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Glanzer

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[54] **APPARATUS FOR OILING SHEET METAL STOCK**

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[58] **Field of Search** ..... 118/315, 316, 326, 118/50, 50.1, 8, 7, 325; 134/103, 109, 57 R

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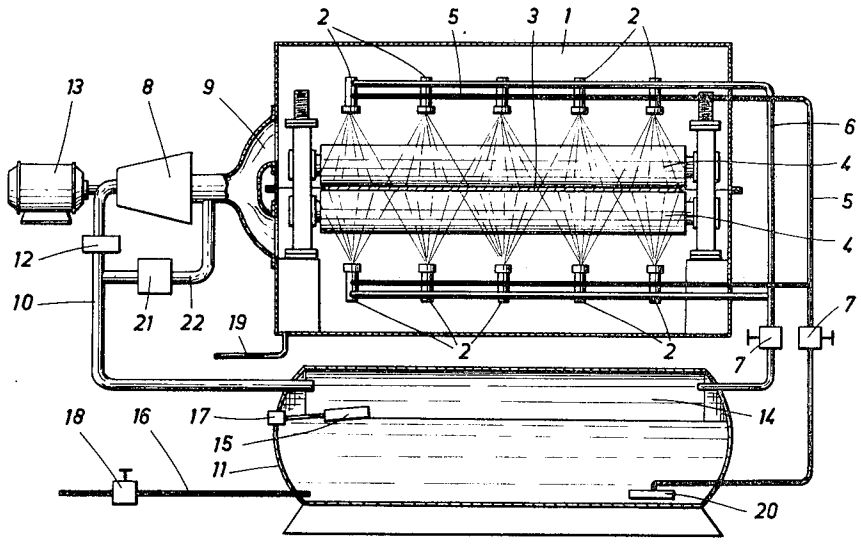
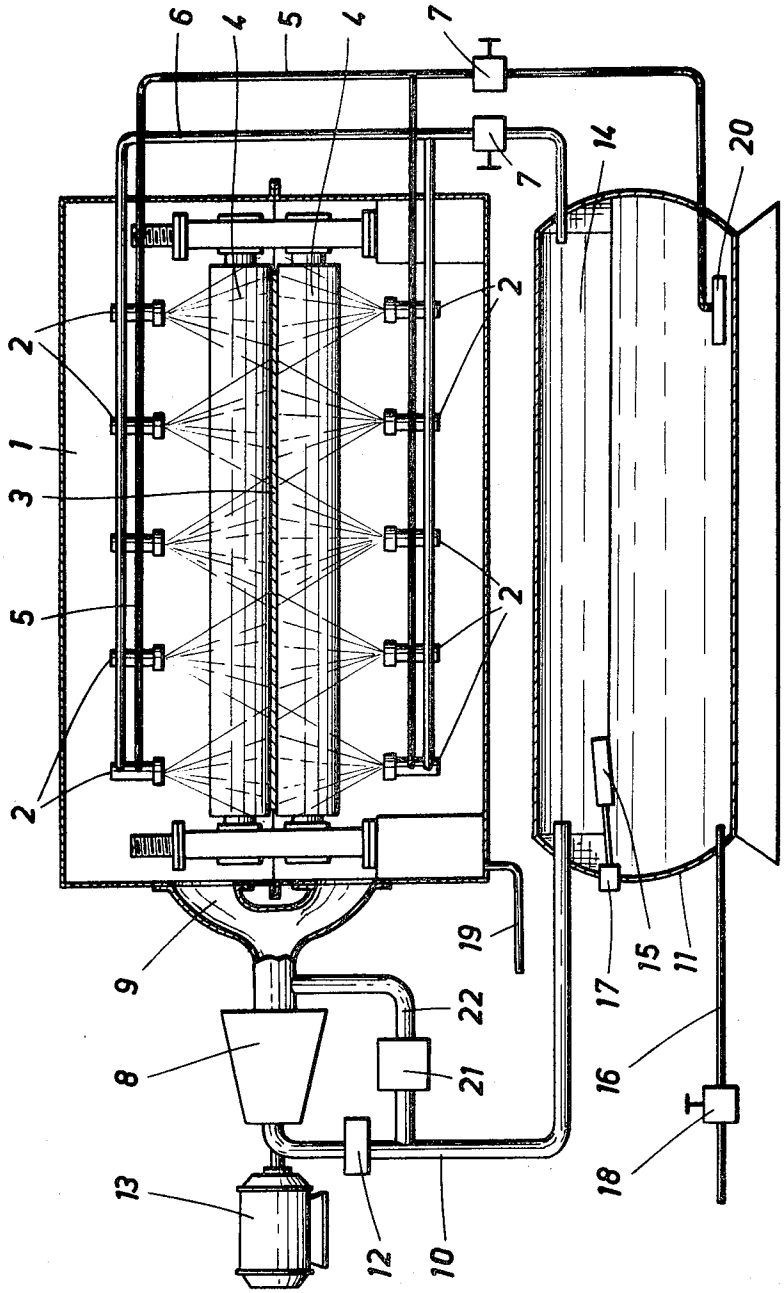
[57] **ABSTRACT**

