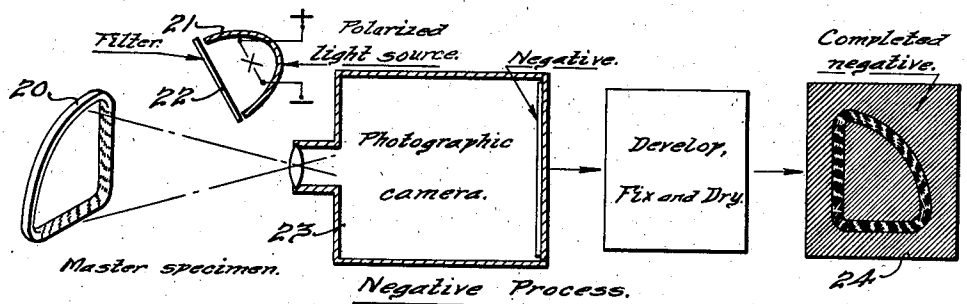
May 28, 1940. H. J. PATTISON 2,202,464

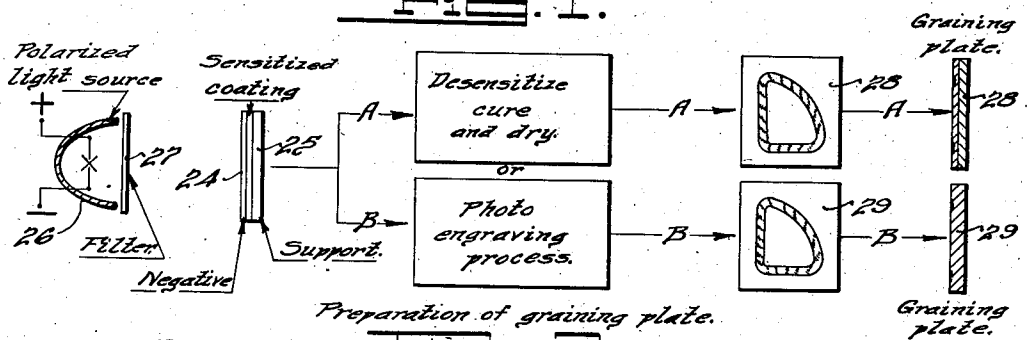
PROCESS FOR GRAINING SURFACES OF IRREGULARLY SHAPED OBJECTS

Filed Nov. 4, 1937



Negative Process.

FIG. 1.



Preparation of graining plate.

FIG. 2.

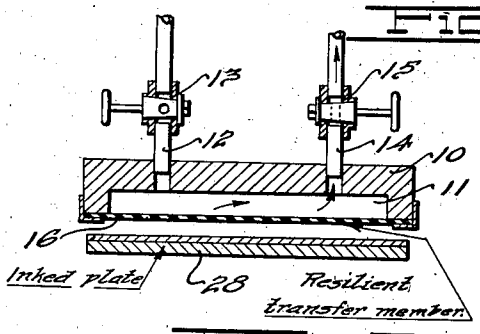


FIG. 3.

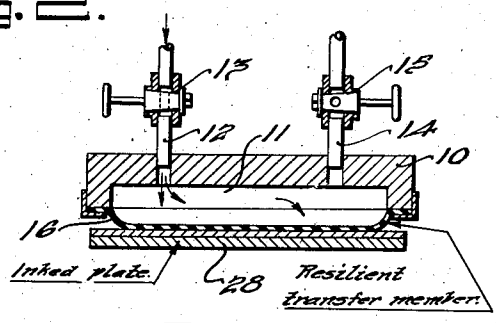


FIG. 4.

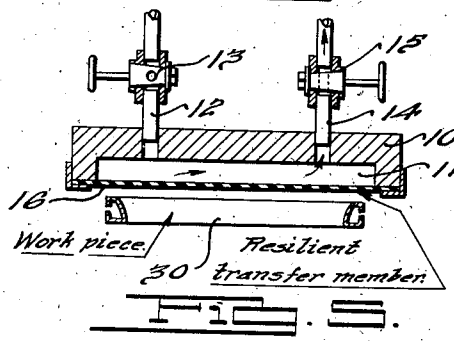


FIG. 5.

