Oct. 20, 1942. A. E. ROWLANDS ET AL 2,299,350

DRAWING COMPOUND APPLICATOR

Filed May 13, 1940 2 Sheets-Sheet 1

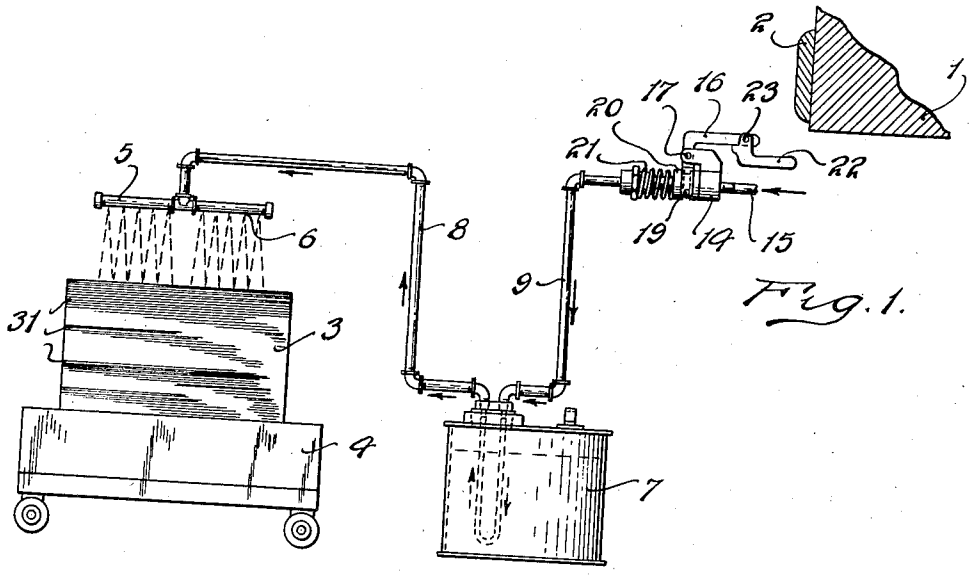


Fig. 1.

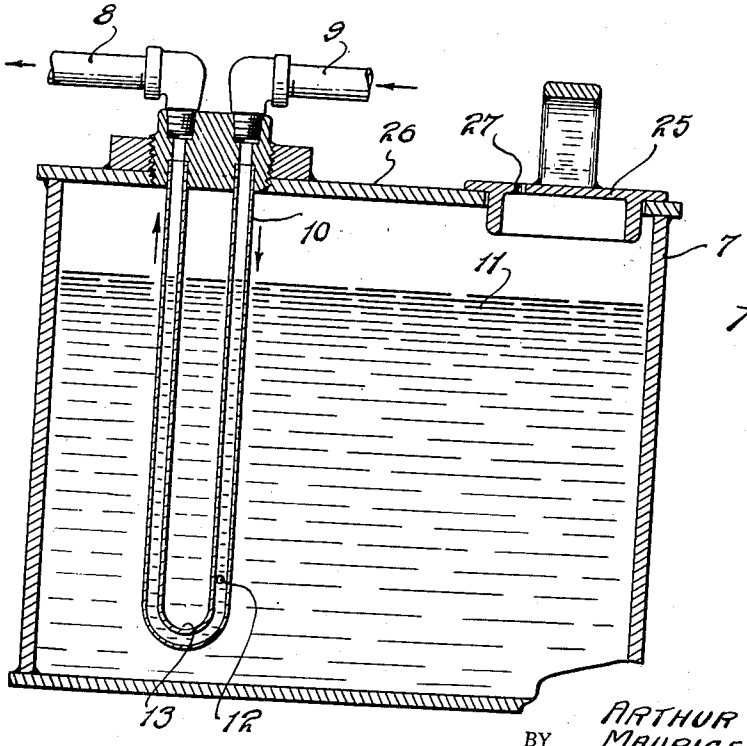


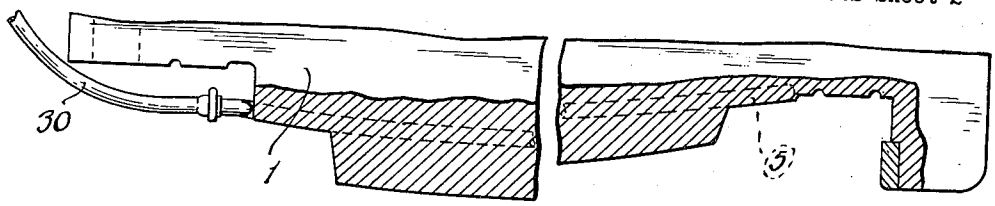
Fig. 2.

