

July 10, 1934.

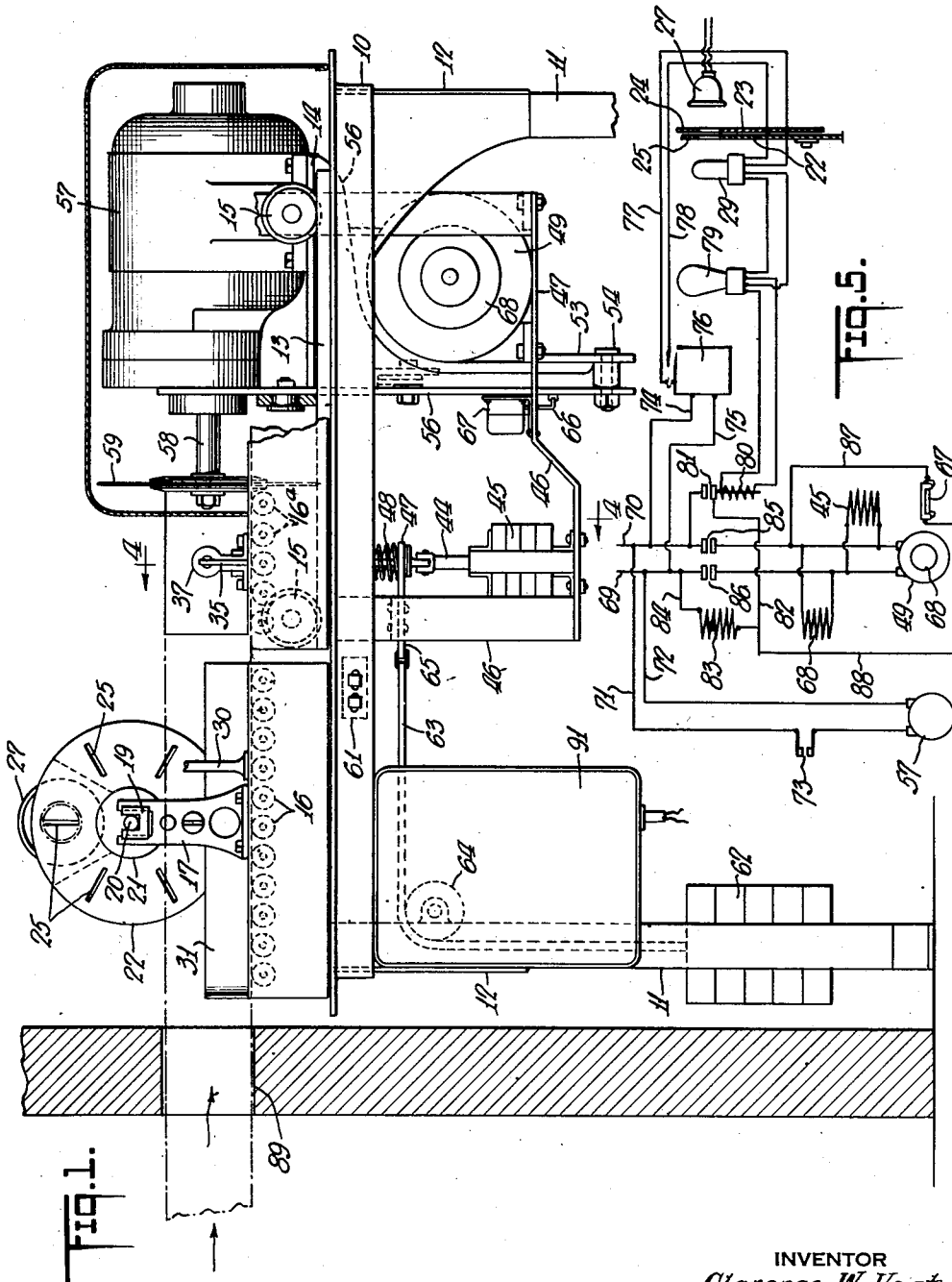
C. W. VOGT

1,965,620

AUTOMATIC CONTROL OF THE TREATING OF MATERIALS

Filed Dec. 10, 1931

3 Sheets-Sheet 1



INVENTOR
Clarence W. Vogt
BY
Dean Fairbank Hirsch & Foster
ATTORNEYS

July 10, 1934.

