

Dec. 14, 1965

A. E. WINSLOW

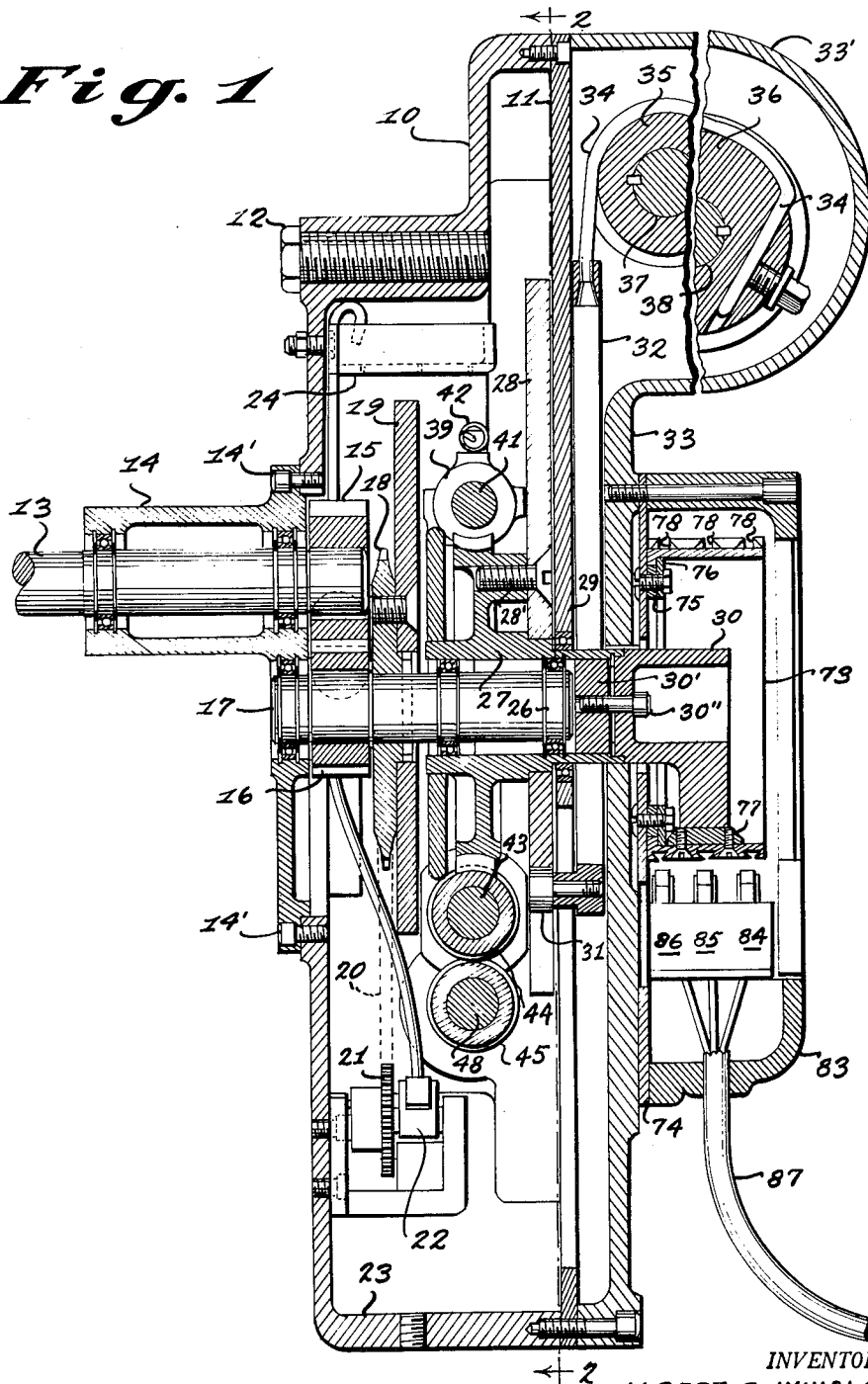
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BUILDER MOTION

