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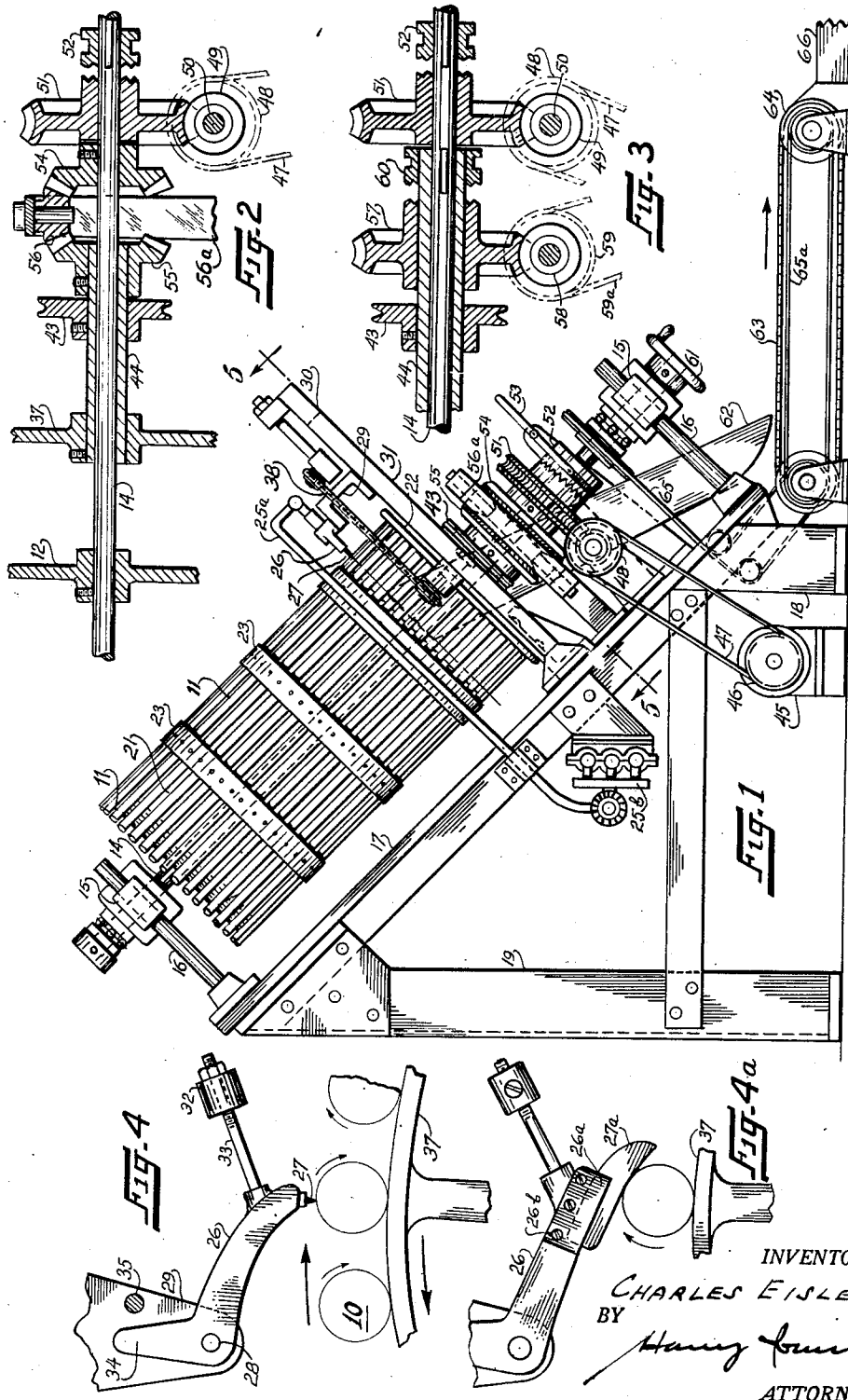
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HIGH-SPEED TUBE OR CANE CRACK-OFF MACHINE