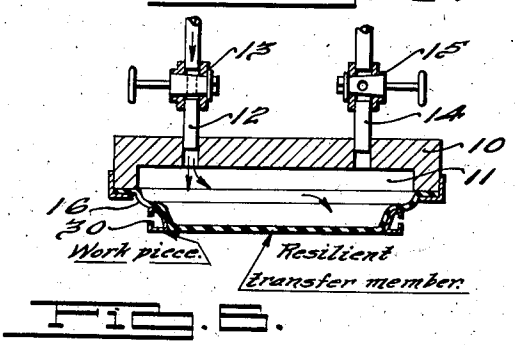


FIG. 6.

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2,202,464

UNITED STATES PATENT OFFICE

2,202,464

PROCESS FOR GRAINING SURFACES OF IRREGULARLY SHAPED OBJECTS

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Application November 4, 1937, Serial No. 172,823

5 Claims. (Cl. 101—426)

The present invention relates to improvements in a process for graining curved surfaces such as those of irregularly shaped objects or articles such, for example, as trim moldings used in the construction of motor vehicle bodies.

The invention pertains in general to the art of ornamenting metal surfaces to simulate the appearance of a wood grained surface. According to the known methods in this art the surface of an irregularly shaped object or article could be grained by printing the grain pattern on the object employing offset methods of printing or lithographing technique. By the offset method the grain pattern of a master specimen of wood was reproduced usually by photographic methods on a plate which is known in the art as a "graining plate". These plates are of various types and known in the art as surface printing plates, intaglio plates, engraved plates, callotype plates and the like. The design of the grain pattern to be reproduced was formed on these plates, the plates were inked and the transfer of ink to the surfaces of the irregularly shaped article was accomplished by the use of elastic transfer rollers which picked up the inked grain pattern from the graining plate and transferred the pattern to the surface of the irregularly shaped object. In a particular instance this method when applied to the graining of a window trim molding of irregular shape and curved cross section required four separate hand operations in addition to a machine operation in order to ornament the entire exposed surface of the molding. This method of applying grain pattern to such a molding resulted in the formation of more or less straight "match" lines which indicated the places where the separate operations were performed and indicated breaks in the otherwise more or less continuous grain pattern.

One difficulty inherent in conventional processes has been that the graining plates have been formed as a plane surface upon which the pattern of the master specimen has been reproduced. When applying the grain pattern from the graining plate it has heretofore been necessary to take a plurality of separate impressions from the plate onto the transfer rolls and to transfer the separate impressions to the surface to be grained in such a manner as to avoid the appearance of "end grain" on the completed surface.

In the graining of the surfaces of certain irregularly shaped objects a large number of special applicators also has been required. This has added to the cost of equipment for use with the process as well as to the expense in actually carrying out the graining operation.

Therefore, it is a principal object of the present invention to provide an improved method of ornamenting objects having curved surfaces, and particularly the surfaces of irregularly shaped objects or articles by the transfer of an unbroken pattern from the graining plate to the surface of the object to be grained.

It is a further object of the present invention to provide an improved method of ornamenting the surfaces of irregularly shaped objects in a single operation and in which the entire ornamental pattern is applied at one time.

It is a further object of the present invention to provide an improved method of ornamenting the surfaces of irregularly shaped objects by the transference of the ornamental pattern in a single transfer operation and in which provision is made for the automatic regulation of the pressure exerted by the transfer member on the graining plate and on the surface of the object to be ornamented.

Other objects and advantages of the invention will appear in the following description and appended claims, reference being had to the accompanying drawing forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is a diagrammatic view illustrating the steps of the improved process herein disclosed in making a negative of the master specimen.

Fig. 2 is a diagrammatic view showing the steps in the manufacture of a graining plate from the negative made in accordance with the process illustrated in Fig. 1.

Figs. 3, 4, 5 and 6 are diagrammatic views showing the steps in the transfer of the image from the graining plate to the surface of the irregularly shaped object according to the method of the present invention.

Before explaining in detail the present invention, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention claimed herein beyond the requirements of the prior art.

