

Feb. 16, 1937.

S. O. HANNA

2,071,033

DEVICE TO PREVENT BUCKLING OF SHEET METAL DURING GRINDING OR POLISHING

Filed Aug. 15, 1936

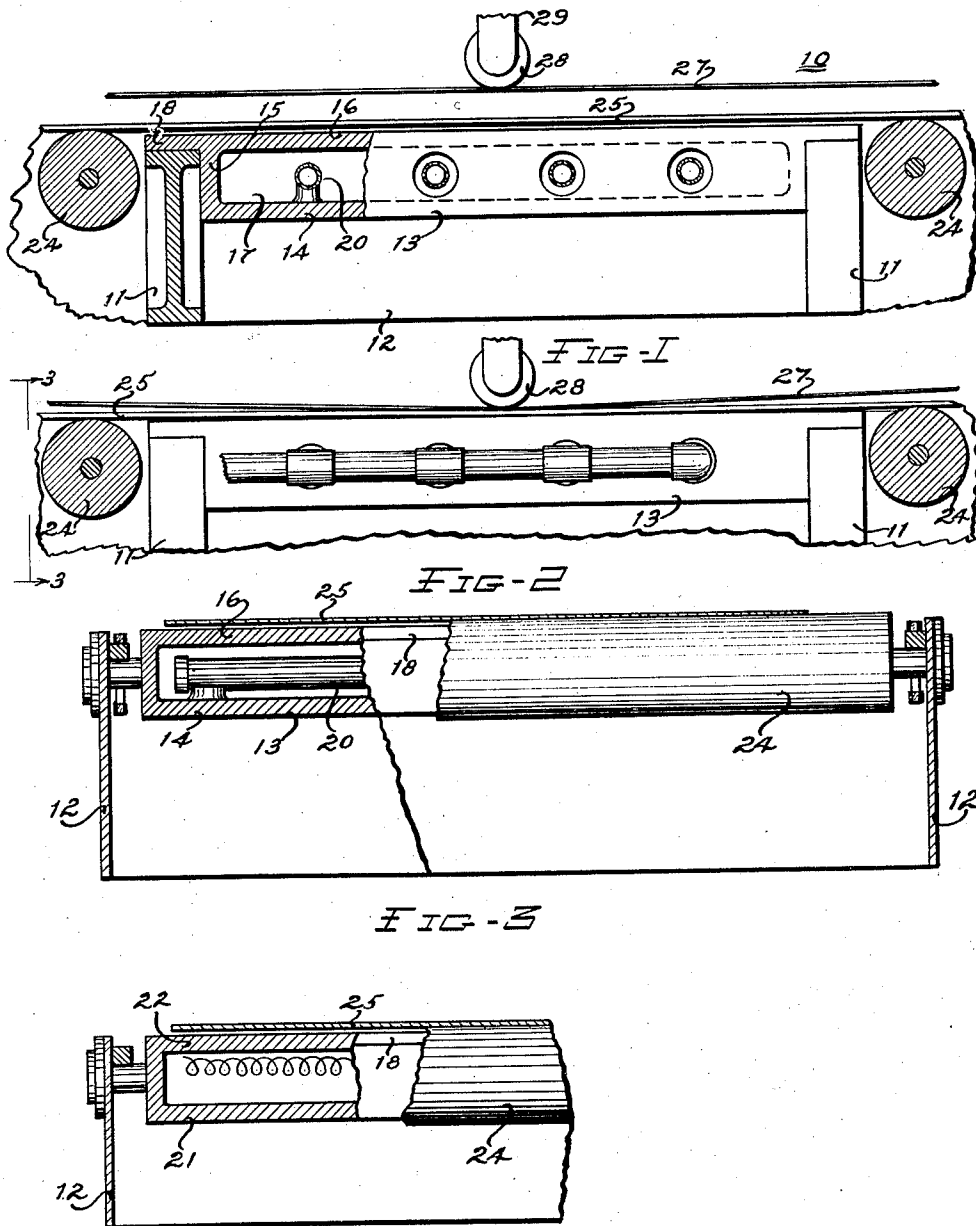


FIG-3

FIG-4

Inventor

Samuel Orr Hanna

By

Richmond S. Hayes
His Attorney

UNITED STATES PATENT OFFICE

2,071,033

DEVICE TO PREVENT BUCKLING OF
SHEET METAL DURING GRINDING
OR POLISHING

Samuel Orr Hanna, Jamestown, N. Y.

Application August 15, 1936, Serial No. 96,231

6 Claims. (Cl. 51—240)

This invention relates to a structure for preventing warping or buckling of a metal sheet during the process of polishing or grinding the surface thereof.