Filed June 1, 1961

6 Sheets-Sheet 1

*Fig. 1*



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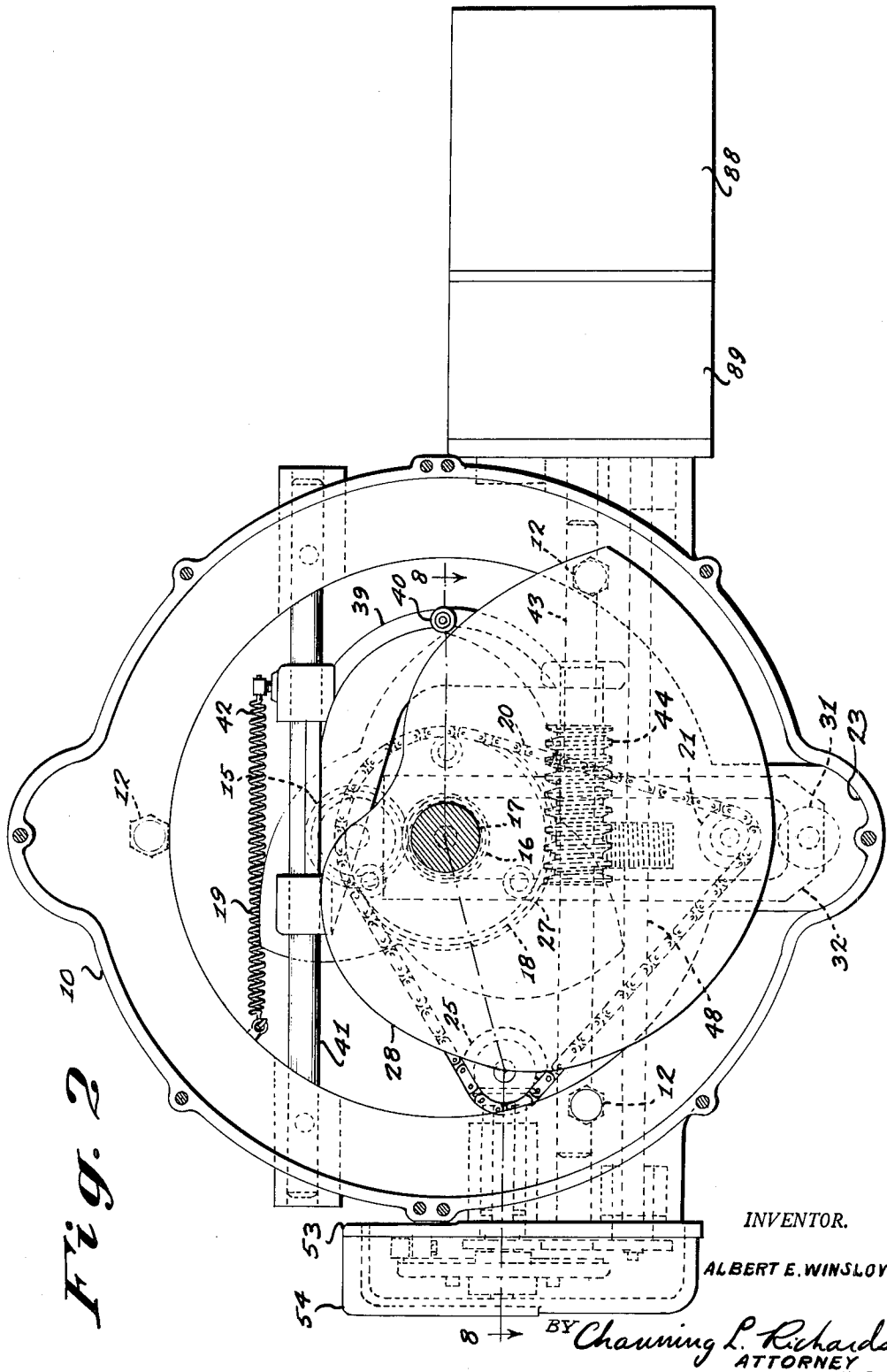
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BUILDER MOTION

