

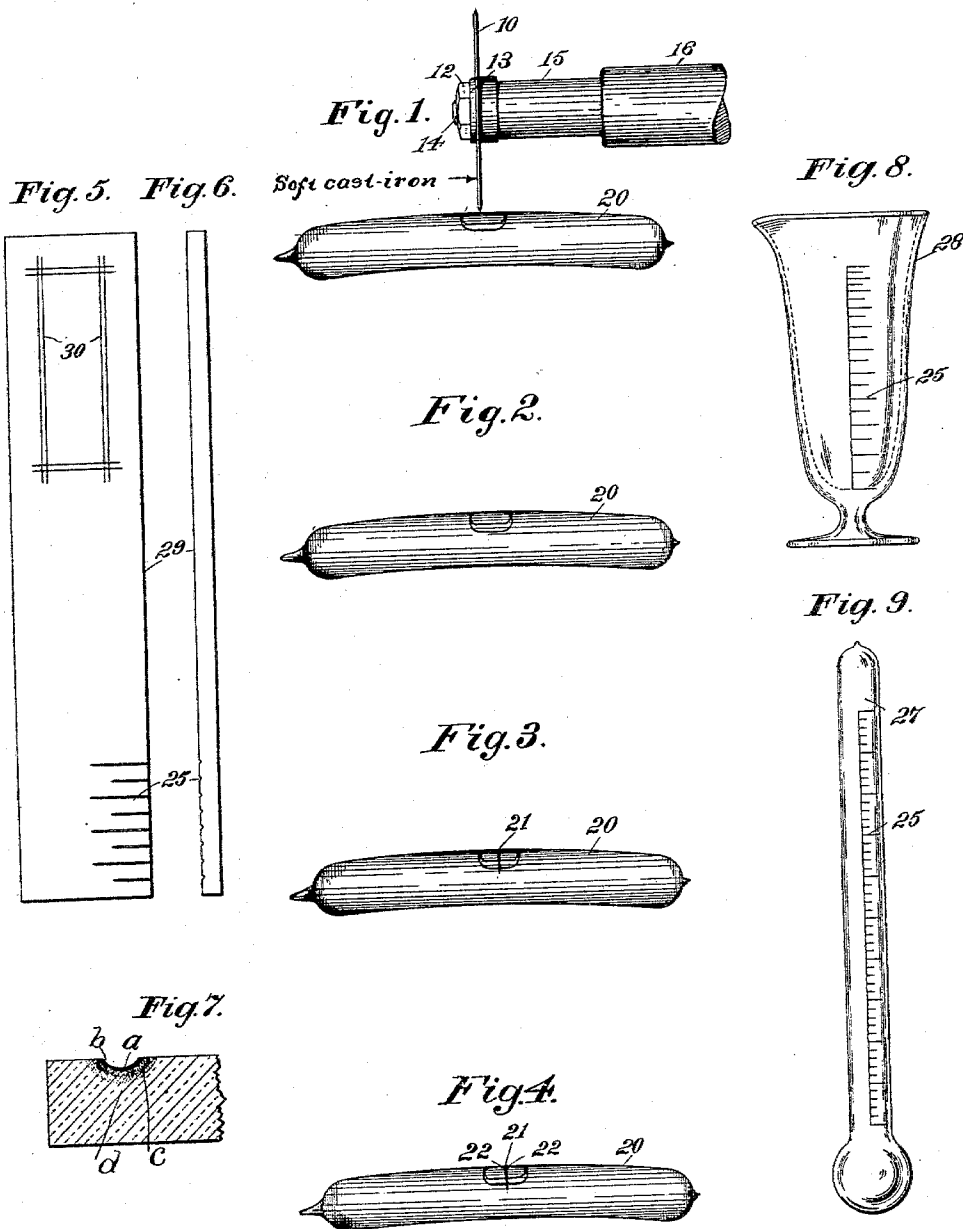
(No Model.)

J. A. TRAUT & C. BODMER.

METHOD OF MARKING LEVEL GLASSES OR ANALOGOUS ARTICLES.

No. 562,679.

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METHOD OF MARKING LEVEL-GLASSES OR ANALOGOUS ARTICLES.

SPECIFICATION forming part of Letters Patent No. 562,679, dated June 23, 1896.

Application filed January 13, 1896. Serial No. 575,222. (No specimens.)

To all whom it may concern:

Be it known that we, JUSTUS A. TRAUT and CHRISTIAN BODMER, citizens of the United States, residing at New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Methods of Marking Level - Glasses or Analogous Articles, of which the following is a specification.