Due to the fact that metal sheets generally have some imperfections or spots in the surface as received from the rolling mill, it is necessary that they be ground or polished before said metal sheets can be used for most manufacturing purposes. Various types of abrading machines have been provided for the purpose of removing surface imperfections in metal sheets, but it has been found almost impossible, during the process of clearing a sheet of spots or other imperfections, to prevent warping or buckling taking place. In the process of grinding or polishing out surface imperfections, regardless of whatever abrasive means is employed, the sheet becomes quite hot in a given spot. Heat generated on one surface of a metal sheet and not on the other results in uneven expansion and contraction, and warping or buckling invariably results.

It is the purpose of the present invention to prevent a metal sheet from warping or buckling during the process of removing surface imperfections by heating or cooling that portion of the under surface of the sheet directly beneath the portion being worked upon. If the under surface of the sheet is to be heated, the temperature must somewhat approximate that generated on the upper surface so that little or no difference in the rate of expansion and contraction of both upper and lower surfaces at a given spot will take place. If the sheet is to be cooled, the spot directly beneath the abraded surface must be cooled to such an extent that heat generated on the upper surface will be so rapidly dissipated that a buckling or warping temperature is not produced by the abrasive means on the upper surface.

The preferred embodiment of the invention is directed to the provision of a structure applicable to an abrading machine which may be used to spot out imperfections in the surface of metal sheets and consists in providing a work table of suitable proportions for a given abrading machine bed. This work table is in the form of a closed receptacle, the top serving as a metal sheet supporting surface and the receptacle portion as a means for enclosing a heating or cooling unit. The top is heated or cooled to a temperature best suited to the particular metal sheet to be worked upon. Suitable means such as rollers, may be provided adjacent the ends of the table and serve to hold a metal sheet slightly above and out of contact with the top of said table. When the abrading means is applied to the upper surface of the sheet, the sheet is depressed to contact the table top, and the

under surface thereof is immediately affected by the temperature of the top at that point. Upon release of the abrading means, the metal sheet moves out of contact with the table top and is not, therefore, continuously affected by the temperature of said top.

The principal object of the invention lies in the provision of means adaptable for use with an abrading machine to prevent warping or buckling of a metal sheet during the process of grinding or polishing the surface thereof.

Another object of the invention lies in the provision of means for heating or cooling that portion of a metal sheet which is being ground or polished for the purpose of preventing warping or buckling.

Other and further objects of the invention will be more fully understood from a consideration of the following specification which is taken in conjunction with the accompanying drawing and in which.

Fig. 1 is a fragmentary side elevational view of an abrading machine fitted with one modification of the invention and showing a metal sheet positioned thereabove;

Fig. 2 is a view similar to Figure 1 showing an abrasive surface in contact with the surface of a metal sheet, the metal sheet in turn being depressed to contact the work supporting surface of the invention;

Fig. 3 is a vertical sectional view showing the invention mounted in an abrading machine bed; and

Fig. 4 is a fragmentary vertical sectional view of a modification of a temperature controlling unit provided therefore.

Referring to the drawing and more particularly to Figures 1 and 2 thereof, one modification of the invention is shown applied to an abrading machine generally indicated by the reference numeral 10. The machine, only a portion of which is shown, comprises a pair of spaced uprights shown in part at 11. Suitable rails 12 extend longitudinally of the machine and are secured, in any desired manner, to the uprights.

Between the uprights 11 is located a member 13 which, in one form of the invention, is provided with a receptacle portion consisting of a base wall 14 and upright walls 15. A top 16 cooperates with walls 15 and base 14 to form a closed compartment 17. The top 16 overhangs the walls 15 to provide flanges 18 which rest upon the uprights 11. Although the member 13 is shown to fit the space between uprights 11, this adaptation is not necessary and it will be understood that said member may be smaller than the spacing between uprights of a given abrading machine, the size depending on convenience of installation and the size of metal sheets to be handled.

Within the compartment 17 is located a unit 60

20 which, in the present modification, takes the form of a gas burner. When the burner is lighted, the flame therefrom is applied directly to the top 16. The height of the flame and the number of burners employed serves to control the temperature of the upper surface of the top 16 with which a metal sheet is adapted to contact. The compartment 17 may also be arranged with a continuous pipe which may be connected with a refrigerating unit for the purpose of cooling the compartment and the top 16. Another means of cooling the top 16 is by a constant flow of cool or cold water in the compartment 17, a suitable overflow being necessarily located beneath the top. Referring to Figure 4, it will be noted that an electrical heating unit is built into a member 21 which has a top or work supporting surface 22 corresponding to the top 16 of member 13. This modification, however, can only be used when it is desired to heat the top.