The present method includes in general the

steps of providing a master specimen of the same size and shape of the irregularly shaped object to be ornamented and providing on the surfaces of the master specimen the desired type of ornamentation which is to be reproduced on the surfaces of the irregularly shaped object. In the particular instance hereinafter to be disclosed, by way of example, the surface ornamentation is a grain pattern simulating the appearance of a wood grain. The master specimen in the preferred example is formed of wood having the desired grain pattern extending in the desired manner around the surfaces of the master specimen. The graining plate is formed by any desired photographic process in such a manner as to provide an inked pattern which corresponds to the shape of the master copy. The graining plate is not completely covered with the grained pattern as in conventional processes but only reproduces the grain pattern in accordance with the grain pattern appearing on the master specimen. The grain pattern is transferred from the graining plate in one operation and as a single unitary pattern directly to the surface of the irregularly shaped object which is to be ornamented. Any suitable method of transfer is within the scope of the present invention but a preferred method is that shown in Figs. 3, 4, 5 and 6, which method is also disclosed in my co-pending application 172,822.

The disclosure of the method of the present invention will proceed with reference to the accompanying diagrammatic drawing showing a preferred embodiment of the invention in reproducing on a motor vehicle window trim molding a continuous grain pattern simulating the appearance of a wood surface. It is to be understood, however, that the invention also may be applied to the graining of the surfaces of other irregularly shaped objects such, for example, as an instrument panel, windshield molding or other objects and that the invention is also applicable to the formation of any desired type of surface ornamentation in accordance with the method which will be hereinafter more fully disclosed.

According to the process of the present invention I provide a master specimen **20** which as shown in Fig. 1 is preferably formed of the material having the desired grain or other ornamental pattern on the surface thereof. The master specimen **20** may, however, be formed as of metal or the like and thereafter veneered or ornamented by known hand methods of ornamentation. The master specimen **20** is lighted by polarized light from a source of polarized light as for example an electric arc light **21** having a filter **22**. An exposure is made in a photographic camera **23** to form a negative which is thereafter developed, fixed and dried to produce the completed negative **24** on which appears the outline of the master specimen and the surface ornamentation thereof. Inasmuch as this is a negative record the dark lines of the surface outline appear as light lines and the dark portions of the ornamental pattern appear as light lines on the negative. The negative **24** is then used in accordance with the steps illustrated in Fig. 2 to form the desired graining plates. As shown in Fig. 2, the negative **24** is placed in contact with a sensitized plate **25** and an exposure is made with any desired type of light or heat rays, such for example as light from a source of polarized light which may comprise the electric arc light **26** and a filter **27**. After the exposure of the sensitized plate **25** has been made the plate may be desensitized, cured and dried in accordance with a conventional process indicated by the line A in which instance a graining plate **28** is produced which, as shown in a diagrammatic section outline, has a regular plane surface which, however, is adapted to absorb ink in accordance with variations of the hardness of the previously sensitized coating. If desired the exposed plate **25** may be treated in accordance with conventional methods as indicated by the line B to form a photoengraved graining plate **29** which, as shown in cross section, has surface irregularities corresponding to the image produced thereon. Other methods are known for forming a graining plate from a photographic negative and any of such methods may be used to provide the desired type of graining plate. Since, however, in accordance with the present invention, the photographic negative contains only the image of the master specimen and the surface ornamentation appearing thereon, it is apparent that the graining plate will reproduce in the inked pattern only the outline of the master specimen and the surface ornamentation appearing thereon.

The graining plate is inked and is then ready for use in the process to effect the transfer of the pattern to the surface of the irregularly shaped object as shown diagrammatically in Figs. 3, 4, 5 and 6. Other methods of transferring the image from the graining plate to the surface of the irregularly shaped object also may be employed within the scope of the present invention. By the preferred method shown by way of example in Figs. 3, 4, 5 and 6, these methods comprise in general the steps of transferring the image from the graining plate to the expanded surface of an inflated transfer member, the deflation of the transfer member and contraction of the surface carrying the inked image, the placing of the surface to be ornamented adjacent the deflated transfer member, the subsequent inflation of the transfer member and expansion of its surface to bring the inked pattern in contact with the surface of the irregularly shaped object to be ornamented until the image is transferred from the transfer member to the surface to be ornamented. After transfer has been effected the transfer member is deflated and may thereafter be cleaned and re-inked by a further contact with the surface of the graining plate.