This invention relates to improvements in marked, lined, or figured articles or receptacles constructed of fusible material, such as glass, and comprising such articles as plate-glass, tubes, spirit-levels, barometric, thermometric glasses or tubes, or other articles made of similar or analogous material, and to the method of lining, marking, figuring, or graduating the same; and the object of the invention is to provide an improved article or articles of the character described, marked or graduated, as required in the arts, and so as to avoid the weakening of such articles at the point of marking or graduation, and thereby producing articles of durable construction not liable to break in the line of such marking, and thus reducing the cost of manufacture thereof.

A further object of the invention is to provide articles or receptacles of the character set forth with lines, marks, or figures of an improved character in which the ornamental designating or indicating mark or marks thereof will be distinct and readily discernible, and which marks will be colored—without the use of pigments or other coloring substances of like character—by coloring-matter embedded or fused in the material of the article, and whereby it is protected from erasure or removal by acids or other substances.

In the drawings accompanying and forming part of this specification, Figure 1 is a view showing an article, such as a filled spirit-level tube or glass, in position to have its designating-mark placed thereon, in accordance with this improved method, by the rotatable member or disk carried by the apparatus. Fig. 2 is a view of such a filled tube or glass before it has been marked. Fig. 3 is a view of the same completed and ready for use and marked in accordance with this improved method. Fig. 4 is also a view of a spirit tube

or glass marked in accordance with this improved method, but having a somewhat different character of mark formed therein. Fig. 5 illustrates this improved method as applied to the lining or marking of plate-glass, said plate-glass having at one end thereof graduation lines or marks and at the other end thereof ornamental outlines. Fig. 6 is a right-hand edge view thereof, illustrating the character of the graduation-marks. Fig. 7 is a sectional view of a portion of a glass or porcelain article, showing this indicating-mark in exaggerated proportions. Fig. 8 shows a graduation glass or receptacle, such as used by druggists, marked in accordance with this improved method; and Fig. 9 shows a barometric or thermometric tube marked in accordance with this improved method.

Similar characters designate like parts in all the figures of the drawings.

Heretofore, in the method of marking glass or other articles of similar character, the marks, figures, or lines have been cut therein by means of frictional contact therewith by an emery-wheel or similar tool pressed against the glass, and when such mark was in the nature of an indicating or graduating mark it was usually formed by means of a diamond, file, or other sharp-edged tool, and it is well known that in forming the mark by means of a diamond or other tool of a similar nature the glass will break or separate at the point where the indicating-mark is made, so that in the manufacture of such glasses as spirit-level, barometric, thermometric, and other tubes or glasses of similar character, as well as other articles or receptacles on which the graduating or indicating mark forms a material part thereof, the tendency of the article to separate at the line of its mark is so great that under the slightest pressure the article will break, and hence be rendered useless. No practicable means has heretofore been found, to our knowledge, to obviate this serious disadvantage in the manufacture of such articles, and hence the manufacture of this class of ware has been rendered very expensive by the waste due to breakage. By a long series of experiments, however, we have discovered that if the mark in the glass or other fusible material is made by a tool of

proper material rotating at great velocity the heat generated at the point of contact of such tool and fusible material will be so great as to soften or partially fuse the same, or, more properly, fuse the fused glass or other material, and thereby permit the mark to be indented therein. By these experiments we have found, however, that marking-tools made of all metals are not equally suitable for this purpose. For instance, we have experimented with tools constructed of copper and brass, and have only obtained inferior results; but with a tool or disk made of soft iron—such as soft cast-iron—we are enabled to produce the mark in the manner above stated, and we have also found by said experiments that articles so marked by a tool of the character above set forth are of remarkable strength and durability, and do not tend to break or separate in the line where the mark is made or formed, owing, probably, to the fact that in the partial fusing, or rather re-fusing, of the material at one point, the same is tempered by the adjacent unheated portions of the material acting as a cooling agent to rapidly absorb the heat generated by the rotating disk at its point of contact with said material, and thereby increasing the strength thereof at the marking-point to equal, if not surpass, the strength of the other portions of the article, so that the articles when they break will do so at other portions of the same, rather than at the marking-point thereof, as has been demonstrated by a number of experiments. It will be understood, however, that we do not limit ourselves to the use of a marking or lining member or tool of soft cast-iron, as other metals might be used—for instance, wrought-iron or mild steel.

It will also be understood that while the method is more particularly adapted for marking or indicating on glass or analogous materials such marks as graduating and indicating lines, it is not limited to such character of work, as figures or other ornamental characters may be formed by this improved method, if desired; and it will be further understood that while a narrow or sharp-edged rotating member or disk is preferable for making indicating or graduating marks other rotating members or disks having varying perimeters may be used, in accordance with the ornamentation to be placed upon the article.