Chamber-defining means define a chamber, a sealing inlet to said chamber and a sealing outlet from said chamber. Stock-feeding means are operable to feed sheet metal stock through said inlet, chamber, and outlet along a predetermined path. A plurality of nozzles open in said chamber and are spaced apart transversely to said path and directed toward said path and operable to discharge an oil-air mixture toward said path. A suction conduit is connected to said chamber. A compressor is connected between said suction conduit and a closed container and operable to such surplus oil-air mixture from said chamber and to deliver compressed air and oil to said container so as to form in said container a body of oil and a body of compressed air above said body of oil. An oil conduit is connected to said nozzles and to said container to communicate with said body of oil. A compressed air conduit is connected to said nozzles and to said container to communicate with said body of compressed air.

6 Claims, 1 Drawing Figure

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APPARATUS FOR OILING SHEET METAL STOCK

This invention relates to apparatus for oiling sheet metal stock in the form of strip, plate or sheet, which apparatus comprises a closed chamber, which is provided with a sealing inlet and a sealing outlet for the sheet metal stock, and a plurality of nozzles, which are disposed in the chamber and spaced apart transversely to the direction of travel of the sheet metal stock and connected to an oil conduit and a compressed air conduit and serve to blow an oil-air mixture onto the sheet metal stock, a suction conduit for the surplus oil-air mixture being provided and connecting the chamber to a suction device.

The buyers of sheet metal stock in the form of strip, plate or sheet impose rigid specifications as regards the oiling of such sheet metal stock because the surface should be provided with a lubricant film which is as uniform as possible. Known apparatus for oiling sheet metal stock in the form of strip, plate or sheet comprise dripping taps, nozzles or the like which are spaced apart transversely to the direction of travel of the sheet metal stock and supply the oil from above to the travelling stock. In these arrangements, the oil is applied to felt rollers, which engage the sheet metal stock. The rapid wear of the felt rollers is a great disadvantage of these arrangements and requires that the felt rollers must be frequently dressed and must be replaced after a certain lifetime. This results in high operating costs. Difficulties arise also in the control of the supply of oil and in the adjustment thereof in response to changes in the speed of travel. Owing to these difficulties, such apparatus have no longer been used in more recent plants.

In another known apparatus for oiling strip metal, the difficulties are avoided substantially in that the oil is sprayed to an applicator roll, which contacts the moving strip and is adapted to be driven in synchronism therewith. The spraying device is operated with intervals of time, which depend on the speed of the strip. The spraying period is constant so that oil in an amount which depends on the speed of travel of the metal strip is sprayed onto the applicator roll and transferred by the latter onto the strip. The applicator rolls of such apparatus consist again of felt rolls, which are not satisfactory, as has been mentioned. Besides, the atomization of the oil gives rise to difficulties and it has been attempted to avoid such difficulties by the use of injection pumps, such as are employed in engines of motor vehicles. Small air bubbles trapped in the oil result in an accumulation of air in the injection pumps so that the latter must be repeatedly vented.

All known apparatus which have been described hereinbefore have the disadvantage of involving a very high consumption of oil but failing to apply the oil to the metal strip as uniformly as desired.