C. W. VOGT

1,965,620

AUTOMATIC CONTROL OF THE TREATING OF MATERIALS

Filed Dec. 10, 1931

3 Sheets-Sheet 2

FIG. 2.

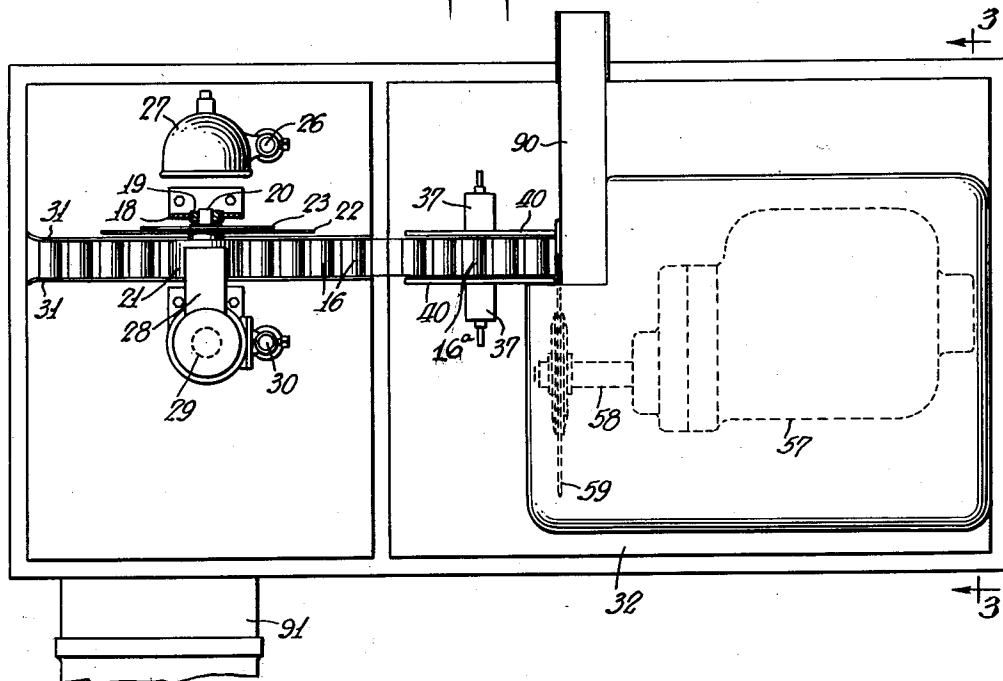
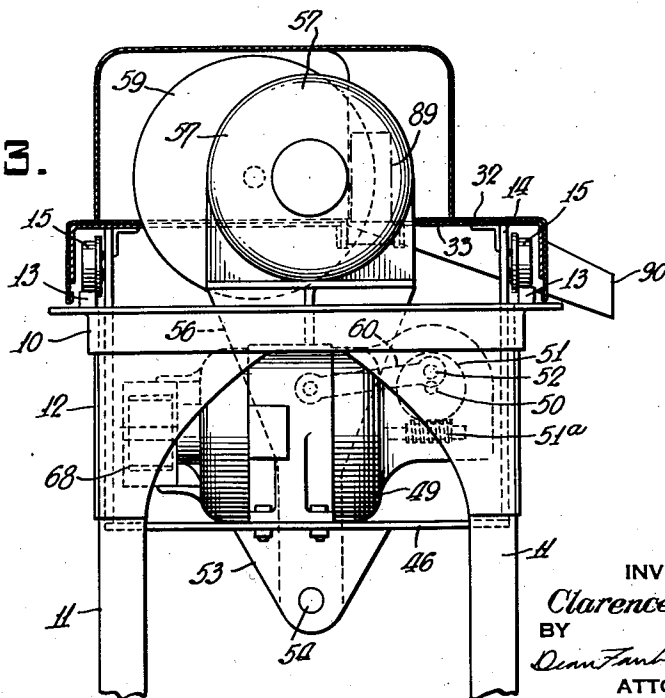


FIG. 3.



INVENTOR
Clarence W. Vogt
 BY
Dennis Fairbank Hurd & Foster
 ATTORNEYS

July 10, 1934.