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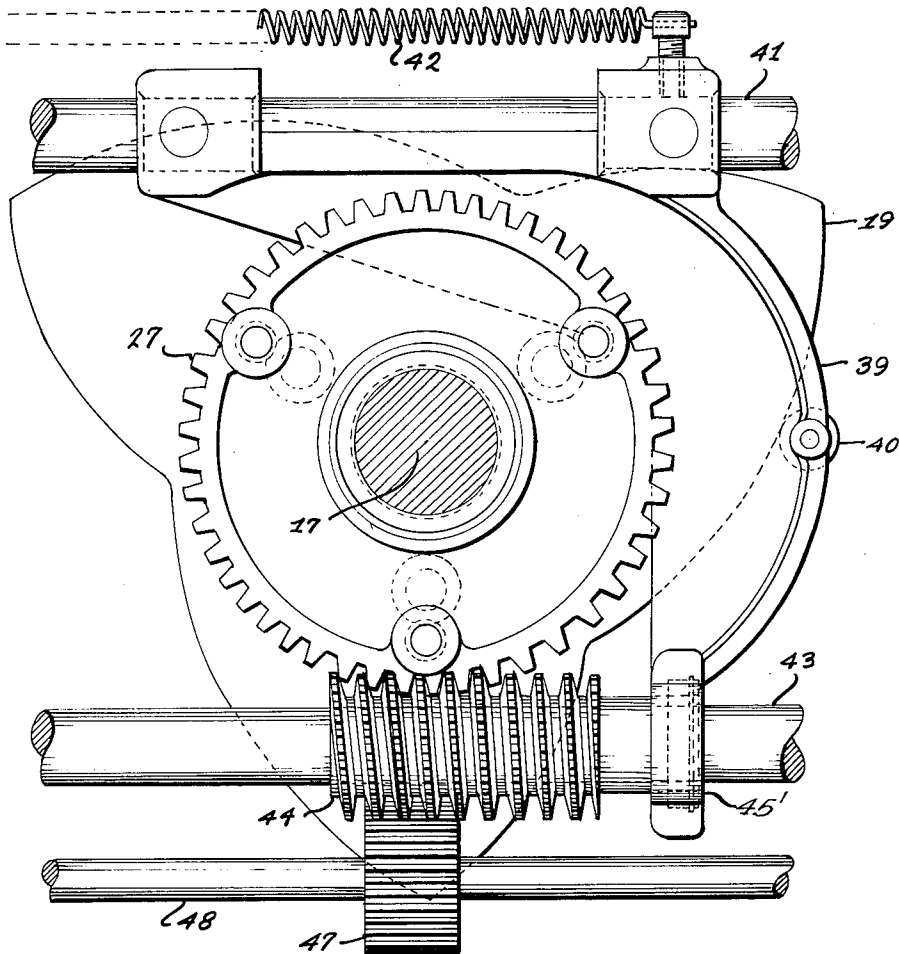
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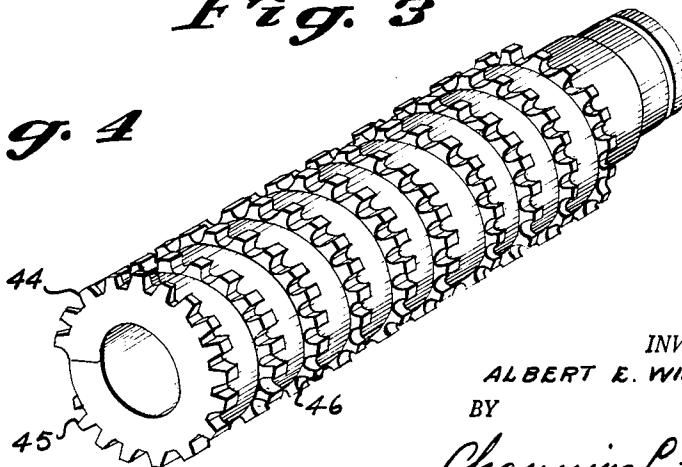
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*Fig. 3*

