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DECORATING METALLIC SURFACES

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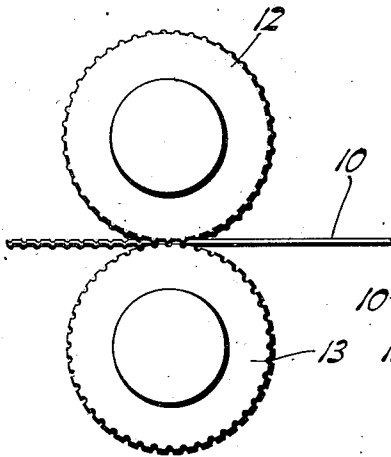


Fig. 1.

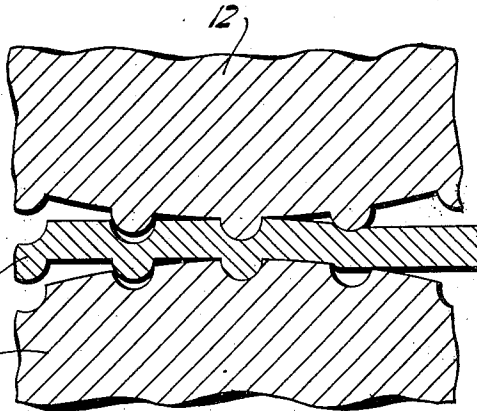


Fig. 2.

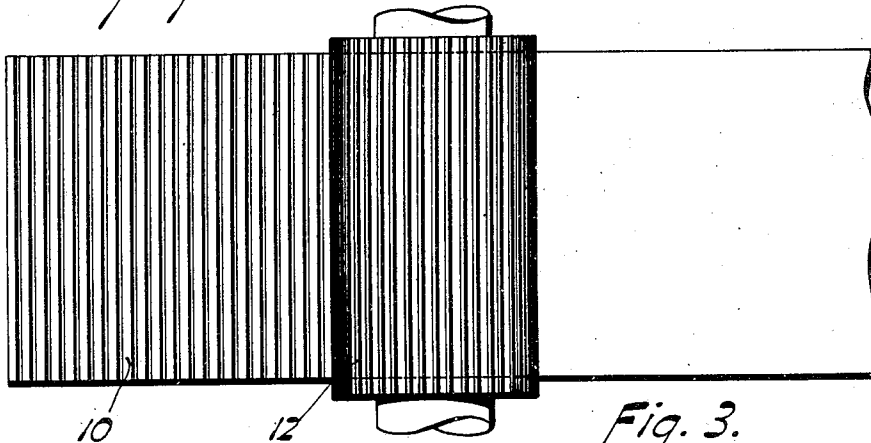


Fig. 3.

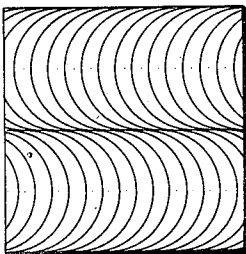


Fig. 4.

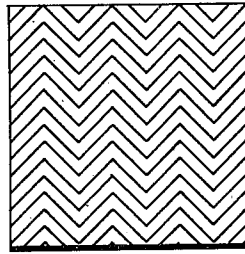


Fig. 5.

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DECORATING METALLIC SURFACES

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5 Claims. (Cl. 29—18)

This invention relates to the art of forming, finishing and decorating metallic surfaces, and more particularly to the finishing and decorating of stainless steel surfaces.

The decorative possibilities of metallic surfaces have long attracted the attention of architects, decorators and workers in metallurgical industry. Particularly interesting is the decorating of metals which are not attacked, or are attacked only to a limited extent, by atmospheric and other influences. Among the most important of such metals are those alloys of nickel and chromium and iron, or chromium and iron, with or without other alloying elements, which are known commercially as stainless steels. This material is capable of a high luster, and as such is admirably suited for decorative purposes.

Hitherto, the cost of preparing and decorating such surfaces has been relatively high, which has limited to a great extent their commercial application. In one method strips of adhesive tape are placed on selected areas of a surface to be decorated, and then the uncovered portion of the surface treated to alter its appearance, such as by abrading, etching or polishing. In this and other methods of preparing such surfaces for decorative purposes, the polishing operation consists in successive grindings by successively finer grits in order to remove the imperfections imposed by the previous grits, followed by a buffing step. For example, one of the most usual procedures is to polish first with coarse grit, then with 100 grit material and grease, then with 120 grit and grease and then with 150 grit and grease, and finally buff. This procedure, with its multiplicity of steps, is both expensive and time consuming. Furthermore, the methods previously used for preparing the decorative surfaces preclude the use of many types of designs desirable for the decoration or finishing of buildings or structures, except by what amounts to a hand operation.

It is an object of this invention to provide a method of preparing and decorating metallic surfaces which requires a relatively small number of simple steps of operation and which is relatively inexpensive to practice. Other objects will appear hereinafter.

It is another object to provide such a method which can be used to produce a great variety of designs and design types.

In the drawing:

Fig. 1 is a side view of a pair of embossing rollers with a metal sheet passing therethrough;

Fig. 2 is an enlarged view of a portion of Fig. 1;

Fig. 3 is a view taken along the line 3—3 of Fig. 1;

Figs. 4 and 5 are plan views of other types of decorative designs obtainable according to this invention.

