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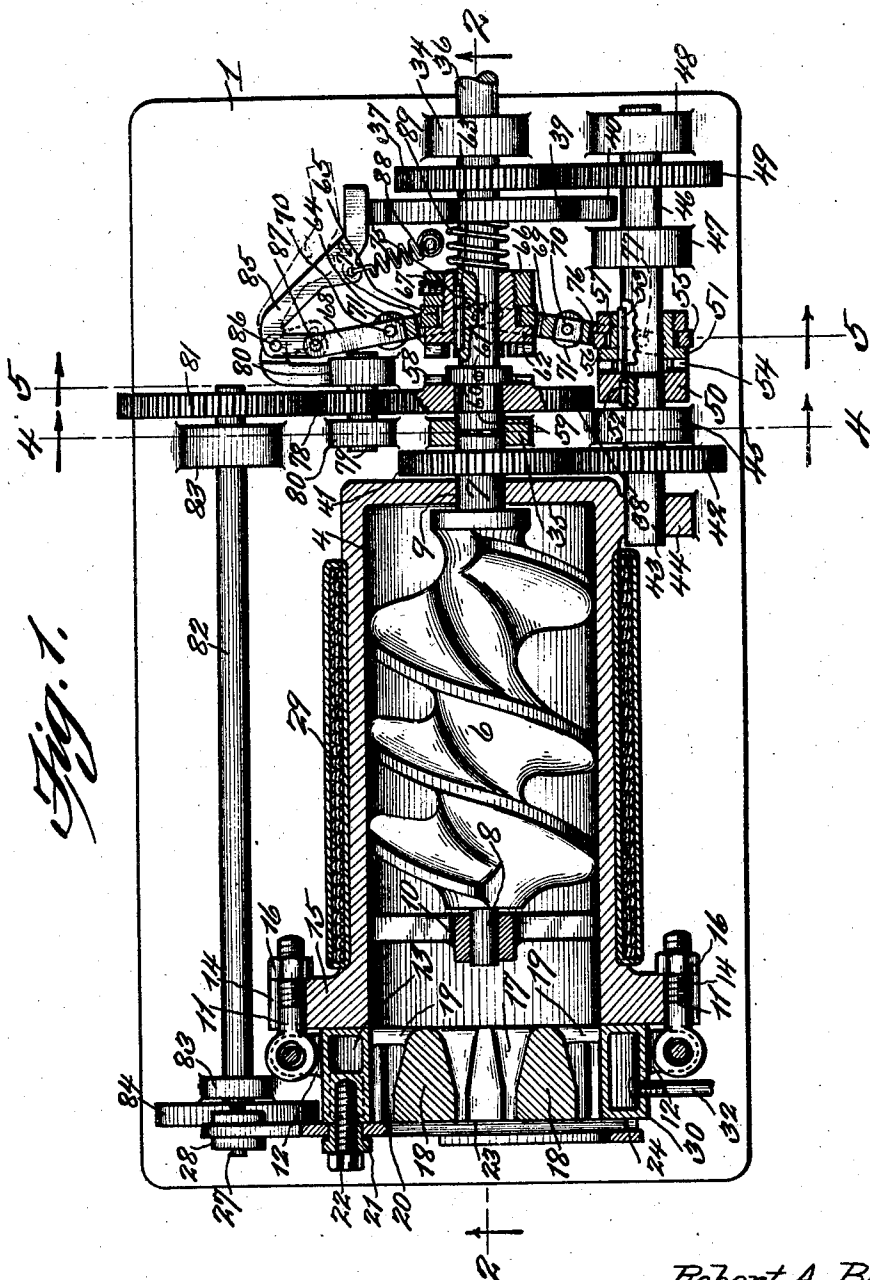
R. A. BOSWELL