Filed Jan. 18, 1950

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

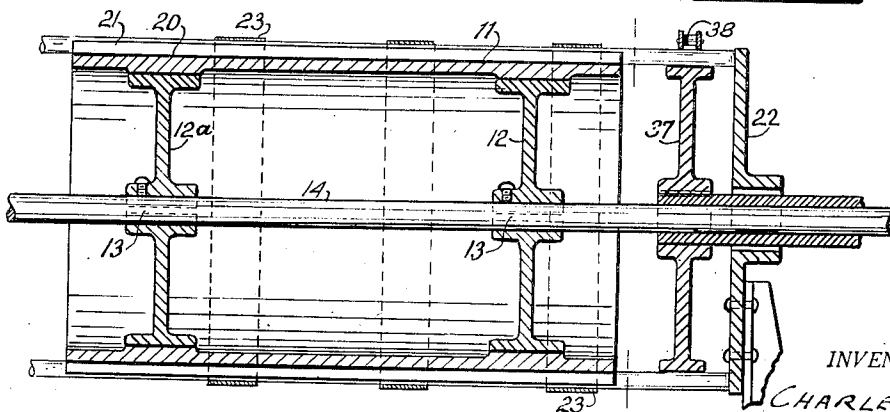
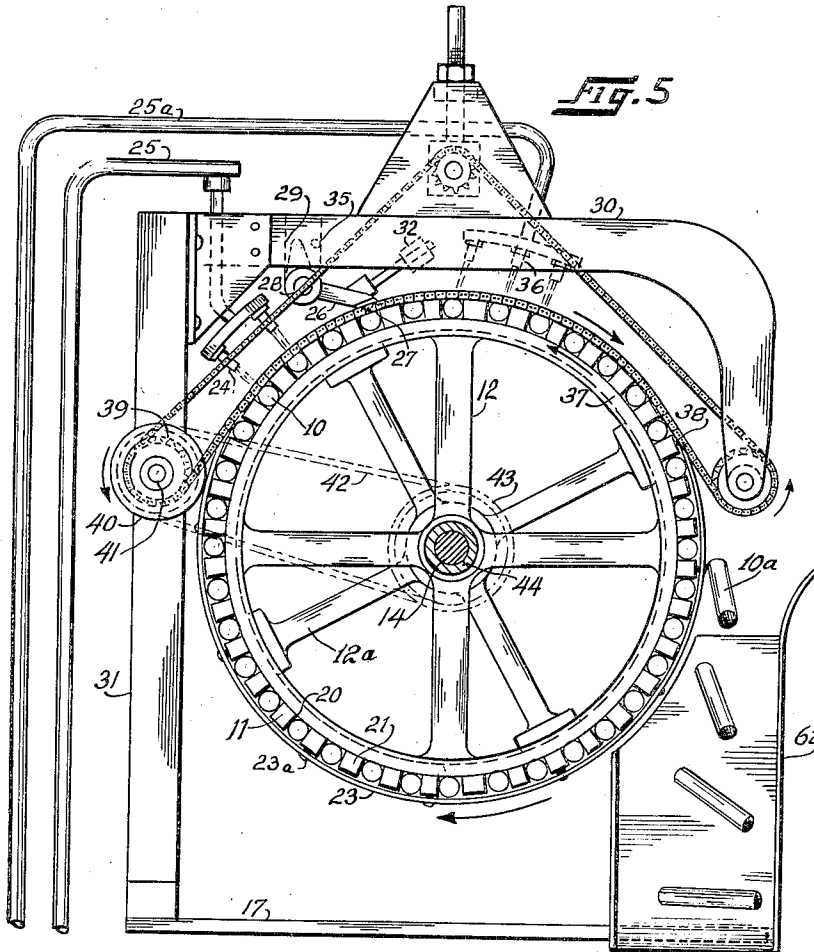


Fig. 6

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HIGH-SPEED TUBE OR CANE CRACK-OFF MACHINE

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2 Claims. (Cl. 49—48)

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The object of this invention is to provide a machine to crack off small lengths of glass tubing or glass cane contained in a rotary magazine or drum from which they are fed by gravity to the crack-off position, the machine being capable of producing a very large volume of pieces per hour of operation.

These and other advantageous objects, which will appear from the drawings, and from the description hereinafter, are accomplished by the structure of my invention, of which an embodiment is illustrated in the drawings. It will be apparent, from a consideration of said drawings, and the following description, that the invention may be embodied in other forms suggested thereby, and such other forms as come within the scope of the appended claims are to be considered within the scope and purview of the instant invention.