Adjacent opposite sides of the member 13 are rollers 24. These rollers are arranged to project slightly above the top 16 and support a sheet 25 slightly out of contact with said top. Above the top 16 is an abrading belt 27, mounted in any conventional manner and depressible into spot contact with sheet 25 by lowering a roller 28 through any suitable structural means 29 (shown only in part). It is to be understood that neither the belt 27 nor the roller 28, by which the belt is caused to contact the surface of sheet 25, forms a part of the invention inasmuch as any suitable abrasive belt and means for moving it into contact with the sheet may be substituted for the structure shown.

For a clearer understanding of the invention it is assumed that there are several imperfections in the sheet 25 and it is desired to remove them. The sheet is moved along rollers 24 until the imperfection is directly beneath roller 28. It is assumed that a gas or other heating unit has been turned on and the temperature of the top or work supporting surface 16 somewhat approximates the temperature likely to be produced by the abrading belt when applied to the sheet. The roller 28 is moved downwardly by actuating structure 29, causing the belt 27 to move into contact with the imperfection on the sheet 25. A certain amount of pressure of the abrading surface of the belt on the metal is necessary to properly remove the imperfection and the roller 28, therefore, depresses the belt 27 and the sheet 25 into contact with the working surface or top 16. At the place of contact of sheet 25 with the top 16, the under surface of the sheet will be instantly heated to approximately the same temperature as that of the top and the temperature on the upper surface of the sheet will have little or no variance with the heat of the under surface at this spot. Thus, buckling or warping cannot take place. As soon as the imperfection has been removed, roller 28 is raised, allowing belt 27 to move out of contact with the sheet 25 and the sheet in turn to straighten out of contact with the top 16. It will be understood that if the sheet 25 were in continuous contact with the heated top 16, it would be subjected to an uneven temperature on opposite surfaces and would warp and buckle. It is, therefore, essential that immediately abrading ceases, the sheet move out of contact with the top 16. As was heretofore mentioned, the member 13 is comparatively small

and, therefore, the span between rollers 24 is short. Thus, sheet 25 is necessarily slightly bowed to contact the top 16 and will immediately move out of contact therewith when roller 28 is raised.

Although applicant has shown and described only one type of unit for use with abrading machines to prevent warping or buckling of a metal sheet during the process of spotting out imperfections on the surface thereof, it will be understood by those skilled in the art that other modifications or adaptations of the invention may be made without departing from the spirit and scope of the invention as defined in the hereunto annexed claims.

Having thus set forth my invention what I claim as new and for which I desire protection by Letters Patent is:—

1. A structure for effecting a temperature change in a metal sheet, during application of an abrasive to the surface thereof, comprising a member having a metal sheet supporting top, means normally supporting a metal sheet out of contact with said top, and further means for producing a desired temperature in said top.

2. A structure for effecting a temperature change in a metal sheet, during application of an abrasive to the surface thereof, comprising a member having a hard surfaced top, means adjacent said top normally supporting a metal sheet out of contact therewith, and further means located in said member for producing a desired temperature in said top.

3. A structure for effecting a temperature change in a metal sheet, during application of an abrasive to the surface thereof, comprising a metal sheet supporting member, means supporting a metal sheet slightly out of contact with said member, a receptacle portion in said table, and means in said receptacle portion for producing a desired temperature in said member.

4. A structure for effecting a temperature change in a metal sheet, during application of an abrasive to the surface thereof, comprising a hard surfaced metal sheet supporting top, rollers adjacent opposite sides of said top, said rollers projecting slightly above said top and normally supporting a metal sheet out of contact therewith, and means for producing a desired temperature in said table.

5. A structure for effecting a temperature change in a metal sheet, during application of an abrasive to the surface thereof, comprising a table, a hard surfaced top on said table, means adjacent said table normally supporting a metal sheet out of contact therewith, a heating unit in said table, said unit being adapted to heat said top to a desired temperature.

6. A structure for effecting a temperature change in a metal sheet, during application of an abrasive to the surface thereof, comprising a table, a smooth surfaced top on said table, rollers adjacent opposite sides of said top, said rollers projecting slightly above the plane of said top and normally supporting a metal sheet out of contact therewith, a receptacle portion in said table and means in said portion for producing a desired temperature in said top, said metal sheet, during work thereon, contacting said top, whereby to effect a temperature change in said sheet at the place of contact.

SAMUEL ORR HANNA.

CERTIFICATE OF CORRECTION.

Patent No. 2,071,033.

February 16, 1937.

SAMUEL ORR HANNA.)

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 38, claim 3, for the word "table" read member; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of March, A. D. 1937.

Henry Van Arsdale
Acting Commissioner of Patents.

(Seal)