1,814,819

MACHINE FOR EXTRUDING OPHTHALMIC MOUNTINGS

Filed Aug. 7, 1925

4 Sheets-Sheet 1



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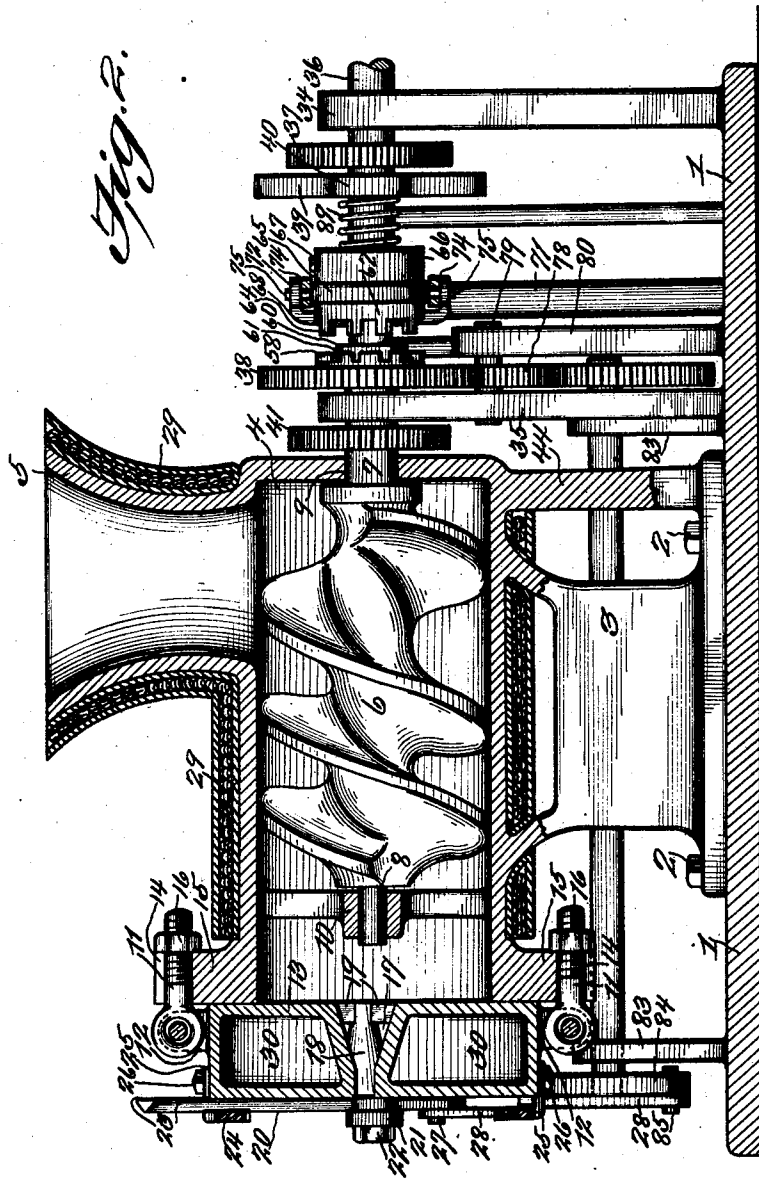
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4 Sheets-Sheet 2



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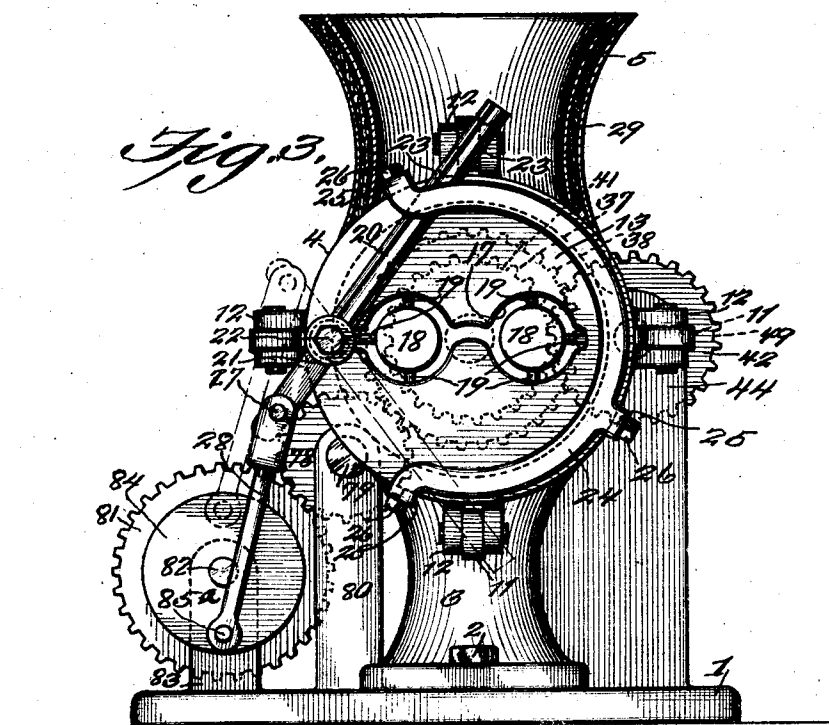
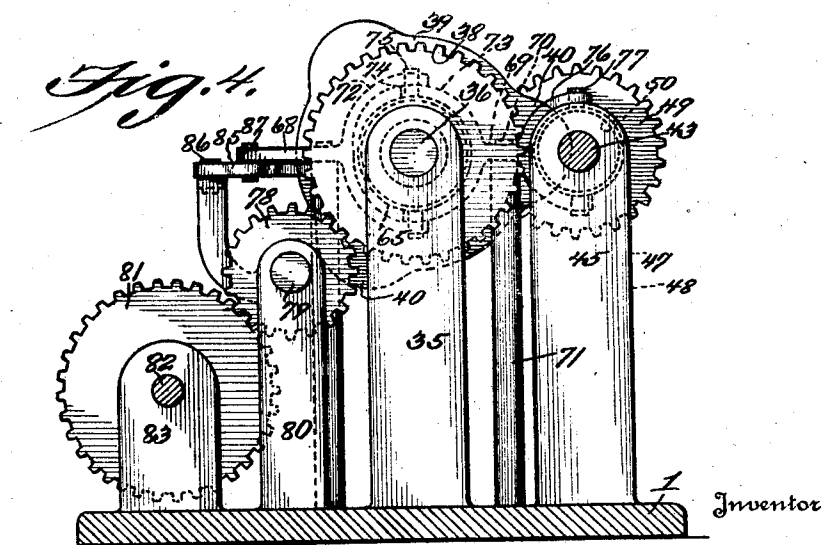
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4 Sheets-Sheet 3