The foregoing steps of the preferred transfer method are illustrated in greater detail in a diagrammatic drawing of Figs. 3, 4, 5 and 6 in which **10** designates in all of the views a rigid member hereinafter referred to as a platen. The platen **10** is preferably stationary and formed of a suitable material to provide an interior chamber **11** which may be of any desired size and shape. The size and shape of the chamber **11** may be varied to adapt the platen for use in the various fields where the invention is to be applied. An inlet duct **12** communicates with the interior of the chamber **11** and is provided with a valve **13** of any desired type which controls the supply of the inflating medium to the chamber. An exhaust duct **14** communicates with the interior of the chamber **11** and is provided with a valve **15** of any desired type to control the discharge of the inflating medium from the chamber.

A resilient transfer member **16**, preferably in the form of a thin sheet of resilient rubber of the type heretofore used in forming rubber dams in dental work, is secured on its marginal edge portions to the platen **10** and extends across the open face of the chamber **11**. Other materials

than the rubber above referred to may be used to form the member 16 in accordance with the present invention as long as such materials (1) have a surface capable of picking up the inked image from the plate or roller; (2) are substantially fluid tight; (3) are readily flexible to conform to surface variations; and (4) are resilient. Various types of natural or artificial rubber sheets are the generally preferred materials for this purpose.

The member 16 is arranged so that upon its inflation by the admission of a fluid under pressure to the chamber 11 the member 16 is distended and its surface is extended and pressed in contact with a surface immediately adjacent thereto. Upon release of the fluid pressure, the resiliency of the member 16 causes it to break the contact with the adjacent surface and to return immediately to its normal position. This manner of breaking contact with the adjacent surface is important as it insures a clean transfer of the inked image to the transfer member 16 in one instance and the clean transfer of the inked image to the surface of the work piece in the other instance. Both transfers are accomplished without impairment of the inked image due to blurring frequently caused in commercial processes by a slippage of the transfer surface relative to the surface of the inking plate or roller or relative to the surface of the work piece.

Inflation and deflation of the transfer member 16 is caused by a fluid under pressure in the chamber 11. Such a fluid in the preferred embodiment here shown is compressed air but any suitable type of fluid or gas under pressure may be used. The pressure exerted by such fluid on the member 16 is substantially uniform at all points and this insures the accurate transfer of the inked image. The pressure on the member 16 during the process is regulated by the valve 13 which controls both the amount of fluid admitted to the chamber 11 and the rate of its admission. Deflation of the member 16 is accomplished by venting the fluid from the chamber 11 through the conduit 14 and the valve 15 which controls the rate of discharge of the fluid as well as the amount of fluid so discharged. In the case where air is used as the fluid, the duct 14 vents the air to the atmosphere. Where some other fluid or gas is employed, the duct 14 may return the material to a supply tank or reservoir.

The operation of a method embodying the present invention is as follows: The resilient transfer member 16 is placed adjacent the surface of an inked graining plate 28 and is inflated as shown in Fig. 4 by opening the valve 13 to admit fluid under pressure to the chamber 11 and closing the valve 15. This expands the surface of the member 16 in the direction of the inked plate 28 and continued inflation of the member 16 causes the surface of the member 16 to come in intimate contact with the inked surface of the plate 28 and to pick up therefrom the inked image to be transferred to the surface of the irregularly shaped object. The fluid pressure in the chamber 11 is controlled in such a manner as to exert any desired amount of pressure on the member 16 after it has been placed in contact with the inked surface of the plate 28. When the transfer of the inked image to the surface of the transfer member 16 is completed, the valve 13 is closed and the valve 15 is opened and the pressure of the fluid in the chamber 11 is released. This causes deflation of the member 16 and its return to the normal position as shown in Fig. 3. If desired, the deflation of the member 16 may be accelerated by connection of the duct 14 with a vacuum line.