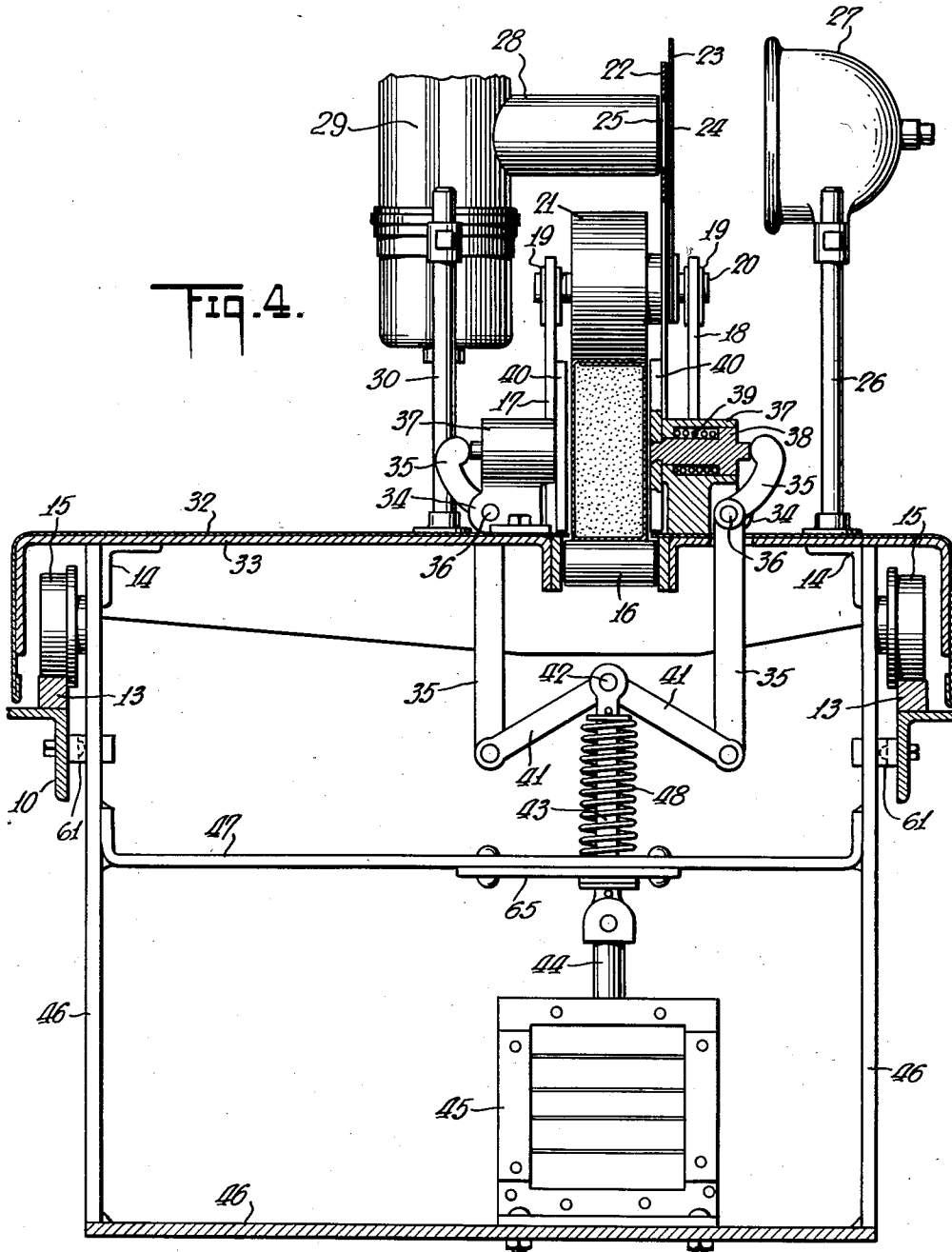
C. W. VOGT

1,965,620

AUTOMATIC CONTROL OF THE TREATING OF MATERIALS

Filed Dec. 10, 1931

3 Sheets-Sheet 3



INVENTOR

Clarence W. Vogt

BY

Dean Fairbank Huesch & Foster
ATTORNEYS

UNITED STATES PATENT OFFICE

1,965,620

AUTOMATIC CONTROL OF THE TREAT-
ING OF MATERIALS

Clarence W. Vogt, Louisville, Ky., assignor, by
mesne assignments, to Vogt Processes, Incorporated,
Louisville, Ky., a corporation of
Delaware

Application December 10, 1931, Serial No. 580,121

22 Claims. (Cl. 107—22)

This invention relates to methods of automatically measuring and cutting material into predetermined lengths, and to apparatus which may be used for carrying out the method.