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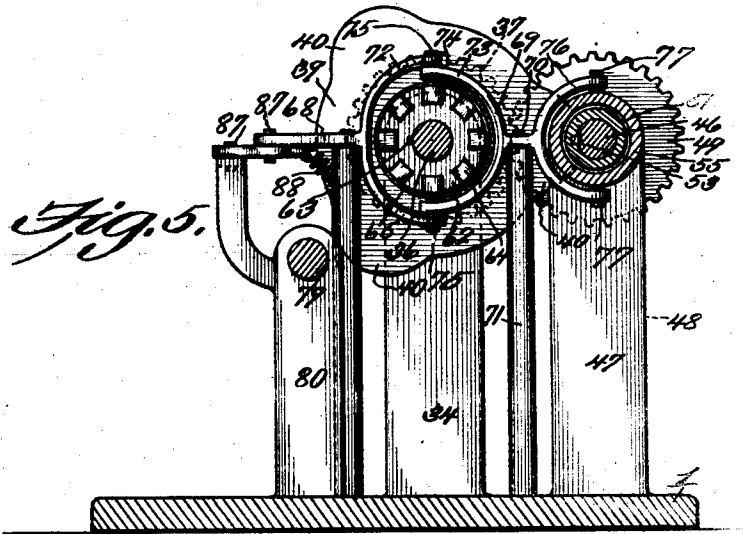
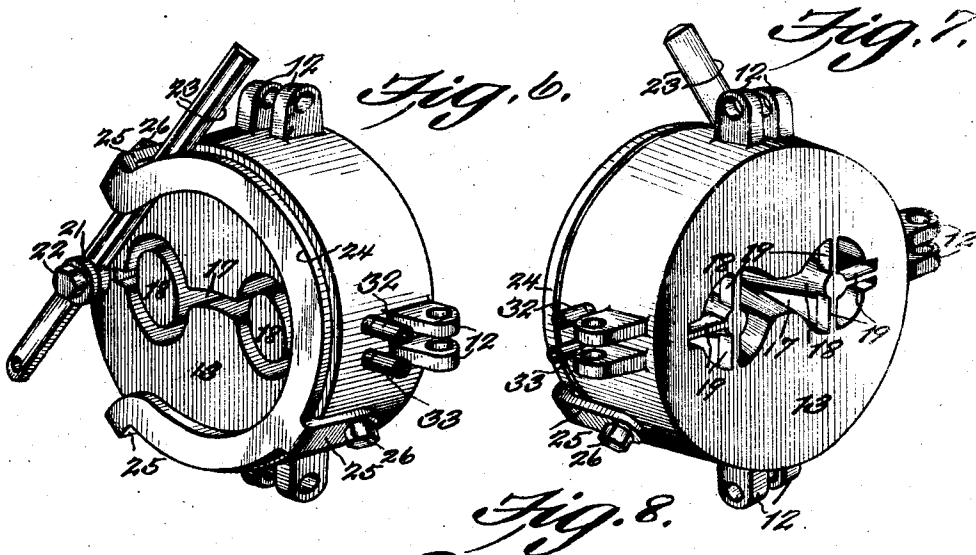
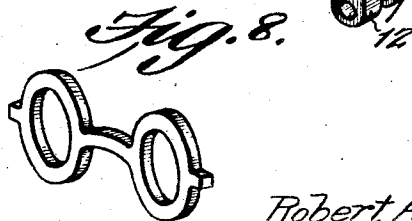
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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MACHINE FOR EXTRUDING OPHTHALMIC MOUNTINGS

Application filed August 7, 1925. Serial No. 48,701.

It is well known that ophthalmic mountings are produced from fibrous material, such as zyl, or zylonite, the general method consisting in stamping the mountings from sheets of such material, and wherein there is considerable waste, which is subsequently returned to the vat and reduced to a soft running mass and then rolled into sheets to be again subjected to the above stamping method. There are various ways for producing ophthalmic mountings, but the most recent methods consist in extruding the fibrous material through formers or dies (which are of such shape as to form or produce the desired contour of the mounting), but these formers or dies have been found crude and impractical, it being difficult to remove the mountings from the former after being produced.