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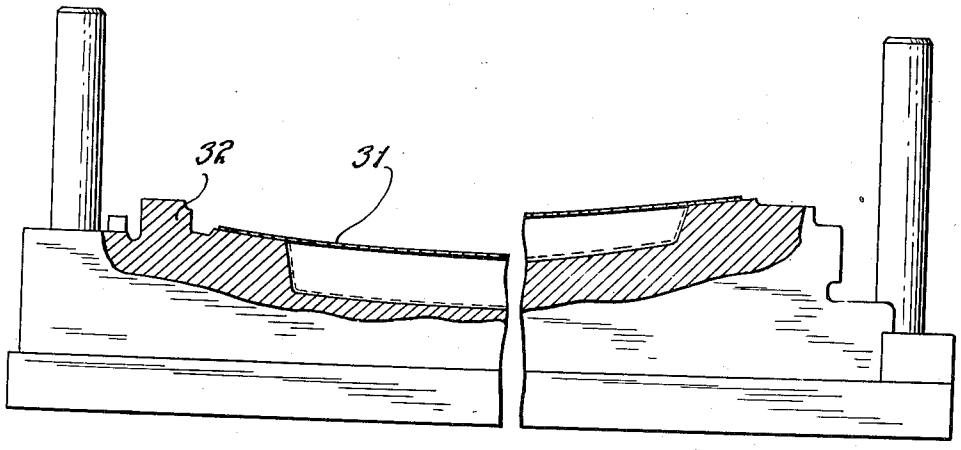


Fig. 3.

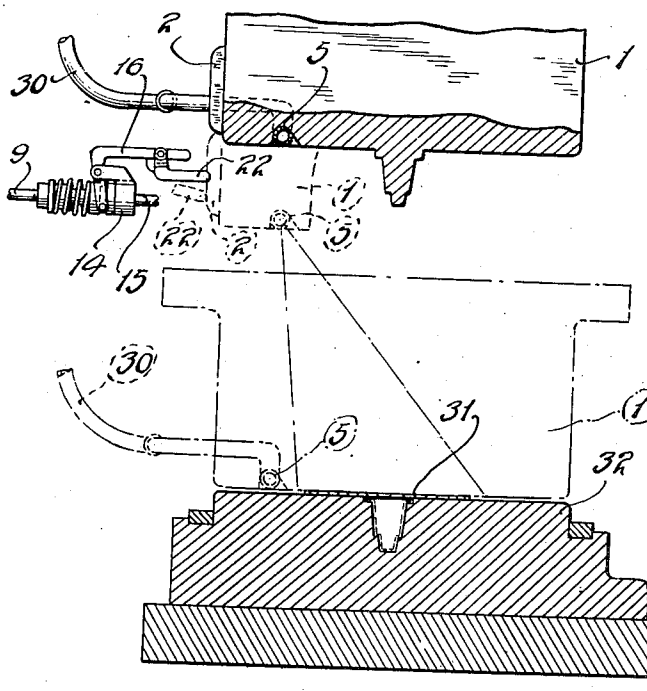


Fig. 4.

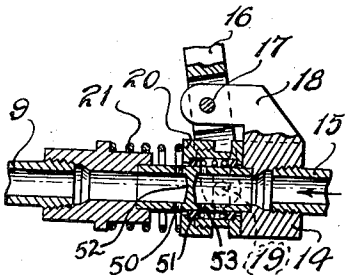


Fig. 5.

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DRAWING COMPOUND APPLICATOR

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Application May 13, 1940, Serial No. 334,934

7 Claims. (Cl. 91—45)

This invention relates to a drawing compound applicator for applying drawing compound to sheet metal stock preparatory to being pressed.

Heretofore it has been customary in drawing or pressing sheet metal to apply the drawing compound, which is usually oil or an emulsion of oil or some other lubricant, by hand after the sheet metal was inserted in the press preparatory to the pressing operation. The amount and the points at which the drawing compound was applied to the sheet metal was largely a matter of guess-work. Because of this large quantities of drawing compound were wasted and much sheet metal stock was wasted owing to breakage of the stock resulting from improper application of the drawing compound.