The drawings accompanying and forming part of this specification illustrate some of the various articles marked in accordance with this improved method, either with ornamental outlines or graduation or indicating marks, although it will be understood, as above stated, that it is not limited to such character of work; and as one means of carrying out this improved method, for the purpose of marking articles with ornamental outlines or graduating or indicating marks, we provide a lining or marking device, preferably consisting of a rotating member in

the nature of a disk of soft iron—preferably cast-iron—of any desired and suitable diameter and thickness; but, in practice, for the purpose of marking articles with graduating or indicating marks, we have found the best results are obtained by the use of an extremely thin disk—such, for instance, from three-thirteenths to three-seventeenths of an inch in thickness—having a narrow or sharp-edged periphery.

In the preferred form thereof herein shown and described, the disk 10 is removably secured by means of a clamping-nut 12 and collar or washer 13, which nut is adapted to be turned on the screw-threaded end of the stud 14 of the arbor 15, and which projects through a central bore in the disk 10, whereby the disk is held in position on the arbor 15. The arbor is shown secured in position in a spindle 16, which may be rotated by any suitable means at any desired speed. In practice, however, we have found that the best results are obtained when the disk is rotated at a velocity of two thousand rotations, more or less, per minute.

Any suitable means may be used for supporting the tube, or the same may be held in position by hand. As this improved method will be more particularly used by us in practice to mark spirit-level tubes or glasses, the method will be more fully set forth in connection with such character of work. The level-tube 20, which is commonly designated as a "spirit-level" tube or glass, having been properly filled and sealed in the usual manner, is held in position to have a portion of its surface engaged by the edge of the rotating disk 10, and to permit the same to have a rubbing or frictional engagement on the glass, to thereby form the mark; and by axially turning said tube through an arc of any desired radius the designating-mark will be formed therein in a manner hereinbefore stated—to wit, the heat generated at the point of contact of the tool and glass, owing to the great velocity of the rotating disk and its frictional engagement with the glass, will soften or partially fuse, or rather re-fuse, the layer of the glass forming the surface of the mark, and permit the mark to be indented therein.

In the marking of articles other than spirit-level glasses—such, for instance, as placing graduation-lines 25 on the barometric or other tube 27, or on the receptacle 28, or on the plate-glass 29, or the ornamental lines 30 on such plate-glass 29—the same operation and result takes place.

By this improved method of marking, owing to the partial fusing, or rather re-fusing, of the layer forming the surface of the mark, and the probable tempering thereof, the article at this point is not only not weakened, but is apparently materially strengthened, whereby it is not liable to break at the point, as has been heretofore the case.

In the application of the method to the

marking of spirit-level glasses or tubes and also to other analogous articles—owing to the fluid or contents of such filled tubes, which act independently of the adjacent portions of the glass as a cooling agent, to rapidly absorb the heat generated by the rotating disk at its point of contact with the glass—the material of the glass is cooled or chilled practically simultaneously with the softening or hardening operation, and thereby more or less additionally tempered, and rendered as strong, if not materially stronger, at its point of marking than at the other portions of the tube, whereby the liability of the tube to break at such point is obviated. It is obvious, however, that in the use of this method with that class of articles which are not permanently filled the same tempering or cooling action can be obtained by the use of a fluid properly applied to the inside of the article, during or after the fusing action thereof, as is secured by the permanent fluid or contents of the permanent filled glasses, and which fluid could be applied therein by means of a jet or any other suitable way, as desired.

Referring now more particularly to Fig. 4, by wabbling, or giving the tube or other article a slight end-to-end motion, or giving the rotating disk a slight sidewise motion, the material, heated and displaced by the tool in forming or indenting the mark 21, can be thrown up in a slight ridge or flange 22 at each side of such mark; such displaced material solidifying as soon as formed, whereby the tube is reinforced at each side of the mark in a manner that will be obvious, and which reinforcement—owing to the tempering of the partially-fused material of the marked layer—not only permits a more distinct mark to be made, but renders the tube or article at these points considerably stronger than the tubes or articles as ordinarily constructed.

Heretofore, in order to make the indicating or graduating mark or line distinct in spirit-level, barometric, and thermometric glasses—and which mark, when made in the ordinary way, is usually white, and, therefore, of the same color as the glass—various methods have been tried—such, for instance, as coloring the mark, or filling the same with pigment, or fusing spun-glass adjacent to the mark; but such methods are expensive and impracticable—and also, heretofore, when coloring the ornamental marks or designs upon various articles, the same has been done by various processes which are expensive.