One of the forms used in one of the extruding methods comprises tongues centered within the openings of the formers for forming the eyes of the ophthalmic mountings, the tongues being separate from the formers and secured in any suitable place on the interior of the container or compartment, which receives the mass of soft fiber or zyl. Such construction of formers cannot be applied to any type of extruding machine, due to there being no way of mounting the tongue, which makes this type of machine impractical.

Another type of former, while being in one piece, consists of tongues spaced within the tubes of the former for producing the eyes of the mountings, but in this type it is difficult to remove the mounting after it is formed, such mounting being very apt to deform or be distorted during the process of removal, and this disadvantage, coupled with the fact that this construction is not applicable to any type of machine, renders such former impractical and undesirable. In both of these constructions fibrous material is formed into tubular bodies from which the mountings are subsequently cut, thus making both methods long drawn out processes.

With these facts in view it is the purpose of the present invention to shorten the

process of making mountings, accomplishing it quicker, with greater ease, and without distorting or deforming the plastic mass or mountings themselves as the plastic body and mountings are being made.

Another purpose is to provide a former or die which is not only in one piece and from which there is no necessity of removing the mountings or the body from which the mountings are cut, but is capable of general application to any construction of extruding machine for extruding such fibrous material for producing ophthalmic mountings.

Still another purpose is to provide a former or die with cutting means carried thereby, and operatively actuated by an automatic mechanism for severing the ophthalmic mountings from a fibrous body, as it extrudes through the former or die, the former or die being applicable to any extruding machine, whose mechanism for actuating the fiber feeding means has operating connections with the cutting means to actuate the latter.

Heretofore in machines of this character the cutting or severing step is a separate and distinct process, subsequently carried out. However, in the herein disclosed machine, the cutting or severing act is timed substantially simultaneously with the forming and extruding of the fibrous material into ophthalmic mountings.

A further purpose is the provision of an improved mechanism in relation with the extruding machine and operatively connected to the fiber feeding means for actuating the latter, the construction and arrangement of said improved mechanism being such as to include means for actuating the cutting or severing device.

A still further purpose is to embody in the mechanism, which operates the feeding element, auxiliary mechanism, constructed and arranged in conjunction with the first mentioned mechanism, whereby the feeding element may operate intermittently with regard to the cutting device, so that when the cutting device is in action, the feeding element ceases and vice versa, the various performances of the machine being entirely au-

tomatic as long as power is being applied to the first mentioned mechanism.

It is to be understood that the particulars herein given are in no way limitive and that, while still keeping within the scope of the invention, any desired modifications of details and desired proportions may be made in the apparatus according to the circumstances.

The invention comprises further features and combinations of parts, to be hereinafter set forth, shown in the drawings and claimed.

In the drawings:—

Figure 1 is a sectional plan view of the improved machine for extruding ophthalmic mountings.

Figure 2 is a sectional view on the line 2—2 of Figure 1.

Figure 3 is an end elevation of the extruding machine showing the former or die end thereof.

Figure 4 is a sectional view on the line 4—4 of Figure 1.

Figure 5 is a sectional view on the line 5—5 of Figure 1.

Figure 6 is an enlarged detailed perspective view of the former or die which is mounted on one end of the extruding machine, showing the outer face thereof.

Figure 7 is a perspective view of the die or former showing the interior face thereof, where the fibrous material begins to be extruded.

Figure 8 is a detailed perspective view of an ophthalmic mounting.

Referring to the drawings 1 designates a base, and mounted thereon as by means of bolts or the like 2, is a frame 3 including an integral cylinder 4 for the reception of a plastic composition such as cellulose. The hopper 5 is formed integrally with the cylinder to receive the composition, which may be fed to the extruding end of the cylinder by means of the feed screw 6. The feed screw 6 has its axially aligned pintles 7 and 8 mounted in bearings of the cylinder. The pintle 7 is journaled in one end of the cylinder as at 9, while the pintle 8 is journaled in a spider or web 10, adjacent the extruding end of the cylinder. The feed screw of this character is a well known expedient, being old in principle as disclosed in patents under date of September 15, 1903 and May 29, 1906, respectively numbered 738,885; and 822,101. In view of these patented disclosures a feed screw in extruding machines is public property, and may be used for the purpose as herein disclosed.

Also, it is well known to be old broadly to employ a former or die at the extruding end of the cylinder, as is disclosed in the above identified patents, as well as the patent under date of January 22, 1907, Patent No. 841,852.

The present invention aims to modify the broad principle of a former or die to the extent of providing it with an opening therein, whose contour conforms to the configuration of an ophthalmic mounting.