*Fig. 4*



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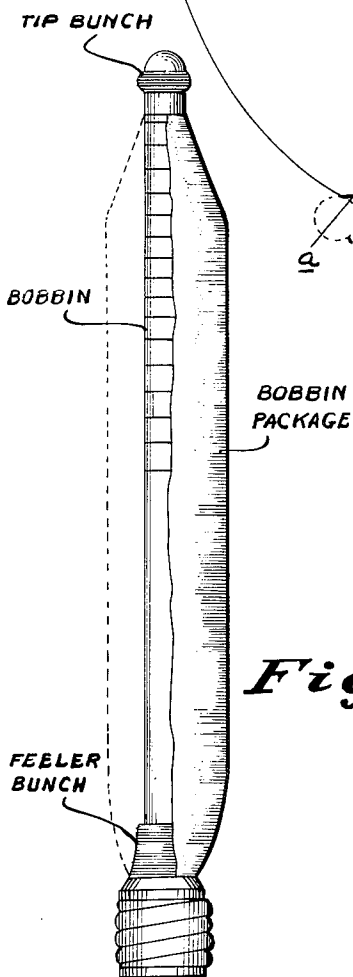
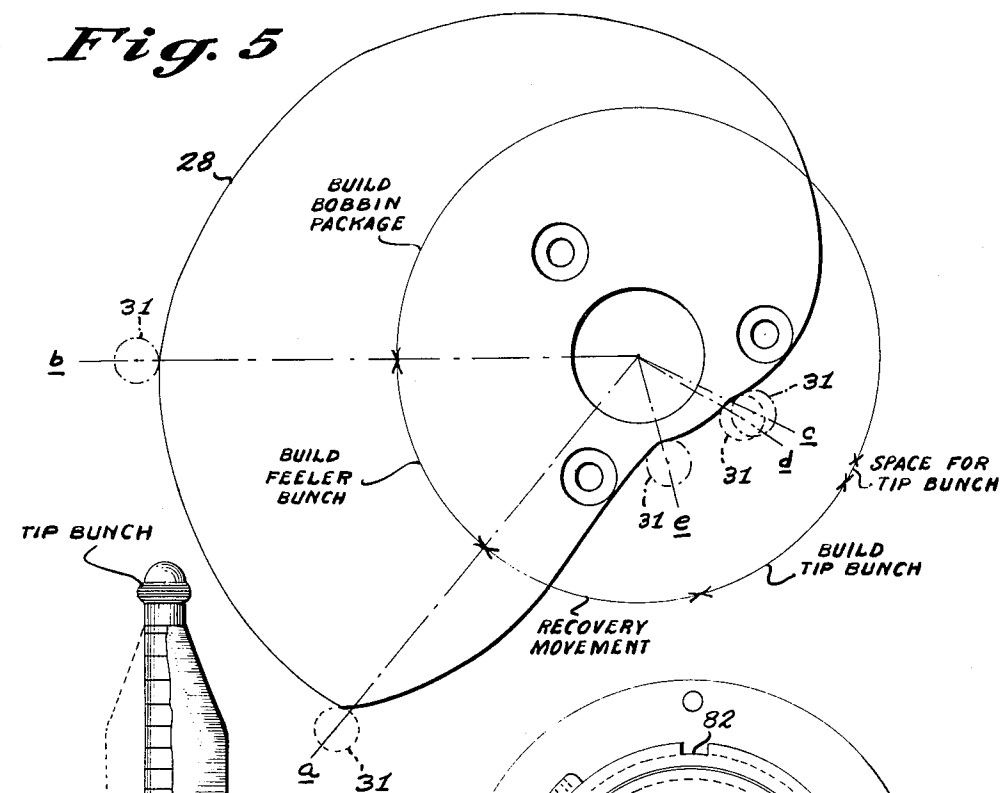
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BUILDER MOTION

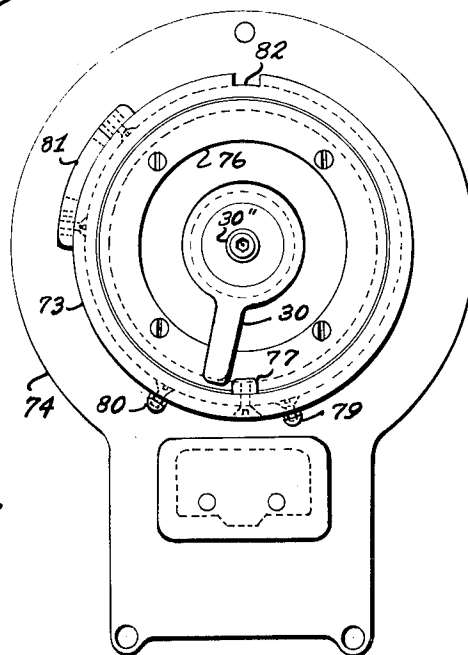
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*Fig. 5*