Another apparatus has been disclosed, which comprises nozzles that are disposed in a closed chamber and blow an oil-air mixture onto the strip metal moving through the chamber and through inlet and outlet openings thereof. This results in an oil film which is as uniform as desired. The apparatus has the disadvantage that the resulting oil mist must be sucked from the chamber and the oil must be separated from the air by filter systems, which are expensive and complicated. Because the oil cannot be completely separated from the air, the air blown into the atmosphere still contains

a considerable proportion of oil so that the opening costs of the plant are much increased.

It is an object of the invention to eliminate these disadvantages and to provide for the oiling of sheet metal stock in the form of strip, plate or sheet an apparatus which ensures an application of a uniform oil layer to the sheet metal with simple means and without an excessively high consumption of oil and compressed air.

In an apparatus of the kind defined first hereinbefore, the above-mentioned object is accomplished by the invention essentially in that the suction device consists of a compressor, a pressure conduit is connected to the compressor and leads to a closed container, which is partly filled with oil, the oil conduit leading to the nozzles is connected to said container at a point below the oil level therein and the compressed air conduit leading to the nozzles is connected to the container above the oil level therein. Hence, the invention provides a substantially closed cycle, which enables a return of the sucked-off oil-air mixture into the container, which serves as an oil reservoir and a compressed air reservoir. The oil-air mixture which has been compressed in the compressor flows through the pressure conduit into the container, in which a major portion of the mixture is segregated and the oil can fill only part of the container. The pressure which is generated by the compressor is transmitted to the container above the oil level and forces the oil out of the container through the oil conduit leading to the nozzles, which are supplied with compressed air through the compressed air conduit from the container serving also as a compressed air reservoir. The nozzles blow the oil onto the surface of the sheet metal to form a uniform film thereon. The surplus oil-air mixture is discharged in the suction conduit. To ensure that a suitable supply of oil will be maintained in the container and that the oil blown onto the sheet metal stock will be replaced, a float is provided, which by means of a controller provides for an automatic control of the supply of fresh oil into the container.

Because a relatively low pressure is sufficient for the operation of the nozzles, the oil conduit and the compressed air conduit preferably incorporate respective pressure-reducing valves, by which the operating pressure can be adjusted independently of the compressor.

In another embodiment of the invention, a by-pass conduit incorporating a pressure relief valve is connected between the pressure conduit and the suction conduit and by-passes the compressor. When operating at a constant speed, the rate of air delivered by the compressor into the container may exceed the rate at which air is supplied from the container to the nozzles. This would result in an excessive pressure in the pressure conduit. When the pressure in the pressure conduit reaches a predetermined value, the pressure-relief valve in the by-pass conduit opens so that the compressor is short-circuited.

The accompanying drawing is a diagrammatic sectional view showing an embodiment of the invention by way of example.

A chamber 1 defined by two housing parts contains a plurality of nozzles 2, which are spaced apart transversely to the direction of travel of the strip metal 3 and disposed above and below the latter. The strip 3 extends through the chamber 1 and through a sealing inlet and a sealing outlet thereof and is moved by two pairs of rollers. One pair of rollers are designated 4 and

disposed behind the plane of the drawing. The other pair of rollers are disposed before the plane of the drawing. These feed rollers are adjustable in height for adjustment to sheet metal stock differing in thickness. A common oil conduit **5** and a common compressed air conduit **6** lead to the nozzles **2.** The oil conduit and the compressed air conduit incorporate respective pressure-reducing valves **7** so that the desired pressure for blowing an oil-air mixture onto the strip steel **3** can be adjusted independently of the compression by a compressor **8.**

A suction conduit **9** extends from the chamber **1** to the compressor **8,** which in the present example is an axial compressor. The compressor **8** is connected by a pressure conduit **10** to a container **11,** which is partly filled with oil. The pressure conduit **10** incorporates a check valve **12.** The container **11** serves as a compressed air reservoir and as an oil reservoir.