Various means have been used for mounting the former or die on the discharge end of an extruding cylinder, and the present invention aims to utilize the attaching means similar to those disclosed in the patent under date of January 22, 1907, No. 841,852. This securing means for the former or die consists of the pivoted bolts 11, mounted pivotally between lugs 12, carried by the former or die 13, said bolts 11 to be moved into bifurcations 14 formed in lugs 15 of the cylinder, there being nuts 16 on the bolts to tighten the parts together, namely, to hold the former or die in close contact with the end of the cylinder in such wise as to preclude the escape of the plastic composition as it is extruded.

As previously stated, the broad idea of the former or die is old and well known, and public property. However, the present die or former 13 is substantially modified for causing the extrusion of ophthalmic mountings. As previously mentioned, formers or dies having openings with contours resembling the configuration of ophthalmic mountings have been devised, but as in these machines and processes the formers or dies are not in one piece to cause a continuous extrusion of the plastic composition, so that ophthalmic mountings may be severed at a point adjacent one face of the former or die as they are extruded. Those that have been previously mentioned necessitate the removal of the former or die, in one instance, in order to remove the plastic body, whereby the mountings may be subsequently and separately cut. In another instance the parts of the opening for forming the eyes of the ophthalmic mounting have cylindrical tongues supported concentrically therein, but entirely separate from the former or die.

Now in the present invention the die or former is in one piece, and the opening 17, whose contour resembles the configuration of an ophthalmic mounting, is capable of extruding a mounting, which may be easily and very quickly severed instantly after it is extruded. The portions (which form the eyes of the ophthalmic mounting) have cores 18 supported concentrically therein by means of the radial arms or ribs 19. It will be noted that the ribs or arms 19 are located adjacent the end of the cylinder, so that the plastic composition in its extruding action will feed around the arms or ribs, so that when the composition discharges from the opening 17 it will assume the shape in cross section conforming to the configuration of an ophthalmic mounting. The ribs or arms 19 are relatively rigid and strong and will

support the cores in such wise as to prevent any pressure of the plastic composition from distorting the cores out of their proper place. The machines and processes above mentioned
 5 for forming ophthalmic mountings are devised along lines necessitating a subsequent distinct and separate operation to cut the final mountings. In this invention the cutting of the extruding plastic composition is
 10 accomplished instantly as it is extruded through the die or former and to accomplish this the die carries an oscillatory knife 20. It is fulcrumed on a headed bushing 21, which is secured to the die or former by
 15 means of a bolt 22. The fulcrum for the knife is to one side of the opening 17, which is formed in the die or former. The long arm of the knife has opposite cutting edges 23, enabling the knife to cut a mounting on
 20 its upward swing stroke as well as on its downward swinging stroke. The long arm with its doubled cutting edges operates under a guard 24, which is provided with arms 25 overlying and secured at 26 to the cylindrical edge of the die or former. The
 25 guard is arcuate, conforming to the circular shape of the die, and acting to hold the knife closely in contact with the face of the die or former, preventing it from moving away
 30 from the face which would cause irregular cutting of an ophthalmic mounting.

The short arm of the knife has connected thereto, as at 27, a reciprocating pitman or link 28, by which oscillatory movements may
 35 be imparted to the knife for the purpose of cutting a mounting upon the downward and upward strokes of the knife.

The plastic composition stiffens or seasons relatively quick, especially where the body
 40 of the composition may be relatively thin, for instance, as thin as it appears to be in passing through the cylinder and being fed by the screw 6.

To prevent excessive stiffening and seasoning of the composition, the cylinder is providing with an exterior heating coil or
 45 unit 29, which may receive current from any suitable source, not shown, and thereby carry heat to the cylinder for keeping the
 50 composition in a workable plastic state.

As the plastic composition is extruded through the former or die, it is in cross section, of a shape resembling the contour of an ophthalmic mounting, and as the knife
 55 has a shearing action on the body of material as it extrudes through the die, there is a tendency for the knife to distort or deform the mounting as it is severed, due to the plastic condition of the material. In order
 60 to avoid such distortion or deformity, various means may be employed to cause a substantial stiffening or seasoning of the composition. An example of such means may consist of a chamber 30, formed in the die
 65 or former, to receive a circulating cooling

fluid 31. This fluid may pass into the chamber through the pipe 32, and leave the chamber by way of a pipe 33. The temperature of this cooling fluid should not be such as would create excessive stiffening or seasoning
 70 of the composition, to prevent the extrusion of the material, but just enough to enable the composition to extrude in a substantial firm state as would permit the mounting to be easily severed without excessive
 75 distortion or deformity.