According to the invention, we first form a continuous strip of stainless steel by hot rolling an ingot in successive conversion steps in a continuous strip mill, in well-known fashion, to a gauge at least 50% in excess of the required finished gauge, and preferably approximately 400% in excess of the required finished gauge. The strip thus formed is then cold rolled, in well-known fashion, to the required finished gauge. The amount of cold-rolling employed is greatly in excess of that employed in the older process of forming discontinuous sheets. As a consequence, it has been found, in accordance with this invention, that the continuous strips thus formed have several advantages over the discontinuous sheets formed by the older processes of hot rolling steel. The most important of these advantages is that the discontinuous sheets require that surface imperfections be ground down. This grinding, which is with a rather coarse abrasive at this stage, necessarily creates minute sharp projections and depressions, which must later be removed. With continuous strips, on the other hand, due to the great amount of cold rolling subsequently employed, most imperfections are eliminated. As a result, any surface imperfections are not of sufficient magnitude to necessitate grinding down at this time and are not sharp.

After annealing the hot strip in well-known fashion, it is pickled in sulfuric acid or other suitable pickling solution, also in well-known fashion. The strip is then reduced in gauge by cold rolling in a number of successive steps to the required finished gauge, in well-known fashion, with annealing and pickling between the cold rolling steps. At this point the strip exhibits an unpolished finish.

Heretofore, it has been thought necessary to subject either continuous strips or discontinuous sheets to a series of polishing operations with abrasives, which consist of successively finer abrasive grits. The first operation has been with a relatively coarse grit. The second operation served to remove the sharp points and depressions formed by the first operation and was accomplished with a finer grit such as 100 grit. The third operation was with, say, 120

grit and the fourth operation with 150 grit. This produced what is known as No. 4 or satin finish. Each operation would be performed by passing a sheet under a polishing wheel or belt. The sheet would be placed on a table, which would reciprocate back and forth underneath the polishing wheel or belt one or more times. The same operation would have to be repeated with the successively finer grits on different machines. After buffing the polished strips, a smooth mirror-like finish was produced.

In accordance with the present invention, it has been found that a plurality of polishing operations is not necessary, in view of the fact that, because of the subsequent decorating operation, an absolutely true flat surface is not required. Such decoration breaks up a mirror-like surface so that imperfections are not apparent and at the same time a sufficiently bright, highly polished surface is obtainable. Instead of the plurality of operations referred to hereinbefore, a single polishing step only is necessary. However, such a polishing step must be applied to a surface which has not previously been ground. Hence arises the importance of using as the initial material, as pointed out above, strips formed on a continuous mill rather than sheets formed by discontinuous processes.

This single polishing operation is performed on a belt or roll polishing machine of well-known form, with 150 grit or finer. It can be performed either on continuous strips or after the strips are cut up into shorter sheets. As extra precautions are necessary to guard against marring when the polished strips are wound up into rolls, it is preferred to first cut the strips into sheets.

After polishing, the strip or sheet may then be buffed, if desired, which operation is performed in well-known fashion. This buffing operation is necessary only when a high luster is desired.

The strip or sheet is then ready for the decorating step. This is performed by passing between a pair of engraved rollers. As with the polishing step, this is preferably performed upon sheets cut from the strip, although it is possible to perform it upon the continuous strip.

One roller of a pair is engraved with the required design, and is for convenience called the male roller. The other roller is engraved with a design opposite thereto and is called the female roller. In the drawings, a sheet of stainless steel 10, which has been formed and polished as described above, is shown passing between an upper or male roller 12 and the lower or female roller 13. The roller 12 is provided with an engraved surface which serves to impress into the strip the required design by means of an embossing action. The rollers are positively driven at the same rate of surface speed, and serve to draw the sheet 10 therethrough once the latter has been fed between the rollers. In order to secure a suitably defined design, the pressure which the rollers exert on the strip depends of course on

the nature of the design, and the depth to which the impression is desired to extend. The distance between the rollers and the pressure exerted thereby can be regulated by suitable adjusting means.

It is apparent that a great variety of designs may be produced by this method. It is not necessary that the design be in a straight line, or symmetrical, or have any other limitation. The designs so embossed on the sheets or strips may be such as to conform to, coincide with, or complement the lines or symmetry of building or part thereof or article of furniture or other object desired to be protected or decorated. Stainless steel strips or sheets according to the present invention are much less expensive to maintain than the heretofore known highly polished satin finish sheets, in that they do not show discoloration or finger marks as is the case with the heretofore mirror polished surfaces.

We claim:

1. The method of forming decorated metallic surfaces comprising hot rolling a stainless steel ingot in a continuous mill to form a strip, subjecting to a single polishing operation, and embossing by pressure between rollers engraved complementarily with a required design.

2. The method of forming decorated metallic surfaces comprising hot rolling a stainless steel ingot in a continuous mill to form a strip, annealing and pickling, cold rolling to the required gauge, subjecting to a single polishing operation, and embossing by pressure between rollers engraved complementarily with a required design.

3. The method of forming decorated metallic surfaces comprising hot rolling to a gauge at least 50% in excess of finished gauge a stainless steel ingot in a continuous mill to form a strip, cold rolling to the required gauge, subjecting to a single polishing operation, and embossing by pressure between rollers engraved complementarily with a required design.

4. The method of forming decorated metallic surfaces comprising hot rolling to a gauge at least 50% in excess of finished gauge a stainless steel ingot in a continuous mill to form a strip, cold rolling to the required gauge, cutting into sheets, subjecting said sheets to a single polishing operation, buffing said sheets, and embossing said sheets by pressure between rollers engraved complementarily with a required design.

5. The method of forming decorated stainless steel surfaces comprising hot rolling to a gauge approximately 400% in excess of finished gauge a stainless steel ingot in a continuous mill to form a strip, cold rolling to the required gauge, cutting into sheets, subjecting said sheets to a single polishing operation, buffing said sheets, and embossing said sheets by pressure between rollers engraved complementarily with a required design.

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