*Fig. 6*



*Fig. 7* INVENTOR.  
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BUILDER MOTION

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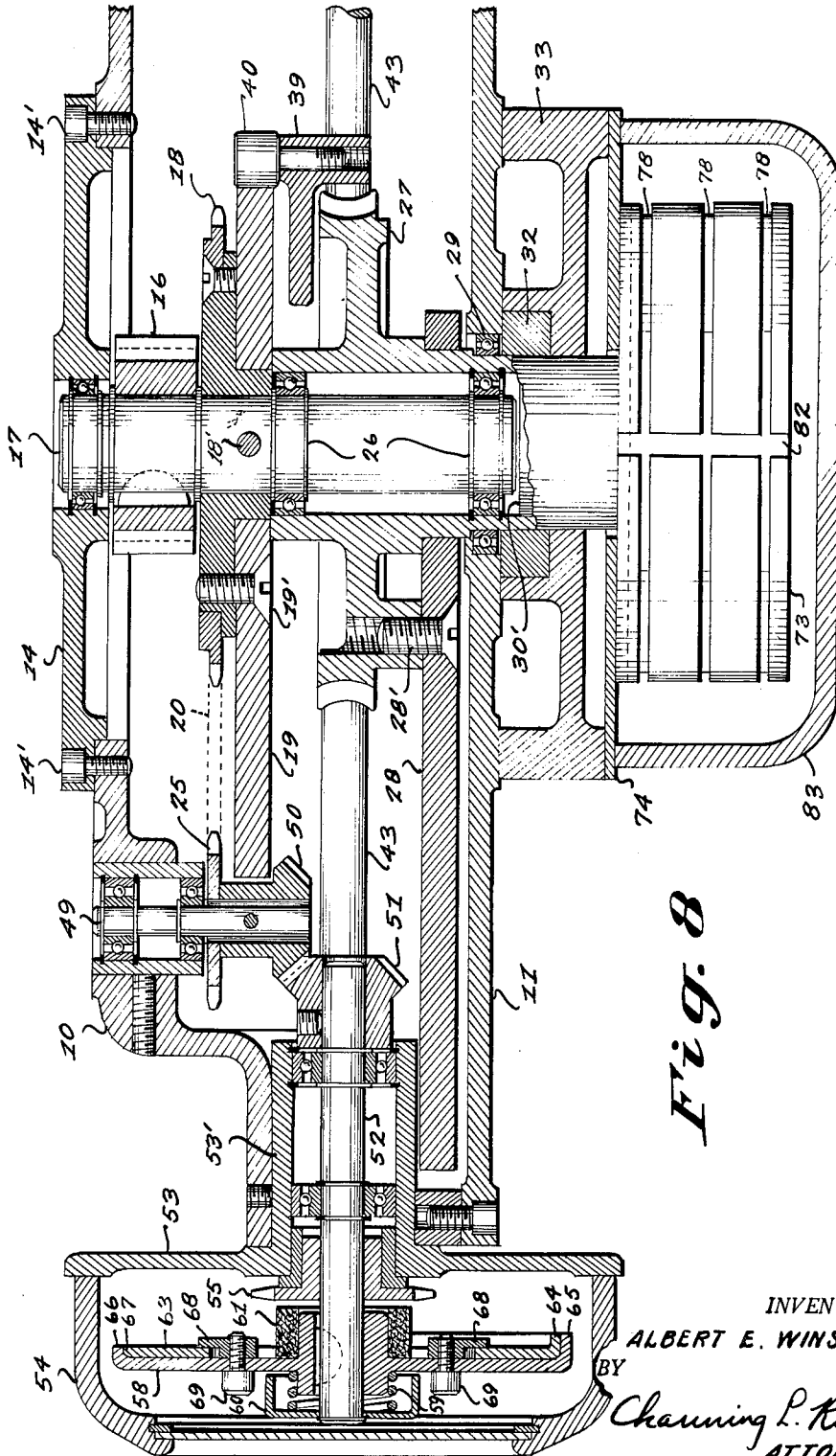