Rising up from the base 1, are bearings 34 and 35, and it will be noted, the end of the pintle 7 on the feed screw is partially journaled in the bearing 35. A shaft 36 axially
 80 aligned with the pintle 7 is journaled in the bearing 34 and partly in the bearing 35. Spur gears 37 and 38 are carried by the shaft 36, the former being fixed to the shaft, the latter being loosely mounted on the
 85 shaft. A cam 39 is fixedly carried by the shaft 36 and is provided with a plurality of cam projections 40. The spur gear 41 is fixed to the pintle 7 of the feed screw and meshes with a spur gear 42 on a shaft 43.
 90 The shaft 43 is mounted in bearings 44 and 45, the frame being an integral part of the base of the frame 3 and the cylinder, while the bearing 45 rises from the base 1. A shaft 46 is journaled in bearings 47 and 48,
 95 which rise from the base 1 and carries a spur gear 49, which meshes with the spur gear 37, and since power may be transmitted to the shaft 36 in any suitable manner, not shown, power is in turn transmitted to the
 100 shaft 46 through the medium of the gears 37 and 49, thereby operating the shaft 46, and when the clutch members 50 and 51 respectively carried by the shafts 43 and 46, are engaged power is transmitted to the
 105 shaft 43 and thence to the feed screw through the medium of the gears 41 and 42, as shown in Figure 1 of the drawings. The clutch 50 is splined at 52 to the shaft 43, while the clutch 51 is splined at 53 to the
 110 shaft 46, the adjacent faces of both clutches having interengaging radial clutch teeth 54. The clutch 51 is capable of a sliding shifting movement on the shaft 46, and to accomplish such a movement, for the purpose
 115 of disengaging the clutches, a collar 55 is swivelly carried by the clutch 51. The collar 55 is located between the flange 56 of the clutch and a ring 57 which is threaded on the clutch 51.
 120

The spur gear 38 has clutch teeth 58 and is held against axial movement between a shoulder 59 and a collar 60, the latter being pinned to the shaft 36 as at 61.

A clutch 62 is splined or keyed as at 63
 125 to the shaft 36, its clutch teeth 64 adapted to interengage with the teeth 58, for the purpose of imparting movement to the spur gear 38, that is, when the clutch is shifted in the proper direction.

A collar 65 is interposed between a flange on the clutch 62 and a ring 66, which is threaded on the clutch and additionally secured by a set-screw 67. The clutch 62 is free to rotate in the collar, when the clutch is shifted so that its teeth may engage with the teeth 58.

Levers 68 and 69 are fulcrumed at 70 on the upper ends of bearings 71, which rise from the base 1. The adjacent ends of the levers 68 and 69 have forks 72 and 73, which conform to and straddle the collar 65, the ends of the forks being pivotally overlapped as at 74, and connected to the diametrically opposite pins 75, which are carried by the collar 65.

The lever 69 has forks 76, which straddle the collar 55, with the ends of the forks pivotally engaged with diametrically opposite pins 77, carried by the collar 55. Obviously, when the levers 68 and 69 oscillate the clutch 62 will move so that its teeth will engage with the teeth 58, and the teeth of the clutch 51 will disengage from the teeth of the clutch 50, thereby causing the power from the shaft 36 to cease its transmission to the feed screw, and in turn transmit it to the spur gear 38, which in turn transmits power to an idle gear 78 on a shaft 79 mounted in bearings 80, and thence to the spur gear 81, which is carried by a shaft 82. This latter shaft is mounted in bearings 83 which rise from the base, and one end of the shaft 82 carries a disk 84, to which the pitman or link 28 is pivotally connected as at 85a. Obviously, when power is transmitted to the shaft 82 and the feed screw held at rest, the disk 84 will reciprocate the pitman or link 28 and oscillate the knife in a downward direction, causing one edge of the knife to sever an ophthalmic mounting as it extrudes through the die or former.

The disk cam 39 with its cam projections 40 impart intermittent oscillatory movements to a lever 85, which is pivotally mounted at 86 on a projecting arm of one of the bearings 80. This lever 85 has a long arm of the shape shown with its end portion riding on the marginal edge of the cam 39 in the path of the cam projections 40. The lever 85 has a short arm, which in turn is pivotally connected at 87 to one end of the lever 68. The lever 85 is under tension of a spring 88, and interposed between the clutch 62 and the cam 39 is a coil spring 89, which assists in moving the clutch 62 so that its teeth 64 may interengage with the clutch teeth 58. While the spring 89 assists in moving the clutch 62 so that its teeth may engage with the teeth 58, the cam projections 40 really actuate the lever 85 to move the clutch. The spring also cooperates with the spring 88 to equalize the friction on the marginal edge of the cam 39,

that is, friction between the long arm of the lever 85 and the cam. The spring 88 acts to retain the long arm of the lever 85 in contact with the cam 39, and to tension it just sufficiently to cause the clutch 62 to move so that its teeth will disengage the teeth 58, when the cam projection 40 moves from under the long arm of the lever 85.

