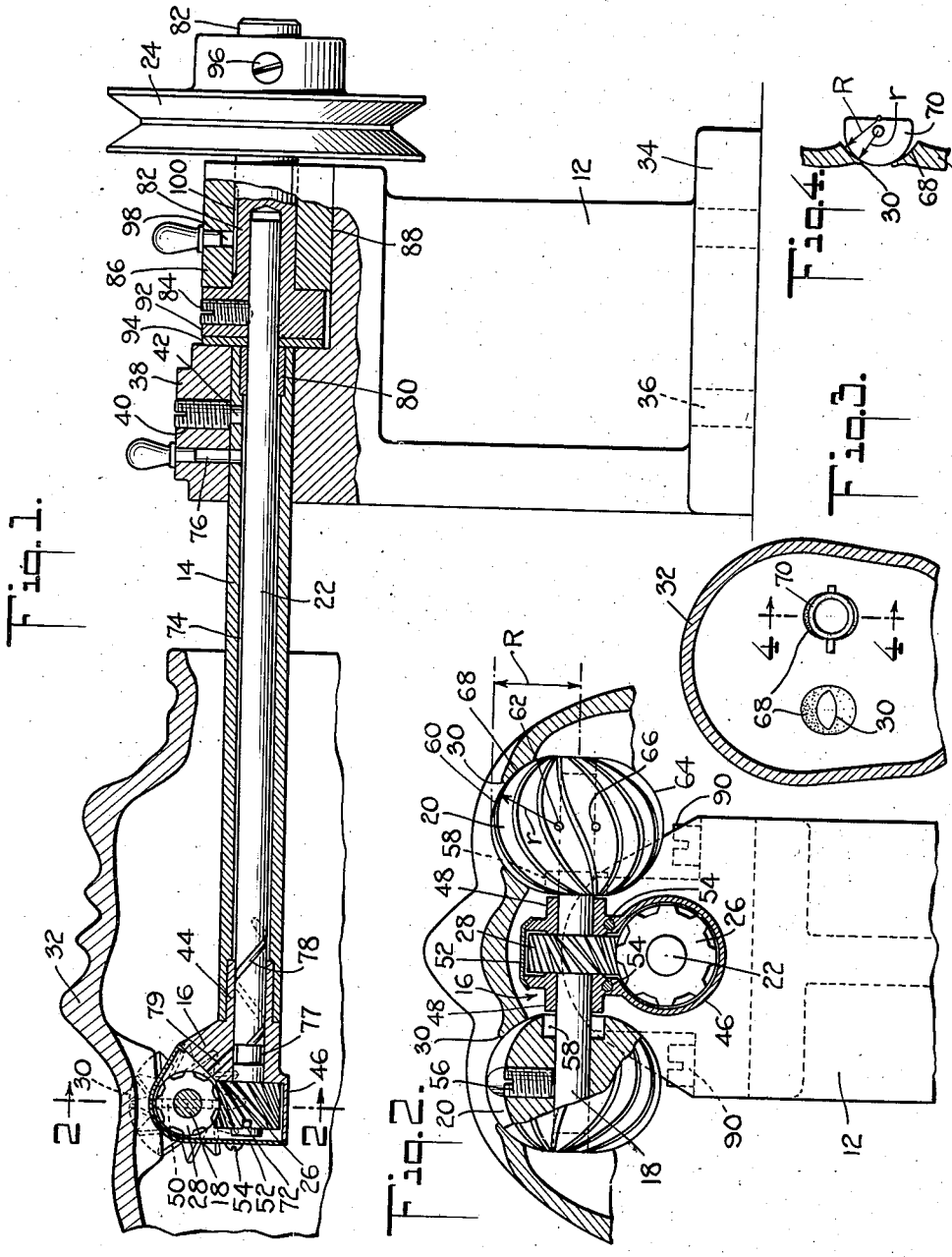
July 6, 1937. S. MARCUS 2,086,333

FRAZING MACHINE

Filed June 21, 1934



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Patented July 6, 1937

2,086,333

UNITED STATES PATENT OFFICE

2,086,333

FRAZING MACHINE

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Application June 21, 1934, Serial No. 731,623

11 Claims. (Cl. 90—18)

This invention relates to frazing machines, that is, machines for frazing the eye openings of a doll's head.