In the drawings:

Fig. 1 is a side elevational view of a machine embodying the invention,

Fig. 2 is a fragmentary sectional view of a means for driving the shaft 14 and sleeve 44 of the machine,

Fig. 3 is a similar view of an alternative drive means,

Fig. 4 is an elevational view of a scoring tool with diamond cutter, used in carrying out the invention,

Fig. 4a is a similar view of the scoring tool shown provided with a steel knife cutter,

Fig. 5 is a schematic elevational view of the drum and the implements used for cracking off, taken on line 5—5 of Fig. 1, and

Fig. 6 is a longitudinal sectional view of the drum and cognate parts.

The machine, as shown in the drawings, comprises the drum 11 having the internal frames 12, 12a mounted on and co-rotative, by such means as keys 13, with mainshaft 14 which is journaled in bearings 15 carried by stanchions 16 secured to bed frame 17 having supports 18, 19. Bed frame 17 and drum 11 are inclined so that the loading end of the drum is disposed highest. The drum and wheel drives, shown in Figs. 1, 2 and 3, may be installed at the higher end of the drum instead of at the lower end without requiring any important alterations other than a longer sleeve shaft.

The glass tubes (or canes) 10 which are to be cracked into short lengths are introduced by the operator into the grooves of the drum at its higher end and are then allowed to slide down by gravity until they abut the stationary stop plate 22 at the lower end.

The drum is provided around its outer periphery with the longitudinal grooves 20, which may be either integral with the drum body, formed in the castings or machine-grooved, or formed

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by suitably spaced slats 21 secured to the drum body.

The glass tubes (or canes) are held in the grooves by outer bands 23 which prevent them from falling out while the drum turns. These bands are secured to the slats by any suitable means such as the screws 23a.

The cracking-off operation takes place a short distance beyond the lower edge of the drum, the length of the cracked-off portion 10a of the tube being determined by the relative position of the stop plate 22. During the rotation of the drum, the tubes pass the burners 24 (Fig. 5) of which there may be one or more, for pre-heating at the region where they are to be cracked, the burners being fed with a mixture of gas and oxygen, which gives a hot flame, through the pipe 25. After heating, the glass tube (or cane, as the case may be) passes to the crack-off position, where the end is cracked off by the cutter 27 of the cutter arm 26 (Fig. 4). The cutter 27 may be of any material suitable for scoring glass, such as diamond, carborundum, hard steel, and the like, the scratching operation, combined with the lower temperature of the cutter, causing the glass to crack off evenly all around.

Fig. 4a shows the cutting arm 26 provided with a scoring knife 27a which may be made of steel or similar material. The knife 27a is clamped by plate 26a and screws 26b to the arm 26 for convenient removal for sharpening.

The cutting arm is hinged as at 28 in the bracket 29 carried by the overhead beam 30 (Fig. 5) supported by stanchion 31 secured to bed frame 17. The cutter 27 in arm 26 is urged into firm contact with the glass tubes by means of weight 32 adjustable on pin 33 carried by the arm. The stop pin 35 on bracket 29, contacted by the angularly directed end 34 of arm 26, prevents the arm and cutter, after the glass tube has been cracked and passed on, from dropping and damaging the next tube.

After the crack-off process, the glass tubes pass under the annealing burners 36, of which there may be a plurality, fed with a mixture of air and gas to correct the strains caused by the crack-off, the mixture being led to the burners by the pipe 25a. Gas pipes 25 and 25a are supplied with their respective mixtures by the usual mixer 25b connected with the gas supply pipes.

During the heating, cracking-off, annealing and cooling processes, the glass tubes are kept rotating about their own axes by the rim of the wheel 37 inside, and the outside chain 38, which are driven in opposite directions.

