axes of the rollers 15, 16, so as to cause the band 6 to be depressed down into this space and thus hold a considerable portion of the under surface of the band 6 in contact with both rollers 15 and 16 for the application of solder coating thereto. This hold-down roller 19 is made solid and preferably of aluminum. The rollers 13 and 19 are

carried by means enabling them to be raised simultaneously above the coating rollers for inserting a band 6 in the machine without the operator being required to touch the hot rollers.

From the roller 16 the band 6 passes under and in contact with the under side of a small hold-down roller 20 fixed to the machine at the delivery end of the tank 2, as shown in Fig. 4. From the roller 20 the band 6 passes over and in contact with a wiper 21, which removes excess solder from the coated under side of the band. This wiper consists of a flat upright steel bar engaging edgewise against the under side of the band 6 and located at the delivery end of the tank 1, so that the excess solder removed from the band will run back into the tank 2.

On leaving the wiper 21 the band 6 passes under and in contact with the under side of a larger roller 22 arranged in the tank 3 and having its lower portion dipping into the cooling water contained therein. The roller 22 causes the stock 6 to pass down into and through the cooling water to chill the coated band and harden its solder coating. This roller 22 is preferably made from hard wood. After coming out of the tank 3, the coated band is wound on a rewinding reel 23 at the delivery end of the machine. This reel is supported on a stand 24 and is driven by a belt 25 and pulley 26 on the shaft on which the reel is mounted. By this means the rewinding reel 23 is rotated at a speed in keeping with the speed of travel of the band 6 through the machine.

The heated roller 13 is carried between a pair of arms 27, 27 on opposite sides of the tank 2 and pivoted at their lower ends to the upright bracket 28 carrying the wiper 10, as shown in the drawings. The roller 13 is near the free ends of these arms. The hold-down roller 19 is carried between the lower ends of a pair of arms 29, the upper ends of which are pivoted to the upper ends of the arms 27. Levers 30, 30ª are pivoted on opposite sides of the machine frame and also are pivoted to the arms 29 at or adjacent the roller 19. Lever 30 is pivoted between its ends and has a handle 31 for raising and lowering the rollers 13 and 19 at the same time. The lever 30 rests on the shaft of coating roller 15 when the rollers 13 and 19 are in their lowered positions in contact with the upper side of the band 6.

The rollers 8, 15, and 16 are power driven and rotate in the direction of travel of the band 6 through the machine, said rollers serving to feed the band through the machine in conjunction with the feed of the rewinding reel 23. The shaft of the coating roller 16 extends beyond the side of the machine opposite the lever 30 and there has fixed to it a sprocket wheel 32 and a driving pulley 33. The shafts of the rollers 8 and 15 also extend beyond such side of the machine and have sprocket wheels 24 and 35, respectively. These several sprockets are engaged by a sprocket chain 36, so that the rollers 8 and 15 are driven from the shaft of the roller 16 when power is applied to the driving pulley 33.

My machine is simple in construction and operation and applies a coating of molten solder to only one side of the ribbon stock 6 by a continuous and uninterrupted process without running the band through the molten solder, so that radiator tubes may be made from the coated stock with the uncoated surfaces of the stock inside for the advantages heretofore stated. The coated side of the stock is outside the tubes so that the fin strips may be soldered thereto in the making of the cores.

While I have shown and described herein the band 6 as being coated with solder, my invention is applicable to a coating with other coating metals, and I do not wish to be limited in the application of my invention to solder coating. Nor do I wish to be limited to the details of structure shown and described, for they may be variously changed and modified without departing from the spirit and scope of my invention.

I claim as my invention:

1. In an apparatus for coating one side only of sheet metal band or ribbon stock with metal by a continuous process, the combination with means including a roller for cleaning the under side of the band, of a plurality of coating rollers for coating the under side of the band with molten coating metal without running the band through the coating metal, a hold-down roller in the space between the coating rollers for depressing the band into said space and causing the band to have contact with a considerable portion of the upper sides of said coating rollers, and means for rotating the cleaning and coating rollers for moving the band over the same.