One of the principal objects of my invention is to accomplish the measurement without the use of a target contacting with the end of the advancing material being measured and/or cut. This is particularly important where material such as ice cream or other comestible is to be cut and where direct contact between a target and the comestible might cause a contamination of the surface at the point of contact or a marring if the material be plastic.

Another disadvantage of a target is due to the obstruction it offers in many cases to the ready removal of the sections of the severed material, because the target is in the path of movement of the material being measured or cut. My new methods and apparatus are useable in connection with the cutting or subdividing of the ice cream column or bars as disclosed in my Patents Nos. 1,810,740, 1,810,863 and 1,810,864, and also certain of my pending applications.

My improved method and apparatus may be advantageously employed in connection with many other materials and products, particularly if the material to be cut is a comestible or is of a somewhat plastic nature.

In the drawings:

Fig. 1 is a vertical longitudinal view of the measuring and cutting mechanism.

Fig. 2 is a plan view of the same.

Fig. 3 is an end elevation partially in section taken on the line 3—3 of Fig. 2.

Fig. 4 is also a sectional view taken on the line 4—4 of Fig. 1, but on a larger scale, and

Fig. 5 is a wiring diagram of the electrical parts of the apparatus.

The apparatus, in the specific form illustrated, includes a frame 10 supported on legs 11 and reinforced at its corners by plates 12. Mounted on the frame 10 are rails or tracks 13 carrying a movable carriage frame 14. The rails support suitable wheels 15 which are mounted in the carriage preferably by ball or other roller bearings (not shown). Mounted in a fixed position on the frame 10 at one end thereof, is a roller conveyer flight 16, the rollers of which are located at such an elevation that the column of material passing to the cutting mechanism in the direction of the arrow (Fig. 1) will rest on or be supported by the top surfaces of the rollers. Mounted on opposite sides of the roller section 16 are pedestals 17 and 18 having their

upper portions grooved to provide a sliding fit with bearing blocks 19 for a transversely extending shaft 20. The shaft 20 preferably is so mounted as to permit rotation with the minimum friction. While the bearings for the shaft are not shown in detail it will be understood that any suitable form of frictionless mounting may be employed.

Fixedly mounted on the rotatable shaft 20 so as to move therewith are a measuring roller 21 and a disk 22 having an annular series of apertures or radial slots 25 spaced at equal distances apart. The spacing of the slots 25 is such that each slot is moved a distance equal to that between successive slots as the roller rotates over material of a length equal to a desired section to be cut off. In close juxtaposition to the apertured disk 22 is a normally stationary shield 23 containing one slot or aperture 24 which corresponds in size to the apertures 25 of the disk 22. Also mounted on the frame 10 and at one side of the apertured disk is a column 26 on which is supported a casing 27 including a reflector and an electric light bulb (not shown), the latter being attached to an ordinary electric light socket by the usual wiring or conductors. On the opposite sides of the disk 22 and shield 23 and closely adjacent thereto is a hood 28 enclosing a photoelectric cell 29. This hood with its photoelectric cell is mounted in a fixed position on a suitable pedestal or column 30 carried by an extension of the stationary frame 10. The flights 16 are provided with side guides 31 for the purpose of centering and guiding the material to be acted upon by the apparatus and delivering it beneath the roller 21.

The carriage frame 14 is covered by apron, top wall or shield 32 secured to cross-supports 33, and on this apron are mounted brackets 34 having trunnions 36 on which are pivoted lever arms 35. The brackets 34 also carry a housing 37 in which are mounted plungers 38 on opposite sides of the material and movable toward and from the latter. The plungers 38 each carry a clamping plate 40 and they are normally held by means of compression springs 39 in their out positions, that is furthest from the side surfaces of the material passing along the conveyer flight 16. Each of the levers 35 is connected by suitable links 41 to a pin 42 mounted on a draw bar 43 which is pivotally connected to the upper end of a rod 44 fastened to the armature of an electro-magnet 45 of the solenoid or other usual type. The electro-magnet is fastened to a depending stirrup or frame 46 fixed to the carriage

frame 14. A brace bar 47 serves to stiffen the stirrup 46 and also serves as a guide for the bar 43 and as a stop to maintain under compression a spring 48 acting to lift the bar 43 in its uppermost position when the magnet is deenergized.