It is an object of this invention to produce a drawing compound applicator for sheet stock which effects considerable economies in the application of the drawing compound and which applies the drawing compound in the proper amount and in the locations on the sheet metal stock where it is needed to eliminate breakage of the stock.

In the drawings:

Fig. 1 is a view of the entire assembly for automatically applying drawing compound to the sheet stock.

Fig. 2 is a detail of the drawing compound supply tank.

Fig. 3 is a modified form of the invention showing in front elevation, partly in section, the drawing compound applicator mounted in the punch of the press.

Fig. 4 is a vertical section through the press and applicator shown in Fig. 3.

Fig. 5 is a section of valve 14.

Referring more particularly to the drawings there is shown one of the vertically reciprocating members of the press such as the punch or ram 1 which is provided with a cam 2. As shown, the punch 1 is about to move downwardly. The work consists of a stack 3 of sheet metal blanks 31 which are preferably mounted on a truck 4 adjacent the press so that the sheet metal blanks 31 can be removed one by one from the stack and placed in the press.

Since it is the object of this invention to properly apply drawing or lubricating compound to each sheet metal blank preparatory to being inserted in the press, to this end there is provided a spray nozzle 5 in the form of an elongated pipe having a plurality of perforations 6 located on the underside of the pipe. The number and location of the holes will depend upon over what area and into what places on each sheet of metal it is desired to apply the lubricant or drawing compound. The holes naturally will be positioned so that the drawing compound will be applied to the metal sheet where needed and in the amount required. The nozzle 5 preferably will be attached to the frame of the press in a position where the stack of metal sheets can be easily placed thereunder.

The drawing compound is supplied to the nozzle 5 from tank 7 by means of pipe line 8. Pipe line 8 is connected to an air line 9 by pipe line 10 which extends into the drawing compound 11. Pipe line 10 preferably, although not necessarily, is U shaped and is suspended vertically into the tank 7 so that it is connected at its upper ends with the air line 9 and drawing compound line 8 respectively. The air line 9 is connected with a suitable source of compressed air (not shown).

The pipe line 10 can be made from any suitable material such as metal tubing. As actually used the pipe line 10 consists of copper tubing having a diameter of $\frac{5}{16}$ of an inch. Line 10 is provided with an opening 12, the size and vertical location of which determines the amount of drawing compound supplied to the nozzle. In actual practice opening 12 is approximately $\frac{3}{32}$ of an inch in diameter and located about one inch above the bottom 13 of the tube 10. In the spray nozzle 5 the perforations 6 actually used are approximately $\frac{1}{16}$ of an inch in diameter. The pipe lines 8 and 9 are ¼ of an inch in diameter. The above dimensions are merely set forth by way of example and not for purposes of limitation. It is, of course, understood that these dimensions will vary depending upon the viscosity of the drawing compound used, the air pressure, the amount of drawing compound desired for each shot, and other conditions obtaining.

The air line 9 is provided with a valve 14 which shuts off line 9 from the compressed air supply line 15. The valve, as shown in Fig. 1, is closed so that line 15 is shut off from line 9. Valve 14 is of the one-way self-exhausting type so that when closed, as shown in Fig. 1, the compressed air is exhausted from line 9. For opening the valve there is provided a bell crank lever 16 pivoted as at 17 on a bracket 18. The bell crank lever is pivotally connected as at 19 with a movable part 20 of the valve which is backed up by a compression spring 21. An arm 22 is pivoted as at 23 on bell crank lever 16. The right hand end of the arm 22 projects into the path of cam 2 so that upon the down stroke of the ram 1, cam 2 strikes arm 22 thereby swinging

lever 16 clockwise to open the valve 14 and admit compressed air into pipe line 9. On the return or upstroke of the ram 1, cam 2 simply raises or swings arm 22 counterclockwise, thereby permitting the ram on its upstroke to pass by lever 16 without affecting or operating valve 14.