2. In an apparatus for coating one side only of sheet metal band or ribbon stock with metal by a continuous process, the combination with a plurality of coating rollers for applying a molten metal coating to the under side of the band, of a heating roller in contact with the upper side of the band in advance of the coating rollers, a hold-down roller between the coating rollers for holding the under side of the band in contact with the upper sides of the coating rollers, and means carrying the heating and hold-down rollers for raising the same above the coating rollers for inserting a band.

3. In an apparatus for coating one side only of sheet metal band or ribbon stock with metal by a continuous process, the combination with coating rollers for coating the under side of the band with molten coating metal,

of a heating roller in contact with the upper side of the band in advance of the coating rollers, a hold-down roller between the coating rollers for holding the under side of the band in contact with the coating rollers, and a compound lever arrangement carrying the heating and hold-down rollers for raising said rollers above the coating rollers for insertion of a band.

4. In an apparatus for coating one side only of sheet metal band or ribbon stock with solder by a continuous process, the combination with three tanks containing acid, molten solder, and cooling water, respectively, of power driven rollers partially submerged in said tanks, means for guiding and holding the under side of the band in contact with the upper surfaces of the rollers in the first two tanks for coating the under side of the band with molten solder without running the band therethrough, said band being submerged in the cooling water by passing under and in contact with the roller in the third tank, and means including rollers bearing against the upper side of the band for holding the same in contact with the rollers in the first two tanks.

5. An apparatus for coating one side only of sheet metal band or ribbon stock with metal by a continuous process, comprising in combination means for cleaning the under side of the band before it is coated with metal, a pair of spaced coating rollers for coating the entire under side of the band with molten coating metal without running the band through the coating metal, a hold down roller in the space between the coating rollers for depressing the band into said space and causing the band to have considerable contact with the upper portions of said coating rollers, means for removing the surplus coating metal from the under side of the band after it leaves the coating rollers, and means providing a driving connection between said coating rollers whereby said rollers may be rotated by power for moving the band thereover.

6. An apparatus for coating one side only of sheet metal band or ribbon stock with solder by a continuous process, comprising in combination means for cleaning the under side of the band before it is coated, means for heating the band preparatory to coating it with solder, a pair of spaced coating rollers for coating the entire under side of the band with molten solder without running the band through the molten bath, a hold down roller in the space between the coating rollers for depressing the band into said space and causing the band to have considerable contact with the upper portions of said coating rollers, means for removing surplus solder from the under side of the coated band after it leaves the coating rollers, means for finally chilling the band to harden its solder coating, and means providing a driving connection between said coating rollers whereby said rollers may be rotated by power for moving the band thereover.

7. An apparatus for coating one side only of sheet metal band or ribbon stock with metal by a continuous process, comprising in combination a bath of molten coating metal, a pair of spaced coating rollers having their lower portions only dipping into the metal bath so as to coat the under side of the band passing over and in contact with the upper portions of said rollers, and a hold down roller between the upper portions of the coating rollers for holding the band in contact therewith, said coating rollers being spaced apart a distance greater than the diameter of the hold down roller so that the latter may extend down deep into said space for causing the under side of the band to have considerable contact with the upper portions of said coating rollers.

8. An apparatus for coating one side only of sheet metal band or ribbon stock with metal by a continuous process, comprising in combination a pair of spaced coating rollers for coating the entire under side of the band with molten metal without running the band through the coating metal, a hold down roller in the space between the coating rollers for depressing the band into said space and causing the under side of the band to have considerable contact with said coating rollers, a heated roller in contact with the upper side of the band in advance of the coating rollers, and means providing a driving connection between the coating rollers whereby said rollers may be rotated by power for moving the band thereover.

In testimony that I claim the foregoing as my invention, I affix my signature this 14th day of February, 1925.

CHARLES WM. OWSTON.