Also mounted on the stirrup 46 is an electric motor 49 provided with a built-in reduction gear of the worm type, with its driven or reduced speed shaft 50 projecting at right angles to the high speed or main motor shaft. To the reduced speed shaft 50 is secured a disk 51 in the form of a worm wheel carrying a crank pin or eccentric 52 and meshing with a worm 51a secured to the shaft of the motor 49. Mounted to the under surface of the stirrup 46 are brackets 53 connected by a pivot pin 54, extending through the hub of a bracket 56 on which is mounted a motor 57 for operating the cutter.

I prefer to operate the motor 57 at a relatively high speed in order to effect easy cutting with a minimum of pressure, and therefore the motor operates through speed-increasing gearing. To the driven or high speed shaft 58 of the motor 57 is mounted a cutting disk 59 which should be of suitable material for the particular substance to be cut and which may have a smooth or a toothed peripheral edge.

For cutting of frozen and hardened ice cream I have found that a disk of stainless steel or Monel metal eight inches in diameter, when operated at approximately 6,000 R. P. M., produces a very clean cut, without rounding or marring the ice cream at the surfaces. Such rounding usually occurs to ice cream cut by the types of cutters previously used in the industry, where the cutters were of the shear type. This rounding is particularly likely to occur if the ice cream is enclosed in a paper wrapper, because the toughness of the paper requires considerable pressure to start the severance thereof.

The bracket 56 is arranged to oscillate about the pivot pin 54 as its center and the oscillation being effected by means of a link 60 pivoted to the bracket 56 above the pin 54 and to the crank pin 52. In the position shown in Fig. 3, the bracket 56 is in the center position and it will be apparent that for each complete revolution of the disk 51 the bracket 56 will be carried approximately an equal distance on each side of this position. This oscillation of the bracket 56 causes the motor 57 and the disk 59 to oscillate a correspondingly larger distance due to their relatively greater distance from the pivot pin 54. The movement is sufficient to move the cutting mechanism entirely through the material to be cut and then entirely out of the material.

The carriage 14 moves with the material during the cutting action and returns to initial position after the cutter has been withdrawn from the material. On the carriage are mounted a flight of rollers 16a which support the material while it is being advanced to the cutter. These rollers do not turn while the carriage is advancing with the material, but rotate during the return movement of the carriage.

The carriage 14, together with the parts carried thereby, normally remains in the position with the edge of the frame 46 abutting an adjustable stop 61 which is fixed to the frame 10. To hold it in this position there is provided a weight 62 depending from one end of a cable 63 extending over a pulley 64 and connected to an extension plate 65 on the stirrup 46.

On the brace 47 there is mounted a mercury switch 67 and on the bracket 56 there is mount-

ed a trip arm 66 for tilting the switch. This switch is well known in the art and contains a pair of contact pins which are connected electrically by means of liquid mercury contained in a glass tube into which these contact pins project. The switch is provided with a spring mechanism (not shown) tending to maintain the mercury in contact with the pins. On each revolution of the disk 51 the trip arm 66 causes the spring mechanism to be opposed sufficiently so that the mercury leaves one of the pins and causes an interruption of flow of the electric circuit of which these pins form a part.

The location of the trip arm 66 is such that this interruption occurs at the extreme outward throw of the bracket 56 or, in other words, at a point where the cutting edge of the disk is the furthest removed from the line of travel of the material. After this current has been interrupted and prior to its reestablishment by the measuring apparatus, the column of material will be free to pass the cutting disk. The electro-magnet 45 is connected in circuit with the motor 49 and the switch 67 so that the interruption of this current by the mercury switch causes deenergizing of the electromagnet 45 and stops the motor 49. The energizing of the electro-magnet causes the plates 40 to grip the sides of the material and causes the carriage to travel along with the material during the cutting action. The deenergizing of the magnet releases the plates 40 from the sides of the material so that the weight 62 carries the carriage 14 and the mechanism back to its normal position.

The motor 49 is provided with a solenoid brake 68 of the electro-magnetically operated spring opposed type, whereby the springs cause a brake mechanism to stop the rotation of the motor when the solenoid is deenergized. The purpose of the brake is to cause the motor 49 to come quickly to rest after its energizing current has been interrupted, as without such provision the motor tends to slowly decelerate due to the momentum of its rotor. This is a feature common in the art of electric motor control and the details have not been illustrated.