The primary object of my invention is to generally improve frazing machines for frazing eye openings in dolls' heads. More particular objects of my invention reside in the provision of a frazing machine which is simple, compact, sturdy, durable, inexpensive, and yet which will make it possible to fraze both eye openings simultaneously in a doll head at a predetermined spacing, which spacing may be adjusted to fit the particular type or size of doll head being frazed.

The doll eye is ordinarily shaped to conform to the surface of a sphere, so that the eye may oscillate at the eye opening while remaining in close contact therewith. Heretofore it has been customary to give the cutter or frazing tool a contour conforming to the surface of a sphere in order to fraze the eye opening to fit the eye. I find that, while this results in correct dimensioning sidewardly in order to prevent side to side movement of the eye, it does not result in the most desirable dimension in a vertical direction, because it is better to have ample clearance around the eye except at the edge of the eye opening itself, thereby reducing the frictional resistance to oscillation of the eye. It is possible with prior frazing machines to attain the desired result by moving the head backwardly and forwardly relative to the frazing tool during the frazing operation, but this is laborious and results in non-uniform frazing, for the operation is performed entirely by guess-work. A further object of my invention is to overcome these difficulties and to provide a machine which will accomplish the desired result directly and uniformly without movement of the head. To this end, I employ a cutter mounted on a transverse axis, that is, an axis extending across the head behind the eye openings, and I shape the cutter with exaggerated equatorial dimension so as to produce a seat for the eye which is of correct width to fit the eye and yet which is defined by an arc of larger radius than the eye when viewed in vertical section, thus providing clearance around the eye and permitting the eye to seat itself in close engagement with the edge of the eye opening. Further objects of my invention are to minimize chattering, as by the use of spiral teeth on the cutters, and to balance the cutting forces applied to the head, as by the use of spiral teeth which slope in opposite directions.

To the accomplishment of the foregoing and such other objects which will hereinafter appear, my invention consists in the frazing machine elements and their relation one to another, as hereinafter are more particularly described in the specification and sought to be defined in the claims. The specification is accompanied by a drawing, in which:

Fig. 1 is a section taken in elevation through a frazing machine embodying features of my invention;

Fig. 2 is a transverse section taken in the plane of the line 2—2 of Fig. 1;

Fig. 3 shows the interior of a doll head and is explanatory of a feature of the invention; and

Fig. 4 is a vertical section taken in the plane of the line 4—4 of Fig. 3.

Referring to the drawing, the frazing machine of my invention comprises a stand or pedestal 12, an extension 14 projecting forwardly therefrom, a gear housing or support 16 at the forward end of extension 14, a cutter shaft 18 mounted at the upper part of gear housing 16 and extending transversely of extension 14, cutters 20 mounted on said cutter shaft 18, a drive shaft 22 extending from gear case 16 to any suitable drive means 24, and helical gears 26 and 28 connecting drive shaft 22 to cutter shaft 18. It will be manifest that with this machine, both eye openings 30 of a doll's head 32 may be frazed at once. The cutters are adjusted to the desired spacing between the eye openings for a particular size or class of head by varying the position of the cutters along cutter shaft 18. It will be evident that the apparatus is fully comparable in compactness and simplicity with the simplest forms of frazing machine heretofore employed intended to fraze only a single eye opening.

Considering the apparatus in greater detail, the foundation or pedestal 12 is preferably a casting the base 34 of which is provided with suitable holes 36 for mounting the machine on a bench or work table. The extension 14 is preferably a tube one end of which is received in a projection or bearing 38 formed at the forward part of pedestal 12. Tubular extension 14 is forced into bearing 38 and is additionally locked in place by a set screw 40 the lower end 42 of which passes into the wall of the tube.