The operation of the device is as follows: When the ram 1 is in raised position and valve 14 is closed, line 9 is open to atmosphere through valve 14 and line 8 is open to atmosphere through perforations 6. The drawing compound or lubricant 11 flows into tube 10 through opening 12 until the drawing compound in tube 10 is at the same level as that in the tank 7. Cover 25 has a loose fit with the top 26 of the tank 7 and is also provided with an air vent 27 so that the drawing compound 11 is at atmospheric pressure. As the ram 1 moves downwardly on its downstroke, the came 2 acts through arm 22 and lever 16 to open valve 14 thereby permitting compressed air to flow from supply line 15, through line 9, tube 10 and line 8. Since the tube 10 contains a slug of drawing compound, the compressed air as it flows from line 9 forces the drawing compound out of line 10, through line 8 and thence out of the nozzle 5 on to the uppermost sheet of metal in stack 3. The valve 14, of course, is only open for an instant and as soon as cam 2 passes arm 22, valve 14 is instantly closed by spring 21 thereby opening line 9 to atmosphere and shutting off the supply line 15. At this time drawing compound again flows into tube 10 through opening 12.

Each time that valve 14 is open a small amount of compressed air enters the tank through opening 12. This is beneficial because it keeps the drawing compound well stirred up or emulsified. Since the punch 1 on its downstroke operates at exactly the same speed for each stroke, valve 14 is open the same length of time for each downstroke of the punch. The pressure in supply line 15 is practically constant. Because of this for any given position of opening 12, the same or a metered amount of drawing compound is withdrawn from the tank 7 and discharged through the nozzle 5 by each of the intermittent shots of compressed air. Where a lubricant having a low viscosity is used, as a general rule upon each shot of air, pipe line 8 and nozzle 5 will be practically cleared of lubricant. On the other hand where the drawing compound is relatively highly viscous so that it has the consistency of a heavy or thick emulsion or grease, then the pipe line 8 will remain practically filled with the drawing compound so that each additional shot of air forces a slug of drawing compound into pipe line 8 and a like amount of drawing compound will be discharged from nozzle 5. When working with a heavier or more viscous drawing compound, the valve 14 will have to be opened several times until pipe line 8 is filled with drawing compound. Upon the next opening of the valve 14 the drawing compound will be ejected from nozzle 5. Once the lubricating applicator is set in operation practically the same amount of drawing compound will be ejected on to the work each time the valve 14 is opened by cam 2.

Figs. 3 and 4 show a modified form of the invention which differs from the principal form only in that the outlet nozzle 5 is mounted directly in the punch 1. In such case the nozzle 5 is connected by a flexible hose line 30 with the pipe line 8 to permit reciprocation of the nozzle 5 with the punch 1. In this form of the invention the metal sheet or blank 31, which is positioned in the lower die 32 while the punch 1 is raised, is sprayed with the drawing compound or lubricant on the downstroke of the punch 1, as indicated in Fig. 4.

A detail sectional view of valve 14 is shown in Fig. 5. As shown in Fig. 5, air line 9 is exhausted to atmosphere through ports 50 and pressure air line 15 is closed by the sliding sleeve member 20 provided with the packing gland 51. Line 15 is shut off from line 9 by the wall 52. As shown in Fig. 5, air ports 53 are closed. When sleeve 20 is shifted leftward from the position shown in Fig. 5, by the downstroke of the ram 1 to bring packing gland 51 to the left of the ports 50, air passes from line 15 through ports 53 into sleeve 20 and thence through ports 50 into air line 9. The specific details of this valve are old and well known.

We claim:

1. An apparatus for metering and applying drawing compound to sheet metal stock or the like comprising in combination a nozzle adapted to be directed at the surface to be treated, a reservoir for the drawing compound, a conduit connecting the reservoir with the nozzle for conducting the drawing compound from the reservoir to the nozzle, said conduit having an opening within the reservoir and positioned below the level of the drawing compound whereby the drawing compound flows into the conduit through said opening, a source of compressed gas, a connection between said source and said conduit, a valve in said connection, means to open said valve when said drawing compound is in said conduit whereby the gas forces the drawing compound through the conduit and nozzle on to the work and means to close said valve whereby said drawing compound may again flow into said conduit.

2. An apparatus for applying a metered amount of drawing compound to sheet metal stock or the like comprising in combination a nozzle adapted to be directed at the surface to be treated, a reservoir for the drawing compound, a conduit extending into the reservoir having one end connected to the nozzle, said conduit within the reservoir having an opening below the level of the drawing compound whereby a quantity of drawing compound flows into the conduit through said opening, said quantity being determined by the hydraulic head of said drawing compound in said reservoir, a source of gas under pressure communicating with the other end of the conduit, a valve interposed between said source and said conduit, means to open said valve when said quantity of drawing compound is in said conduit whereby the gas under pressure is admitted into the conduit and the quantity of drawing compound is ejected out of the conduit through the nozzle on to the surface to be treated.