The wiring diagram, Fig. 5, indicates schematically the connections for electrically controlling the measuring and cutting mechanisms. Leads 69 and 70 carry electric current from a lighting or power circuit and supply current for operating the high speed cutter motor 57 through wires 71, 72 and toggle switch 73. Thus, as long as the switch 73 is closed, motor 57 will be operating. Wires 74 and 75 supply current from the source to a panel 76 which contains the necessary transformers and other equipment for adjusting the voltage and polarity of the current supplied through connections 77 and 78 to the photo-electric tube 29. With a voltage of proper magnitude and polarity applied between the elements of the photo-electric tube 29, the current it passes is proportional to the amount of light shining on it. Thus when the material passing under the measuring roller 21 causes one of the apertures 25 of the disk 22 to come into registry with the aperture 24 in the shield 23, sufficient light rays emanating from electric light bulb within the reflector 27 reach the tube 29 to cause the tube to pass sufficient current to the amplifying tube 79 to actuate a sensitive relay 80, and thus complete the circuit from the line 70 through contacts 81, wire 82, solenoid coil 83 and lead 84. The energizing of coil 83 causes the making of contacts of main switches 85 and 86, thus

supplying the current to operate the electro-magnet 45, the motor 49 and the solenoid brake 68. The energizing of the solenoid brake 68 removes the brake pressure on the motor 49 so that this motor is free to rotate, and the operation of the electro-magnet 45 causes the plates 40 to move into engagement with the advancing material so that the carriage 14 starts to move with said material.

Before the apertures 24 and 25 have passed sufficiently out of registry to cause the cessation of the passage of sufficient current through the amplifying mechanism, the mercury tube has returned to its closed position, and thereafter the current for maintaining the solenoid 83 in its energized position (thereby maintaining a closed circuit through main contacts 85 and 86), is supplied through lead 87, switch 67 and lead 88. However, just as the disk 51, attached to the driven shaft of the motor 49, has completed one revolution (thus having caused the cutting disk 59 to have traversed and retraversed the path of material and thus cut a measured portion of the material), the trip arm 66 causes the switch 67 to open as hereinbefore described, and the current supply to the motor 49 and magnets 45, 68 and 83 to be interrupted. Thereupon the brake takes effect upon the shaft of the motor 49, and the carriage which has been locked to and thus moved by the advancing column of material by the engagement of the plates 40 with the side of the material, is released and returned to its starting position by means of the weight 62. As soon as the succeeding aperture 25 registers with the aperture 24, this current is reestablished and the cycle is repeated.

The length of time that the photo-electric cell is energized or is permitting sufficient current to pass to the amplifying tube to actuate the sensitive relay, is governed by the speed of movement of the column, and also by the width of apertures 24 and 25. It is also affected by the intensity of light from the light bulb.

Provided more rapid actuation of main line switch is desired, the delay may be replaced by a thyatron tube of sufficient capacity to carry the current required by the motor 49 and magnets 45 and 68. In securing the amplification from microamperes to amperes by this device, the time lag is much less than that required by a series of relays of the electro-magnetic type.

The material to be operated upon may be first treated by methods and devices disclosed in my patents hereto referred to and then passed through an opening 89 of the housing enclosing the cutting apparatus. The advancing material passes over the roller conveyor flight 16 underneath the roller 21 and into the field of action of the cutter 59. The cut portions fall or slide down a chute 90 where they may be collected by hand and placed in suitable bundles, stacks or containers, or carried to wrapping machines as desired.

The photo-electrical relays, transformers and other electrical equipments are advantageously enclosed in a housing 91 secured to the frame structure 10.

It will be understood that while I only show one cutting disk, a plurality of disks mounted at desired spacing may be employed.

Obviously the cross-sectional shape of the bar to be cut is immaterial so far as the present invention is concerned. This bar is shown as rectangular in Fig. 4, but might be cylindrical or of any other desired shape. The cutter 59 is illus-

trated as being so mounted that it cuts at right angles to the direction of movement of the material to be cut. By mounting the axis of the motor 58 with one end higher than the other or with one end nearer to the path of travel of the material than is the opposite end of said axis, it will be obvious that the cutter may cut the material on a diagonal rather than at right angles. Such modifications do not involve any alteration in the construction, but only in the assembly or relative mounting of the parts.