In the operation the plastic composition is fed through the hopper into the cylinder, and when the clutches 50 and 51 are engaged, as in Figure 1, the feed screw receives motion causing the plastic composition to feed toward the extruding die or former. When sufficient composition has extruded from the opening 17 in the die or former, that is, enough equal to an amount that may be extruded approximately on a third revolution of the feed screw, or sufficient to form a proper thickness of ophthalmic mounting, one of the cam projections 40 on the cam 39 engages with and actuates the lever 85, causing the clutch 62 to shift on the shaft 36, whereby the teeth 64 may mesh with the teeth 58, and the clutch 51 disengages from the clutch 50, thereby stopping the feed screw and causing power to be transmitted to the shaft 82 through the medium of the gears 78 and 81 and the disk 84 to oscillate the knife in a downward direction. The cam projections 40 are of such size as to cause sufficient revolvable movement to the shaft 82, to lower the knife in its extreme movement for severing an ophthalmic mounting. As soon as the cam projection 40 moves from under the lever 85 the clutches return to the position shown in Figure 1, and thereby impart movement to the feed screw, causing more plastic composition to be extruded through the opening in the die or former, that is, enough until another cam projection rides under the lever 85. These operations successively repeat themselves and it is obvious that great numbers of ophthalmic mountings may be easily and very quickly produced without the necessity of separate and distinct steps. Ophthalmic mountings after being produced are passed through finishing and polishing stages, during the manufacture of spectacles or eye glasses.

It is to be noted that the chamber 30 for receiving the cooling fluid is around and conforms to the contour of the extruding opening 17. The fact is that this chamber 30 extends between the portions (which form the eyes of the ophthalmic mounting) of the extruding opening 17, so as to properly harden or season the bridge of the mounting. The temperature of the cooling fluid shall be such as not to harden the bridge too much, but just sufficient as to permit the extruded bridge to properly and freely pass through the bridge forming portion of the extruding opening, and in such wise as

not to retard the passage of the mounting. Being that there is so little of material forming the bridge, such material cannot be hardened or seasoned too quickly, for the reason that the bridge would be retarded and the eye portions of the mounting would extrude in advance of the bridge portion which would cause a distorted body from which the mounting is to be cut, thereby causing an irregular shaped mounting. While it is obvious that the cores 18 can be fluid cooled, by extending the chamber 30 through the supporting ribs 19 and into the cores, they are not so cooled for the reason that those portions (which form the eyes of the mounting) of the extruded body would harden or season too rapidly, and hence tend to retard the eye forming portions of the extruded body, in which case the bridge forming portion of the extruded body would extrude in advance of the eye forming portions. In case the cores should be fluid cooled, it would then be necessary to thicken the walls around the bridge forming portions of the extruding opening 17, by lessening the conformity of the chamber 30 to the bridge forming portion of said opening. However, it is necessary to maintain the cooling fluid, in either case, at a uniform constant temperature so as to insure proper and uniform hardening or seasoning of the extruded body from which the mountings may be cut.

As previously set forth the die or former is in one piece, the fact being that all parts thereof are integral, therefore, one of the most important features of the invention, and since the die is mounted, so that the die may be easily detached or swung to one side, the die can be readily cleaned. To enable the die to be swung hingedly, all nuts 16 excepting one at the side may be loosened allowing the bolts 11 with the loosened nuts to be removed, and then after detaching the link 28 from the knife or cutter, the die may be swung hingedly, permitting access to the inner face of the die.

In making all parts of the die proper integrally solid the cores are integrally supported by the ribs 19, and in addition the inner portions of the cores are tapered, the purpose being to increase the inner portion of the extruding opening 17, allowing a greater bulk of material to enter the opening, than is permitted to extrude from the opening.

In this way the plastic composition is gradually contracted from a larger expanded size to a smaller size, thereby causing the particles of the composition, after being divided by the ribs 19 during the initial passage of the composition into the extruding opening, to bind integrally together into a homogeneous mass. In this specification it has been pointed out the necessity of

making the die in one piece, that is to simplify the structure for this particular character of mounting and to make a more practical, desirable machine to produce a particular process, which results in making a greatly desired and definite ophthalmic mounting, and since necessity is the mother of invention, it is essential to support the cores integrally in the openings 17 by the ribs 19 and to taper the cores in order to integrally bind the particles of the composition into a solid homogeneous mass, whereby the knife in making its operations may cut the mountings without crushing or distorting them.

The invention having been set forth what is claimed is:

1. A machine for forming ophthalmic mountings, comprising a die having an opening whose contour conforms to the configuration of an ophthalmic mounting, means for expressing plastic material through the die, a knife operating against the outer face of the die and movable across the opening thereof, a driving means, and means operating automatically to alternately connect the driving means with the expressing means and knife-operating means.

2. A machine for forming ophthalmic mountings, comprising a die having an opening conforming in contour to an ophthalmic mounting, means for expressing plastic material through the die, a knife operating against the outer face of the die and movable across the opening thereof, a driving means, and means operating automatically to alternately connect the driving means and knife-operating means, including two clutches, one co-acting with the expressing means and the other with the knife-operating means, and means operated continuously by the driving means acting to alternately shift one of the clutches in and the other out of operative engagement with the driving means.