After deflation of the member 16 the surface of the work piece 30 to which the ink pattern is to be transferred is placed adjacent the contracted surface of the member 16. The valve 13 is opened, the valve 15 is closed and the member 16 is again inflated as previously disclosed as shown in Fig. 6. This causes the member 16 to contact the surface of the work piece 30 and to conform readily to the shape thereof. This condition is maintained until the inked image is transferred from the surface of the transfer member 16 to the surface of the work piece. The pressure of the fluid in the chamber 11 is released and the member 16 is drawn away from the surface of the work piece leaving the inked image or pattern printed thereon.

The surface of the member 16 is then cleaned in any suitable manner and is re-inked for subsequent operations.

In effecting the transfer of the entire ornamental pattern for the surface of the irregularly shaped object as herein disclosed, it will be apparent that suitable provision must be made as by a jig or other fixture to secure proper registration of the transferred image onto the surface of the irregularly shaped work piece. Such devices are known commercially to those skilled in the art and may be of any desired type to accomplish the desired objective.

It will be apparent that the contour of the surface of the irregularly shaped object may be such as to cause a distortion of the image in the photographic negative. The distortion of the image in the photographic negative will be reproduced on the graining plate and will be transferred by the transfer member to the surface of the irregularly shaped object which is to be ornamented. In certain instances particularly in the ornamentation of convex surfaces it will be found that this distortion of the image is not objectionable as it creates an optical illusion which adds to the reality of the transfer pattern. In other instances, however, this distortion of the image is objectionable but may be overcome in the formation of the negative by methods known to those skilled in the photographic art as for example by particular placement of the master specimen, particular lighting of the specimen and particular placement of the camera relative to the specimen so as to compensate for the distortion which might otherwise appear on the negative and be transferred to the object to be ornamented.

While the present invention has been disclosed in a preferred embodiment in which an inflatable resilient transfer member is utilized, it is to be understood that the transfer may be effected by conventional methods within the scope of the present invention and I do not desire to be limited by the present disclosure to any particular method of transferring the inked image from the graining plate to the work piece.

I claim:

1. In the method of ornamenting objects having curved surfaces, the novel step of providing a master pattern of the object having the desired ornamentation on the surface thereof, reproducing the entire pattern and ornamentation on a graining plate by photographic methods, inking the graining plate and transferring in one operation the inked impression of the entire pattern and ornamentation from the graining plate to

the surface of an object having such curved surfaces and corresponding in size and shape to said master pattern.

2. In the method of ornamenting the surface of objects having curved surfaces, the novel step of providing a master pattern of said object having the desired ornamentation on the surface thereof, reproducing the entire pattern and ornamentation on a graining plate by photographic methods, inking the graining plate and transferring in a single operation the inked impression from the graining plate to the surface of the object by offset printing methods utilizing an elastic transfer member.

3. In the method of ornamenting the surface of objects having irregular surfaces, the novel step of providing a master pattern of the object having the desired ornamentation on the surface thereof, reproducing the pattern and ornamentation on a graining plate by photographic methods, inking the graining plate and transferring in a single operation the entire inked impression from the graining plate to the surface of said object by offset printing methods utilizing an elastic transfer member and regulating the pressures exerted by the transfer member on the graining plate and on the irregular surfaces of the object.

4. In the method of ornamenting the irregular surfaces of an object, the novel step of providing a master pattern of the object having the desired ornamentation on the surface thereof, reproducing the entire pattern and ornamentation on a graining plate by photographic methods, inking the graining plate and transferring in a single transfer operation the entire inked impression from the graining plate to the irregular surfaces of the object by offset printing methods by inflation of an elastic transfer member having the inked pattern thereon to bring said member in printing contact with the surface to be ornamented.

5. In the method of ornamenting objects having curved surfaces, the novel step of providing a master pattern of the object having the desired ornamentation on the surface thereof, reproducing the entire pattern and ornamentation on a graining plate by photographic methods, inking the graining plate and transferring the entire unbroken inked impression in a single transfer operation from the graining plate to the curved surface or surfaces of the object by offset printing methods by inflation of an elastic transfer member having the inked pattern thereon to bring said member in printing contact with the surface to be ornamented and regulating the inflating pressure to insure an intimate contact of the printing surface of the transfer member with the contours of said surface to be ornamented.

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