One of the principal advantages of my novel method of measuring and cutting is the fact that this linear measurement is unopposed by a target and likewise the actuation of the cutting mechanism does not require the measuring device to make or break an electric contact, as has been the case with all other linear measuring devices heretofore proposed.

The elimination of the necessity for periodic contacts permits a more accurate linear measurement, and the elimination of slippage between the parts of the measuring elements, and the activating mechanism for the cutting attachments. Such slippage would occur where physical contacts, such as targets, were employed.

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

1. An apparatus for treating advancing material, including means for advancing the material, a rotary member having a light aperture, means for rotating said rotary member at a speed at all times proportional to the linear speed of travel of the material, and means controlled by the passage of light rays through said aperture, for effecting an operation on the advancing material.

2. An apparatus for treating advancing material, including a rotary member having an annular series of light apertures, means for rotating said member at a speed directly proportional to but faster than the linear speed of travel of the material, a source of light adapted to project light rays through said apertures in succession as said apertures are moved across the path of said light rays, and means controlled by the light from said source passing through said apertures in succession, for effecting successive operations on the advancing material.

3. A machine for cutting advancing material into predetermined lengths, including a cutter, a source of light rays, a member engaging with and rotated by the material, and having an aperture therethrough, so positioned that said aperture passes periodically across the path of said light rays at a frequency proportional to the speed of movement of said material, and means actuated by said light rays passing through said aperture for moving said cutter transversely across the path of movement of said material, to cut said material.

4. A machine for cutting advancing material into predetermined lengths, including a cutter, a source of light rays, a rotatable disk having an aperture, which is movable in the path of said light, means for rotating said disk at a speed varying in accordance with the speed of movement of said material, whereby the light rays from said source will pass through said aperture periodically in accordance with the speed of said advancing material, a photo-electric cell disposed on the side of said disk opposite to said source of light rays, and in the path of said light rays passing through said aperture, and means actu-

ated by said photo-electric cell for periodically moving said cutter transversely across the path of movement of said material.

5 5. A machine for cutting advancing material, including a cutter, a roller adapted to engage said material so as to be rotated in accordance with the speed of advancement of said material, a disk rotated by said roller, and to periodically permit light rays to pass, and means actuated by
10 said passing light rays for moving said cutter transversely across the path of movement of said material to cut said material.

6. A machine for treating advancing material, including a roller adapted to engage said material so as to be rotated by said advancing material, a member moved by said roller and having an aperture adapted to periodically move into the field of light rays, whereby said rays will pass through said aperture periodically in accordance with the rotation of said roller, and means actuated by the light rays passing through said aperture, for effecting successive operations on the advancing material.

7. An apparatus for treating advancing material, including a roller having its periphery adapted to be engaged by the advancing material and rotated by the advancement of said material, a plate having a slot, a rotary disk rotated by said roller and having an annular series of slots, adapted to move into registry successively with said first mentioned slot, and means energized by light rays passing through said registering slots for effecting successive operations on the advancing material.

8. A machine for cutting advancing material into predetermined sections, including a carriage, a cutter on said carriage, a roller having its periphery adapted to be engaged by the material to be cut, and rotated by the advancement of said material, and means controlled by said roller for moving said carriage in the direction of travel of the material.

9. A machine for cutting advancing material into sections, including a carriage, a cutter mounted on said carriage, a roller having its periphery adapted to be engaged by the material to be cut, and rotated by the advancement of the material, a clamping member connected to said carriage, and means controlled by the roller for moving said clamping member into engagement with said material to interlock said carriage with said material, whereby said carriage is moved with said material in the direction of travel of the latter.

10. A machine for cutting advancing material into sections, including a carriage, a cutter mounted on said carriage, a roller having its periphery adapted to be engaged by the material to be cut, and rotated by the advancement of the material, and means controlled by the roller for moving said cutter into cutting relationship with said material, and for moving said carriage in the direction of travel of the material.

11. A machine for cutting advancing material into sections, including a carriage movable back and forth in the direction of travel of the material, a frame pivoted on said carriage, a rotary cutter, an electric motor carried by said frame for rotating said cutter, and a second electric motor carried by said carriage for oscillating said frame, whereby said rotary cutter is moved periodically across the field of travel of said material to cut said material.