The gear support or gear housing 16 preferably comprises a casting the top and forward sides of which are open and the rear end of which is formed into a tubular projection 44 which is forced into the forward end of tubular extension 14, the parts being joined in immovable relation. The lower part 46 of the support 16 is preferably shaped to surround helical gear 26, while the

upper part includes bearings 48 for the cutter shaft 18. The cutter shaft is held against axial movement by helical gear 28 which is fitted directly between the bearings 48 and which is keyed to the shaft by a pin 50 (Fig. 1). The top and front sides of support 16 are closed to form a gear casing by a sheet metal cap 52 held in place by screws 54.

The cutters 20 are approximately spherical in shape and are axially adjustable or slidable on cutter shaft 18. They are held in any position of adjustment by appropriate set screws 56. The external dimension of bearings 48 is preferably reduced to a minimum, and the inner sides of cutters 20 are preferably countersunk or recessed at 58 to fit around the bearings 48, so that the cutters may be moved quite closely together when necessary.

The cutters preferably depart from spherical shape by being enlarged at the equator, or/and flattened at the poles. The cutter may, for example, be made in the form of an oblate spheroid, but it is more accurate and precise for the present purpose, as well as simpler, to shape the cutter so that transverse sections, that is, latitudes, are truly circular, while axial sections or longitudes are defined by somewhat spaced semicircles connected by straight lines. Thus, referring to Fig. 2, curve 60 is a semicircle struck about a center 62, while curve 64 is a semicircle struck about a center 66.

With this construction, the seat 68 formed in back of the eye opening will be defined in horizontal plane by an arc of small radius *r* (Fig. 2) equal to the radius of curvature of the eye member 70, while it will be defined in a vertical plane by an arc of large radius R equal to the maximum radius of the cutter (Fig. 4). It will be manifest from inspection of Fig. 4, that the difference in curvature of the eye and the frazed seat permits the eye to move into close engagement with the edge of the eye opening, while providing clearance around the eye opening to minimize frictional resistance to movement. It will further be evident from inspection of Fig. 3, that the eye is accurately seated in the frazed seat with respect to sideward movement, thus holding the eye member in accurate location. Of course, the engagement of the seat with only the sides of the eye member does not create appreciable frictional resistance because there is but slight movement at these points.

The exterior surface of the cutter is fluted to form suitable cutting teeth. These need not be spiral, and I have performed satisfactory work with cutters having plane teeth. However, the cutting action may be increased in smoothness by making the teeth spiral in configuration, and when this is done it is preferable to slope the spiral teeth of the two cutters in opposite direction, as is clearly shown in Fig. 2, in order to balance the axial thrust of one cutter by the thrust of the other.

Reverting now to Fig. 1, helical gear 26 is secured to a drive shaft 22 by a pin 72. The shaft is appreciably smaller than the interior of the tube, thus providing ample clearance 74 therebetween. It fits the gear support 16 with a running fit, and the bearing and gears are oiled by oil supplied through an oil hole 76 to tubular extension 14 and thence forwardly to the gear housing 16 by way of a spiral oil groove 78, a well 77, and a riser 79.

The rear end of shaft 22 is borne by a bushing 80 received in the end of tube 14 and also oiled from oil hole 76. Shaft 22 is driven by a pulley shaft 82 in which it is received and to which it is secured by a set screw 84. Pulley shaft 82 itself rotates within a bearing 86 seated on the top face 88 of pedestal 12 and secured thereto by appropriate screws 90 (Fig. 2). It goes without saying that bearing 86 when secured in place is coaxial with bearing 38 at the forward part of the pedestal.

Pulley shaft 82 is preferably formed integrally with a thrust collar 92 received between bearings 38 and 86. A thrust washer 94 may be used if necessary, to bring the collar to proper dimension. The outer end of pulley shaft 82 carries a pulley 24 secured thereto by a screw 96. The shaft is lubricated through an oil hole 98 and an oil groove 100. It will be understood that because of the removable nature of bearing 86, the parts are readily assembled by first inserting pulley shaft 82 through bearing 86 before securing the bearing to the pedestal.