3. A machine for forming ophthalmic mountings, comprising a die having an opening conforming in contour to an ophthalmic mounting, means for expressing plastic material through the die, a knife operating against the outer face of the die and movable across the mounting thereof, a driving means, and means operating automatically to alternately connect the driving means and knife-operating means, including two clutches, one co-acting with the expressing means and the other with the knife-operating means, and means operated continuously by the driving means acting to alternately shift one of the clutches in and the other out of operative engagement with the driving means, and comprising a cam on the driving shaft and clutch-shifting levers operatively engaged by the gear.

4. Steps in the process of forming a blank

for an ophthalmic mounting, consisting in extruding plastic composition through a die having a suitable opening to form the blank, cooling the mass while passing through the die, projecting the material from the die mounting just sufficient to form the blank and then immediately cutting said extruding portion from the mass within the die.

5. A machine for forming ophthalmic mountings, comprising a die having an opening whose contour conforms to the configuration of an ophthalmic mounting, means for expressing plastic material through the die, a knife including means for operating the same against the outer face of the die and moving it across the opening thereof, means extending about and adjacent the greater portion of the marginal edge of the outer face of the die to retain the knife in close engagement with the outer face of the die, a driving means, and means operating automatically to alternately connect the driving means with the expressing means and said knife operating means.

6. A machine for forming ophthalmic mountings, comprising a die having an opening conforming in contour to an ophthalmic mounting, means for expressing plastic material through the die, a knife operatively mounted on the die moving against the outer face of the die and across the opening and provided with double cutting edges to sever on the down and up-strokes of the knife, means for actuating the knife, a driving means, and means operating automatically to alternately connect the driving means with the expressing means and knife operating means.

7. A machine for forming ophthalmic mountings, comprising a die having an opening conforming in contour to an ophthalmic mounting, means for expressing plastic material through the die, a knife operatively mounted on the die moving against the outer face of the die and across the opening and provided with double cutting edges to sever on the down and up-strokes of the knife, means for actuating the knife, a driving means, means operating automatically to alternately connect the means with the expressing means and knife operating means, and a circular guard mounted on the die conforming to the greater portion of the marginal edge of the outer face of the die and spaced therefrom to admit of the knife and retain the latter in close contact with the outer face of the die.

8. The herein set forth process of manufacturing ophthalmic mountings, consisting in forming of plastic material an article whose cross sectional contour conforms to the configuration of an ophthalmic mounting, keeping the article constantly shaped, feeding the material in a mass and thereby maintaining a constant integral connection

with the article during the forming step, hence insuring a constant shaping of the material to form the article, cooling the article inwardly through its outer wall from the outer periphery of the article, and intermittently interrupting the feeding of said material, and hence allowing sufficient time for the cooling of the article.

9. The herein set forth process of manufacturing ophthalmic mountings, consisting in forming of plastic material an article whose cross sectional contour conforms to the configuration of an ophthalmic mounting, keeping the article constantly shaped, feeding the material in a mass and thereby maintaining a constant integral connection with the article during the forming step, hence insuring a constant shaping of the material to form the article, cooling the article inwardly through its outer wall from the outer periphery of the article, and intermittently interrupting the feeding of said material, and hence allowing sufficient time for the cooling of the article, cutting the article into ophthalmic mountings subsequently to the cooling step, each mounting being cut alternately with the interrupting step.

10. Steps in the process of forming an ophthalmic blank of the kind set forth, consisting of extruding a plastic composition through an opening having the shape of an ophthalmic mounting, allowing initial normal extrusion of the composition and dividing of the composition as it enters the opening, and subsequent progressive decreasing of the area of the composition as it leaves the opening, causing the divided parts of the composition to unite and bind together, cooling the composition to form the blank by injecting a cooling fluid in the wall of the opening, and thereby cool the mounting from the outer periphery thereof.

11. The herein set forth process, consisting of extruding a plastic composition through an opening having the shape of an ophthalmic mounting to form an article of corresponding shape in cross sectional contour, dividing of the composition as it enters the opening, and subsequent progressive decreasing of the area of the composition as it leaves the opening causing the particles of the walls of the mounting to bind together in a homogeneous mass, constantly forming the article and cutting the article transversely immediately after it is formed, thereby making ophthalmic mountings.

12. The herein set forth process of manufacturing ophthalmic frame blanks, consisting of forming an article of plastic composition with a cross sectional contour corresponding to an ophthalmic frame blank, automatically severing the end of the article

as it is extruded, and thereby continually
producing blanks for spectacle frames, and
cooling the article as it is being formed,
whereby as it is extruded its end may be
5 cut to form blanks.

In witness whereof the inventor's signa-
ture is hereunto affixed.

ROBERT A. BOSWELL.

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