Fig. 8

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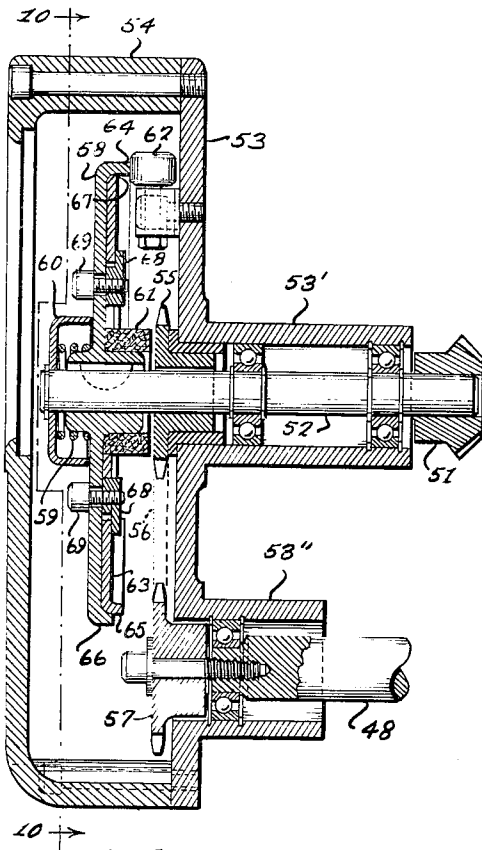
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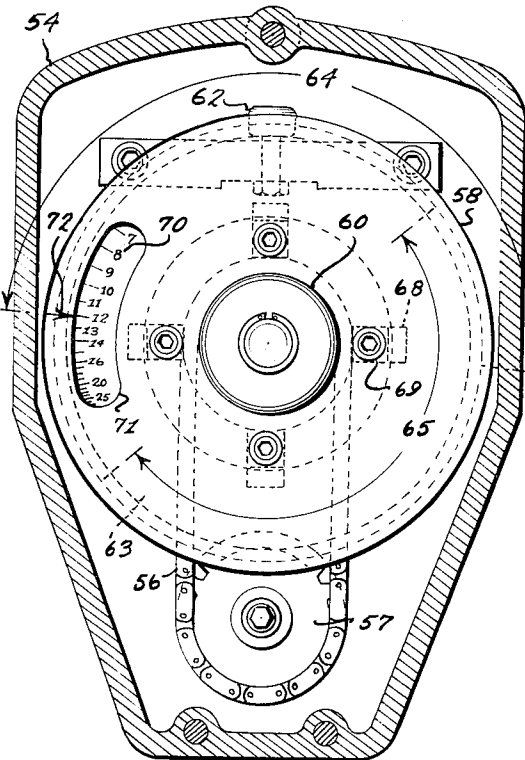
## BUILDER MOTION

Filed June 1, 1961

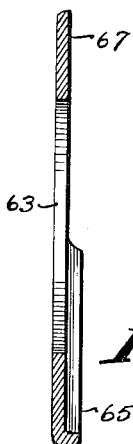
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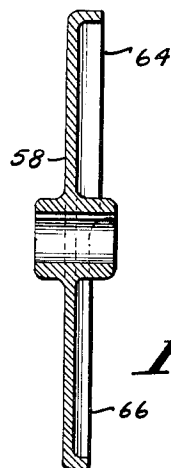
*Fig. 9*



*Fig. 10*



*Fig. 11*



*Fig. 12*

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3,222,941

## BUILDER MOTION

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Filed June 1, 1961, Ser. No. 114,132  
14 Claims. (Cl. 74—55)

This invention relates to builder motions such as are used for actuating a winding traverse in the operation of yarn spinning and twisting machines and the like, and more particularly to a uniquely improved builder motion of this sort by which the specific winding traverse required for any given form of yarn package can be provided for and controlled to exceptional advantage.

The builder motion of the present invention operates with singular effectiveness, for example, in the winding of filling or shuttle bobbins for use in automatic loom batteries, and for which purpose the filling bobbins must be built to include not only the usual "feeler bunch" as a part of the main yarn package, but a "tip bunch" as well that is required at a spaced disposition above the main package for use in automatically finding and retaining the package end as the battery operates to deliver the bobbins successively. The building of bobbins must be critically controlled in order to handle them satisfactorily in automatic batteries, and it has heretofore been usual to employ a special rewinding operation in forming shuttle bobbin packages that were intended for this purpose. The present invention, however, makes it possible to control the traverse movement with such accuracy that "direct spun" shuttle bobbins for automatic batteries may be built successfully at the spinning frame, so as to eliminate the special rewinding operation formerly needed.