It is believed that the mode of constructing and using the frazing machine of my invention, as well as the many advantages thereof, will be apparent from the foregoing description. The machine is simple, compact, and inexpensive, yet frazes both eye openings at once. It is possible to adjust the cutters to a desired eye spacing without any of the complexity of machines heretofore devised to make possible such an adjustment. The eye openings are frazed to a configuration which departs from a spherical surface in a desirable and advantageous manner without necessitating any movement of the head. The eye set obtained is of uniform and predetermined dimension and shape. The increase in equatorial dimension of the cutter which is used to produce the sought-for clearance about the eye member while preventing sideward movement thereof, is characterized by a further incidental advantage in that it makes it possible for the cutters to fraze the eye openings without premature interference between the front wall of the head and the gearing therebetween. It is doubtful whether the simplified apparatus layout here disclosed could be satisfactorily used with spherically shaped cutters while utilizing gearing of adequate strength and size. The apparatus is compact in over-all dimension and is sufficiently small at the forward end of the extension to be readily received through the neck opening of even small heads.

It will be apparent that while I have shown and described my invention in preferred form, many changes and modifications may be made in the structure disclosed, without departing from the spirit of the invention, defined in the following claims.

I claim:

1. A frazing machine for frazing the eye openings in a doll's head, said machine comprising a support, an extension projecting forwardly from said support, a gear case at the forward end of said extension, a drive shaft extending from the gear case to the support, side bearings on said gear case, a cutter shaft mounted in said bearings and extending transversely of the extension, means gearing the drive shaft to the cutter shaft, and a pair of approximately spherical cutters mounted at the outwardly projecting ends of the cutter shaft, said cutters being recessed at their inner sides to fit over the bearings of the cutter shaft.

2. A frazing machine for simultaneously frazing both of the eye openings in a doll's head, said

machine comprising a pedestal-like support, a tubular extension projecting forwardly from said support, a compact gear housing at the forward end of said tubular extension, a drive shaft extending through said tubular extension and support, drive means at the rear end of said shaft, a cutter shaft mounted in the upper part of the gear housing and extending transversely of the tubular extension, helical gears connecting the drive shaft and cutter shaft, and a pair of approximately spherical cutters mounted at the outwardly projecting ends of the cutter shaft.

3. A frazing machine for simultaneously frazing both of the eye openings in a doll's head, said machine comprising a pedestal-like support, a tubular extension projecting forwardly from said support, a compact gear housing at the forward end of said tubular extension, a drive shaft extending through said tubular extension and support, a pulley mounted at the rear end of said shaft, a cutter shaft mounted in the upper part of the gear housing and extending transversely of the tubular extension, helical gears connecting the drive shaft and cutter shaft, and a pair of approximately spherical cutters mounted at the outwardly projecting ends of the cutter shaft, said cutters being axially adjustable along the drive shaft to fit the spacing of the eye openings.

4. A frazing machine for simultaneously frazing both of the eye openings in a doll's head, said machine comprising a support, an extension projecting forwardly from said support, a gear case at the forward end of said extension, a drive shaft extending from the gear case to the support, a cutter shaft mounted in the upper part of the gear case and extending transversely of the extension, means gearing the drive shaft to the cutter shaft, and a pair of approximately spherical cutters mounted at the outwardly projecting ends of the cutter shaft, said cutters being axially adjustable along the drive shaft to the spacing of the eye openings, said cutters being flattened at the poles and increased in dimension at the equator.

5. A frazing machine for frazing the eye openings in a doll's head, said machine comprising a support, an extension projecting forwardly from said support, a gear housing at the forward end of said extension, side bearings thereon, a drive shaft extending along said extension, a cutter shaft mounted in said side bearings and extending transversely of the extension, means gearing the drive shaft to the cutter shaft, and a pair of approximately spherical cutters mounted at the outwardly projecting ends of the cutter shaft, said cutters being axially adjustable along the drive shaft to the spacing of the eye openings, and the inner poles of said cutters being recessed to permit the same to be moved inwardly around the side bearings.