By this improved method of marking glass and analogous articles constructed of fusible material, the use of pigments and other impracticable and expensive methods to make the line more distinct are obviated, as, owing to the incorporation of the particles of the rotating member or disk within the layer of material forming the surface of the mark, such mark is darkened or blackened, and thereby rendered distinct and discernible—that is to say, owing to the heat generated by

the velocity of the disk, particles of the same, worn off by the frictional engagement of the disk with the article being marked, are incorporated with the re-fused layer of material forming the surface of the mark, when said mark is made, thereby darkening or blackening the same, and thereby making the mark distinct and easily discernible. It will be understood, however, that if it is desired to fuse the mark or line without coloring the same a tool of soft metal would be used, which would permit the fusing of the material, but would not be sufficiently soft to permit its particles to be incorporated in the fused material forming the mark.

To more clearly illustrate this improved method of coloring a mark, reference is now made to Fig. 7, in which *a* indicates, in an exaggerated way, the groove or indented mark, *b* the colored layer comprising the fused glass or material and the separated particles of the disk mixed together and practically inseparable from each other by the action of acids or other substances, and *c* the intermediate layer of semifused glass or porcelain joining the colored layer *b* and body *d* of the material.

Owing to the coloring material being derived from the lining or marking device, it is thoroughly incorporated with the surface-layer *b*, so that the particles of the coloring-matter are protected by the fused material from the action of acids or other substances, as above stated, while the mark is practically indelible, and is not affected by moisture, and does not require additional labor or manipulation of the tube or other article, in order to form the same, as the marking and coloring thereof are performed at one and the same operation.

By this improved method of marking and lining articles of the character set forth, we are enabled to cure an evil which has long been regarded as necessarily endured, especially in the marking of spirit-level glasses and tubes of similar character by the method now in vogue, and thereby lessening the expense in the manufacture of the same.

Having thus described our invention, we claim—

1. The improvement in the art of lining or marking glass or analogous fusible material which consists in simultaneously softening the material at the point where the proposed mark is to be made, indenting at that point the material to form a line or mark, and cooling the softened material by the action of a fluid to thereby prevent the splitting or breakage thereof.

2. The improvement in the art of marking glass or analogous fusible material which consists in fusing and indenting a line or mark therein, and at the instant such material reaches its fusing-point, and throughout its entire fusing action, incorporating with said material particles of metal to thereby color the mark.

3. The improvement in the art of marking or lining glass or analogous fusible material which consists in simultaneously softening the material at the point where the proposed mark is to be made, and incorporating coloring-matter therein to form a line or mark, and cooling the softened material by the action of a fluid to thereby prevent the splitting or breakage thereof.
4. The improvement in the art of marking or lining glass, or analogous fusible material which consists in fusing a mark or line therein, and incorporating with said fused material, particles of metal to thereby color the mark or line, and simultaneously cooling the material by the action of a fluid to thereby prevent the splitting or breakage thereof.
5. The improvement in the art of marking filled level or other glasses, which consists in softening the glass, and indenting a mark therein, and, simultaneously with the softening and indenting operation, cooling the glass by the fluid or liquid contained within the same.
6. The improvement in the art of marking filled level or other glasses, which consists in softening the glass, and indenting a mark therein, coloring the same, and, simultaneously with the softening and indenting operation, cooling the glass by the fluid or liquid contained within the same.
7. The improvement in the art of marking filled level or other glasses, which consists in fusing a mark therein, and incorporating in said mark particles of metal, to thereby color the mark, and simultaneously cooling the material by the fluid or liquid contained in the glass.
8. A level-glass or analogous article having a mark or line, fused and indented therein,

whereby said line will form a groove extending below the outer surface of the glass.

9. A level-glass or analogous article having a mark or line fused, indented, and colored therein, and whereby said line will form a groove extending below the outer surface of the glass.

10. A level-glass or analogous article having a line or mark, fused and indented therein, whereby said line will form a groove extending below the entire outer surface of the glass, and said mark being bordered by ridges or flanges extending above the outer surface of said glass.

11. A level-glass or analogous article having a mark or line fused, indented, and colored therein, whereby said line will form a groove extending below the entire outer surface of the glass, and said mark being bordered by ridges or flanges, extending above the outer surface of said glass.

12. A level-glass or analogous article having a mark or line fused and indented therein, whereby said line will form a groove extending below the entire outer surface of the glass, said mark being colored by particles of metal incorporated therewith and bordered by flanges or ridges extending above the entire outer surface of said glass.

13. A level-glass or analogous article having a line or mark fused and indented therein, whereby said line will form a groove extending below the entire outer surface of the glass, and said mark being colored by particles of metal incorporated therewith.

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