Briefly described, the improved builder motion of this invention is characterized by a cycling cam contoured for controlling the particular traverse pattern desired, and associated mechanism for causing oscillation and selective indexing rotation of the cycling cam so as to deliver the traverse movement therefrom. By this arrangement it becomes possible to deliver the traverse movement rectilinearly from the cycling cam so that the traverse pattern is not distorted by an arcuate lever arm movement such as is characteristic of prior builder motions, and so that the cycling cam may be formed precisely in accordance with any predetermined traverse pattern for programmed oscillation and indexing rotation to control the position, extent and rate of the traverse movement with unique exactness and advantage.

These and other features of the present invention are described in further detail below in connection with the accompanying drawings, in which:

FIG. 1 is a vertical section view of a builder motion embodying the present invention;

FIG. 2 is a side elevation of the builder motion shown in FIG. 1 substantially as seen with the housing cover removed at the line 2—2;

FIG. 3 is an enlarged fragmentary detail of the mechanism through which oscillation and indexing rotation of the cycling cam is effected;

FIG. 4 is a perspective view of the special worm employed in the mechanism illustrated in FIG. 3;

FIG. 5 is a plan view diagramming the cycling cam;

FIG. 6 is a representative elevation of a filling or shuttle bobbin partly broken away to illustrate the nature of the bobbin build in relation to the cycling cam diagram of FIG. 5;

FIG. 7 is an elevation detail on timing means provided for actuating selective indexing rotation of the cycling cam;

FIG. 8 is a further section view of the builder motion taken substantially at the line 8—8 in FIG. 2;

FIG. 9 is an enlarged vertical section detail of the

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mechanism provided for actuating periodic indexing rotation of the cycling cam;

FIG. 10 is a left side elevation detail corresponding generally to FIG. 9;

FIG. 11 is a further section detail of the inner cam plate employed in the mechanism shown by FIGS. 9 and 10; and

FIG. 12 is a corresponding section detail of the outer cam plate of the FIGS. 9 and 10 mechanism.

Referring now in detail to the drawings, and more particularly at first to FIGS. 1 and 2, the illustrated builder motion embodying the present invention is shown arranged in a main housing 10 having a cover plate fitted thereto at 11. Threaded leveling plugs 12 are provided on the main housing 10 so that its mounted disposition may be squared properly in relation to a main input drive shaft 13 journaled in a housing bracket 14 and extending from any suitable power source (not shown). In using the builder motion on a spinning frame, for example, the input shaft 13 may be extended from the head end worm drive normally provided for the builder, and the leveling plugs 12 allow the housing 10 to be squared readily in relation to this drive source upon installation. Also, it should be noted that the housing bracket 14 carries the input shaft 13 in offset relation so that it may be attached to the main housing 10 at more than one position by the same attaching screws 14' to provide for adjusting the position of the builder motion to the space available in the spinning frame or other machine on which it is to be installed.

The input shaft 13 extends inwardly through the housing bracket 14 to carry a spur gear 15 in mesh with a paired gear 16 fixed on a main builder shaft 17, that is journaled centrally in the housing bracket 14 at one end and supported by the housing cover plate 11 at its other end. Adjacent the spur gear 16, a sprocket wheel 18 is doweled on the builder shaft 17 (as indicated at 18'), and has an oscillator cam 19 attached thereto by screws 19', so that both of these elements are fixed on the builder shaft 17 to be rotated therewith by the drive from the input shaft 13.

The sprocket wheel 18 has a chain 20 trained thereover that extends also about a lower sprocket wheel 21, to drive a suitable pump means 22 for circulating lubricant from a housing sump portion at 23 to an overhead drip pan at 24; and about a lateral sprocket wheel 25 from which a letoff action is operated in the manner described in detail further below. Likewise, the purpose and operating arrangement of the oscillator cam 19 is described in particular further below.