6. A frazing machine for simultaneously frazing both of the eye openings in a doll's head, said machine comprising a support, an extension projecting forwardly from said support, a gear housing at the forward end of said extension, a drive shaft extending from the gear housing to the support, a cutter shaft mounted in the upper part of the gear housing and extending transversely of the extension, means gearing the drive shaft to the cutter shaft, and a pair of approximately spherical cutters mounted at the outwardly projecting ends of the cutter shaft, the cutters being provided with oppositely directed spiral teeth.

7. A frazing machine for simultaneously frazing both of the eye openings in a doll's head, said machine comprising a support, a tubular extension projecting forwardly from said support, a gear housing at the forward end of said tubular extension, a drive shaft extending through said tubular extension and support, a cutter shaft mounted in the upper part of the gear housing and extending transversely of the extension, helical gears connecting the drive shaft and cutter shaft, and a pair of approximately spherical cutters mounted at the outwardly projecting ends of the cutter shaft, said cutters being axially adjustable along the drive shaft to the spacing of the eye openings, said cutters being flattened at the poles and increased in dimension at the equator.

8. A frazing machine for simultaneously frazing both of the eye openings in a doll's head, said machine comprising a pedestal-like support, a tubular extension projecting forwardly from said support, a compact gear housing at the forward end of said tubular extension, a drive shaft extending through said tubular extension and support, a cutter shaft mounted in the upper part of the gear housing and extending transversely of the tubular extension, helical gears connecting the drive shaft and cutter shaft, and a pair of approximately spherical cutters mounted at the outwardly projecting ends of the cutter shaft, said cutters being axially adjustable along the drive shaft to the spacing of the eye openings, said cutters being flattened at the poles and increased in dimension at the equator and being provided with oppositely directed spiral teeth.

9. A frazing machine for simultaneously frazing the two eye openings in a doll's head, said machine comprising a base, a relatively long slender support arm projecting from said base, a short cutter shaft mounted on and extending transversely of said support arm, said cutter shaft and support arm assembly being dimensioned to pass through the neck opening of a conventional doll head, whereby said cutter shaft is supported transversely behind and generally parallel to the front wall of the doll head and extends from eye opening to eye opening in a direction from temple to temple of the head, means extending along said support arm between the base and the cutter shaft to rotate the cutter shaft, and a pair of cutters of equal size mounted one at each end of the cutter shaft.

10. A frazing machine for simultaneously frazing the two eye openings in a doll's head, said machine comprising a base, a relatively long slender support arm projecting from said base, a gear housing at the outer end of the support arm, a short cutter shaft extending through said gear housing transversely of said support arm, said cutter shaft and support arm assembly being dimensioned to pass through the neck opening of a conventional doll head, whereby said cutter shaft is supported transversely behind and generally parallel to the front wall of the doll head and extends from eye opening to eye opening in a direction from temple to temple of the head, a drive shaft extending along said support arm between the base and the cutter shaft and geared to the cutter shaft, and a pair of cutters of equal size mounted one at each of the outwardly projecting ends of the cutter shaft, each of said cutters being approximately spherical in shape but increased in dimension at the equator.

11. A frazing machine for simultaneously frazing the two eye openings in a doll's head, said machine comprising a base, a relatively long slender support arm projecting from said base, a short cutter shaft mounted on and extending trans-

versely of said support arm, said cutter shaft and support arm assembly being dimensioned to pass through the neck opening of a conventional doll head, whereby said cutter shaft is supported transversely behind and generally parallel to the front wall of the doll head and extends from eye opening to eye opening in a direction from temple to temple of the head, means extending along said support arm between the base and the cutter shaft to rotate the cutter shaft, and a pair of cutters of equal size mounted one at each end of the cutter shaft, each of said cutters being fluted to form teeth thereon and being approximately spherical in shape but flattened at the poles and increased in dimension at the equator.

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