As shown in Fig. 5, the chain 38 is entrained over substantially only the upper half of the drum, and, as shown in Fig. 1, engages the tubes at a point below the point of engagement there-

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with of the cutter, whereby the tubes will be cut to length by the cutter and will be held by the chain in engagement with the drum until the drum has been rotated past the chain (Fig. 5), whereby the cut tube lengths 10a will fall by gravity into the discharge chute 62. The chain is driven by sprocket 39 and sheave 40, both on shaft 41, and belt 42 over sheave wheel 43 mounted on sleeve 44, rotatable on the drum shaft 14. The drum shaft is driven by the motor 45, pulley 46, belt 47, and pulley 48 which drives worm 49 of shaft 50. Worm 49 drives wormwheel 51 which is freely journaled on shaft 14, and with which it can be clutched by means of clutch 52 splined on shaft 14. When the clutch is thrown in by clutch lever 53 (Fig. 1), the worm wheel and shaft are co-rotative and the drum 11 revolves.

In order to rotate the glass tubes, the drum 11 and internal wheel 37 are revolved in opposite directions. This can be effected either by driving wheel 37 and its sleeve shaft 44 in the required direction, as hereinafter explained, directly from shaft 14, as shown in Fig. 2, or else by a completely independent drive from the motor, as shown in Fig. 3. In Fig. 2, bevel gear 54 is shown mounted on shaft 14, opposing a similar gear 55 on shaft 44, both gears meshing with the idler bevel pinion 56. Bevel gear 55 is fixed on sleeve shaft 44 on which is also fixed the glass tube friction wheel 37. By means of the idler pinion 56, mounted in fixed support 56a, the direction of rotation of sleeve shaft 44 is therefore the reverse of that of shaft 14 (and thus of drum 11). In this particular exemplification, the clutch 52 thus connects or disconnects both the wheel 37 and the drum 11 with or from the motor.

In Fig. 3, the described reversing mechanism is omitted, and a second worm wheel 57 is freely mounted on sleeve shaft 44, and is driven by worm 58 actuated by a direct motor drive 59, 59a. The worm wheel 57 is clutched by clutch 60 with sleeve shaft 44. In this exemplification, then, either the drum 11 or the internal friction wheel, or both together can be connected to and/or disconnected from the motor.

When drum and wheel have been de-clutched (leaving motor still running), or when the motor has been stopped, the drum and drum shaft can be turned by hand, for adjustment and cleaning, by the hand wheel 61 on shaft 14.

The cracked-off tube ends 10a fall by gravity into the discharge chute 62 and from there onto conveyor 63 driven from pulley 64 by transmission 65, 65a, to be finally disposed in work box 66.

Variations and elaborations of the drive mechanisms may be made within the scope of the invention.

In the manufacture of lengths of glass tubing, it is found, in practise, that variations in length are bound to occur. The machine of the invention enables the glass tubes to be made initially greater than an approximate length, and to be then cut to units of precisely standard length.

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Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a high speed tube crack-off machine, a frame, supports to dispose the frame on a horizontal surface, bearings secured to said frame at spaced points relative to each other, defining an acute angle to said horizontal surface, a shaft disposed in said bearings, and thereby located at an acute angle to said horizontal surface, a drum secured to said shaft coaxially, outer bands secured to said drum in spaced relation thereto to define therewith openings to receive glass tubes, means on said drum for spacing said tubes in parallel relation, a stop plate at the lower end of the drum against which the tubes come to rest by gravity, friction means engaging the tubes at spaced points internally and externally of the drum to rotate the tubes, and a cutter disposed at a predetermined distance from the stop plate to contact the rotated tubes and cut them to precise predetermined lengths fixed by the spacing of the cutter from said stop plate.

2. In a high speed tube crack-off machine, a frame, supports to dispose the frame on a horizontal surface, a shaft, and bearings for said shaft on said frame to locate the shaft at an acute angle to the horizontal surface, a drum secured to said shaft, means engaging said shaft to rotate the same, means on said drum to hold a plurality of tubes on said drum, a stop plate at the lower end of the drum against which the tube rests by gravity, and a chain entrained over substantially the upper half of said drum, means to rotate said chain to rotate the tubes, and a cutter disposed at a predetermined distance from the stop plate to contact the rotating tubes at the upper half of the drum and to cut them to precise predetermined lengths, said chain engaging the tubes at a point below the point of engagement therewith of the cutter, whereby the tubes will be cut to said lengths by the cutter and will be held in engagement with the drum by the engagement of the chain therewith until the drum has been rotated past the chain whereupon the cut tube lengths will fall by gravity.

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