3. An apparatus for applying a predetermined quantity of drawing compound to sheet metal stock or the like comprising in combination a nozzle adapted to be directed at the surface to be treated, a reservoir for the drawing compound, a conduit one end of which communicates with said nozzle, and a source of gas under pressure connected to the other end of the conduit, a normally closed valve interposed between said source and said conduit, the said conduit having an approximately vertical portion between its ends extending downwardly into the drawing compound in the reservoir, said portion of the conduit having an opening below the level of the drawing compound in the reservoir whereby the drawing compound flows into the said portion of

the conduit until the level of drawing compound in the conduit equals the level of drawing compound in the reservoir when the compressed gas is shut off from the conduit, means for opening said valve and connecting the source of compressed gas with the conduit whereby the gas under pressure is admitted into the conduit and the drawing compound in the conduit is ejected through the nozzle and compressed gas flows through the opening into the drawing compound to agitate the same.

4. An apparatus for applying a predetermined quantity of drawing compound to sheet metal stock or the like comprising in combination a reservoir for the drawing compound, a source of gas under pressure, a conduit having a first end thereof operatively connected to said source, a normally closed valve interposed between said source and said first end of said conduit, the said conduit extending into said reservoir and being provided with an opening below the level of the drawing compound in the reservoir, a nozzle, said conduit having its second end connected to said nozzle and a portion of said conduit between said opening and said nozzle being above the level of drawing compound in the reservoir whereby the drawing compound flows into the said conduit when the compressed gas is shut off from the conduit, means for opening said valve and connecting the source of compressed gas with the conduit whereby the gas under pressure is admitted into the conduit and the drawing compound in the conduit is ejected through the nozzle.

5. An apparatus for spraying a metered quantity of liquid comprising in combination a nozzle, a reservoir for the liquid, a conduit connecting the reservoir with the nozzle for conducting the liquid from the reservoir to the nozzle, said conduit being provided with an opening within the reservoir and positioned below the level of the liquid compound whereby the liquid flows into the conduit through said opening, said nozzle being positioned at an elevation higher than the level of liquid within the reservoir, a source of compressed gas connected to said conduit on the opposite side of said opening from said nozzle, said conduit being continuous from said nozzle to said source of compressed gas, a valve in said conduit between said opening and said source of compressed gas, means to open said valve when said liquid is in said conduit whereby the gas forces the liquid through the conduit and nozzle and means to close said valve whereby said liquid may again flow into said conduit.

6. An apparatus for metering and applying drawing compound to sheet metal stock or the like, comprising in combination a nozzle adapted to be directed at the surface to be treated, a reservoir for the drawing compound, a source of compressed gas, a valve connected to said source, a U-tube having one end thereof connected to said nozzle and the other end thereof connected to said valve, and an intermediate portion immersed in said drawing compound, said conduit having an opening within the reservoir and positioned below the level of the drawing compound whereby the drawing compound flows into the conduit through said opening, means to open said valve when said drawing compound is in said conduit whereby the gas forces the drawing compound through the conduit and nozzle on to the work and gas escapes from said opening to agitate said drawing compound.

7. An apparatus for metering and applying drawing compound to sheet metal stock or the like comprising in combination a nozzle adapted to be directed at the surface to be treated, a reservoir, for the drawing compound, a conduit connecting the reservoir with the nozzle for conducting the drawing compound from the reservoir to the nozzle, said conduit being continually open to the atmosphere through said nozzle, said conduit having an opening within the reservoir and positioned below the level of the drawing compound whereby the drawing compound flows into the conduit through said opening, a source of compressed gas connected to said conduit, said conduit being continuous from said nozzle to said source of compressed gas, a valve in said conduit between said opening and said source of compressed gas, means to open said valve when said drawing compound is in said conduit whereby the gas forces the drawing compound through the conduit and nozzle on to the work and some of said gas escapes through said opening in said conduit to agitate said drawing compound and means to close said valve whereby said drawing compound may again flow into said conduit.

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