12. A machine for cutting advancing material, including a carriage, a frame pivoted on said car-

riage and mounted to swing transversely with respect to the direction of movement of said material, a cutter carried by said frame, means for oscillating said frame about its pivot point to move said cutter transversely into cutting action with said material, and means on opposite sides of the path of travel of the material for gripping the material and thereby moving said carriage in the direction of travel of the material.

13. A machine for cutting advancing material into sections, including a carriage movable back and forth in the direction of travel of the material, a cutter mounted on the carriage, movable therewith, and also movable transversely to the direction of movement of the carriage to sever the material, and clamping members carried by said carriage for gripping the advancing material, and causing the carriage to advance with said material.

14. A machine for cutting advancing material, including a carriage movable back and forth in the direction of travel of the material, a cutter mounted on the carriage, movable therewith, and also movable transversely of the direction of movement of the carriage to sever the material, an electric motor on the carriage for moving said cutter transversely to cut said advancing material, and means for causing the carriage to advance with the latter while said cutter is cutting said material.

15. A machine for cutting advancing material into sections, including a carriage movable back and forth in the direction of travel of the material, a cutter mounted on the carriage, movable therewith, and also movable transversely of the direction of movement of the carriage to sever the material, clamping plates on the carriage for gripping the material, and causing the carriage to advance with the latter, and electrical means carried by the carriage for operating said clamping plates.

16. A machine for cutting advancing material into sections, including a carriage movable back and forth in the direction of travel of the material, a cutter movable transversely of the direction of movement of the carriage to sever the material, electrically operated means for moving said cutter transversely with respect to the direction of movement of the material for cutting said material, clamping plates on the carriage for gripping the material and causing the carriage to advance with the latter, electrically operated means on the carriage for operating said clamping plates, and a switch mechanism for controlling the operation of both electrically operated means.

17. A machine for cutting advancing material into sections, including a carriage movable back and forth in the direction of travel of the material, a rotary cutter, an electric motor for operating said cutter and carried by said carriage, means for swinging said motor transversely with respect to the line of movement of said carriage, to sever the material, and means for interrupting the movement of said last mentioned means when said cutter is moved out of cutting action with said material, to permit said material to pass through the field of action of said cutter.

18. A machine for cutting continuously advancing material into predetermined lengths, including a rotary cutter, an electric motor for rotating said cutter, a second motor for oscillating said first motor bodily, whereby said cutter is moved transversely across the path of movement of said material, said motors being

80

85

90

95

100

105

110

115

120

125

130

135

140

145

150

mounted together for movement in unison in a direction parallel to the direction of movement of said material, means for interlocking said material and said motors, during the cutting action
 5 of said cutter, whereby said motors will travel from a normal initial position in the direction of movement of said material, while said cutter is operating on said material, and means for returning said motors to a normal position in a direction parallel to and opposite to the direction
 10 of movement of said material after said cutter has completed its cutting action.

19. An apparatus for cutting advancing material into sections, including a carriage, a cutter
 15 mounted on said carriage, a rotary member adapted to engage with the material and be rotated therewith, and having an aperture, and means controlled by the passage of light rays through said aperture for effecting the operation of said
 20 cutter.

20. A machine for cutting advancing material into sections, including a carriage movable back and forth in the direction of travel of the material, a cutter mounted on the carriage and movable
 25 therewith and also movable transversely to the direction of movement of the carriage to sever the material, and means carried by said carriage and on opposite sides of the path of travel of the material for gripping the advancing material and

causing the carriage to advance with the material.

21. A machine for cutting continuously advancing material into sections, including a carriage movable back and forth in the direction of
 80 travel of the material, a cutter mounted on the carriage and movable therewith and also movable transversely to the direction of the movement of the carriage to sever the material, means for intermittently advancing the carriage with the
 85 material, said means having parts for gripping the material on the carriage and in advance of the cutter whereby the carriage is advanced at the same rate as the material and without contacting with the previously cut exposed end surface of the material, and yielding means for moving
 90 the carriage in the opposite direction.

22. A machine for cutting continuously advancing material into sections, including a carriage movable back and forth in the direction of
 95 travel of the material, a cutter mounted on the carriage and movable therewith and also movable transversely to the direction of the movement of the carriage to sever the material and coacting means for intermittently locking together said
 100 carriage in advance of the cutter and said advancing material and thereby causing the carriage to advance with the material.

CLARENCE W. VOGT.

30	105
35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145