The surplus oil-air mixture is withdrawn from the chamber **1** through the suction conduit **9** by the compressor **8,** which is driven by a motor **13** and compresses the mixture and delivers it through the pressure conduit **10** to the container **11.** The oil which separates from the oil mist as it is compressed flows also through the pressure conduit **10** into the container **11.** The compressed air in the pressure zone **14** of the container **11** is maintained under a constant pressure because the oil level is automatically controlled by means of a float **15,** which operates an electric switch **17,** which by a controller, not shown, controls a valve **18** in an oil supply conduit. The oil supply conduit **16** is connected to an oil supply tank, to which a drain conduit **19** is connected, which serves to return the oil that has collected at the bottom of the chamber **1** during the operation of the oiling apparatus. Upon a drop of the oil level in the container **11,** the float **15,** the switch **17** and the control device cause the valve **18** to open so that fresh oil can flow from the supply tank through the conduit **16** into the container **11.** When the desired oil level has been reached, the valve **18** is closed to block the conduit **16.**

Owing to the operation of the compressor, a pressure of about 5–6 kg/cm² above atmospheric pressure is maintained in the pressure zone **14** and forces the oil through a fine filter **20** into the oil conduit **5.** The oil pressure desired for the operation of the nozzles can be adjusted by means of the pressure-reducing valve **7.** At the same time, compressed air is supplied from the pressure zone **14** through the compressed air conduit **6** and the adjustable pressure-reducing valve **7** to the nozzles **2.** The last-mentioned pressure-reducing valve **7** serves to reduce the air pressure to the desired operating pressure. The nozzles **2** result in a fine atomization of the oil and blow it onto the strip **3,** which is continuously moved through the chamber **1.** The operation of the nozzles results in the production of an oil mist at a rate which depends on the rate at which compressed air is supplied. By the axial compressor **8,** the surplus oil-air mixture is sucked off through the suction conduit **9** and compressed to about 5–6 kg/cm².

Operating at a constant speed, the compressor **8** delivers air into the pressure zone **14** of the container **11** at a rate which is higher than the rate at which air is supplied from the pressure zone through the conduit **6** to the nozzles **2.** This results in an excessive pressure in the pressure conduit **10.** When the pressure in the pressure conduit **10** has reached a predetermined value, a pressure relief valve **21** opens, which is incorporated in a by-pass conduit **22,** which by-passes the compressor **10** and is connected between the pressure conduit **10** and the suction conduit **9.** When the pressure relief valve **21** is open, the compressor **8** is short-circuited. It is desirable to maintain in the chamber a pressure which is slightly subatmospheric so that the oil mist cannot escape from the chamber **1,** e.g., at the joint between the two parts of the housing defining the chamber. The subatmospheric pressure produced by the compressor causes a small amount of fresh air to be sucked into the chamber **1** so that there will be no deficiency of air during the operation of the oiling apparatus.

It is apparent that the apparatus provided by the invention and serving to oil sheet metal products in the form of strip, plate or sheet can be operated with a minimum oil consumption and requires only a low power to produce the continuously circulating compressed air. Special requirements are not involved in the maintenance and control of the entire plant. For these reasons, the apparatus can fully accomplish the object underlying the invention.

What is claimed is:

1. Apparatus for oiling sheet metal stock, which comprises

chamber-defining means defining a chamber, a sealing inlet to said chamber, and a sealing outlet from said chamber,

stock-feeding means operable to feed sheet metal stock through said inlet, chamber, and outlet along a predetermined path,

a plurality of nozzles opening in said chamber and spaced apart transversely to said path and directed toward said path and operable to discharge an oil-air mixture toward said path,

a suction conduit connected to said chamber,

a container,

a compressor connected between said suction conduit and said container and operable to suck surplus oil-air mixture from said chamber and to deliver compressed air and oil to said container so as to form in said container a body of oil and a body of compressed air above said body of oil,

an oil conduit connected to said nozzles and to said container to communicate with said body of oil, and

a compressed air conduit connected to said nozzles and to said container to communicate with said body of compressed air.

2. Apparatus as set forth in claim **1,** in which said stock-feeding means are operable to feed sheet metal stock in strip form.

3. Apparatus as set forth in claim **1,** in which said stock-feeding means are operable to feed sheet metal stock in the form of discrete elements.

4. Apparatus as set forth in claim **1,** which comprises means for maintaining a predetermined level of oil in said container.

5. Apparatus as set forth in claim **1,** which comprises

a pressure-reducing valve incorporated in said oil conduit and

a pressure-reducing valve incorporated in said compressed air conduit.

6. Apparatus as set forth in claim **1,** which comprises

a by-pass conduit connected between said pressure conduit and said suction conduit to by-pass said compressor and

a pressure relief valve incorporated in said by-pass conduit.

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