The remaining extent of the builder shaft 17 is fitted with bearings 26 to support the hub of a worm wheel 27 for rotation thereon. The worm wheel 27 is formed to have a cycling cam 28 assembled coaxially therewith by attaching screws as indicated at 28' in FIG. 1, and the worm wheel hub portion extends through a bearing support at 29 in the housing cover plate 11 to carry a plug 30' for receiving an attaching screw 30" by which a radial arm member 30 is fixed at the extending hub portion end to rotate with the worm wheel 27.

In vertical alignment below the builder shaft 17, the housing cover plate 11 is vertically slotted to allow disposition at the cycling cam 28 of a follower roll 31 that is carried by the lower end of a slide member 32 arranged at the outer face of the cover plate 11 in a slide-way structure 33 (compare FIGS. 1, 2 and 8) to deliver the traverse movement. For this purpose, a cable 34 or the like is extended from the upper end of the slide member 32 over an idler pulley 35 to a jack shaft pulley 36, the slideway structure 33 having an upper housing portion 33' formed to carry the pulleys 35 and 36 on respective shafts 37 and 38 with the jack shaft 38 ex-

tended exteriorly for connection in any usual or suitable manner (not shown) to operate the machine elements that are to be traversed.

Returning now to consider more particularly the operating relation of the several elements carried by the builder shaft 17, and referring additionally to FIG. 3 in this connection, the oscillator cam 19 is seen to be a three-lobe cam of the type commonly employed in builder motions for obtaining a filling build. Normally, however, a cam of this sort is arranged to act on a pivoted builder arm to deliver the traverse movement as previously noted, while the builder motion of the present invention incorporates no builder arm of the conventional type at all and uses the cam 19 simply as a source of oscillating motion. Accordingly, the shape of the oscillator cam 19 becomes a matter of convenience as employed in the present invention, so that its illustrated shape is purely representative and might be varied at will for supplying an oscillating motion suited to a particular instance being dealt with.

To transmit the oscillating motion from the oscillator cam 19, a slidably mounted yoke 39 is arranged in following relation thereto; this yoke 39 having a follower roll carried thereon at 40 to ride the outline of cam 19, and being hung from an upper slide rod 41 with a bias spring 42 extended therefrom to make certain that the following relation is always maintained. The upper slide rod 41 is fixed in the main housing 10 at a disposition extending transversely of the builder shaft 17 and vertically aligned above the worm wheel 27 (compare FIGS. 1 and 2), and a lower slide rod 43 is similarly carried by the housing 10 below the worm wheel 27, while the yoke 39 is offset to extend downwardly between the oscillator cam 19 and the worm wheel 27 for connection with a worm 44 that is rotatably and slidably disposed on the lower slide rod 43 in engagement with the worm wheel 27.

The connection of the yoke 39 with the worm 44 is made through a bearing unit (as indicated at 45' in FIG. 3), so that the worm 44 remains rotatable on the lower slide rod 43 while being caused to oscillate axially in response to the motion transmitted by the yoke 39 from the oscillator cam 19; and the result of such axial oscillation is that the worm 44 acts additionally as a rack to oscillate the worm wheel 27 angularly about its axis, together with the cycling cam 28 carried thereon, while still being rotatable for acting in its usual character to rotate the worm wheel 27 and cycling cam 28. In order to provide for its rotation, the worm 44 is formed specially according to the present invention, as seen best in FIG. 4, with longitudinal grooves 45 that intersect the spiral thread 46 in its outer surface in the endwise outline of a spur gear, so that a meshing spur gear 47 can be arranged on a countershaft 48 spaced parallelly below the lower slide rod 43 for effecting rotation of the worm 44 at any time during its axial oscillation.

The nature of the cycling cam 28 that is assembled with the worm wheel 27 for oscillation and rotation through the worm 44 as just described above, is illustrated in FIG. 5 with diagramming related to the showing in FIG. 6 of a representative filling bobbin build to be produced. As indicated in FIG. 6, a filling bobbin characteristically requires a "feeler bunch" to be built first adjacent the base of the bobbin for signalling imminent exhaustion of the active shuttle bobbin during loom operation; then a main yarn package extending predominantly on the body of the bobbin; and finally, if an automatic loom battery is to be serviced, a "tip bunch" must be built in spaced relation above the main yarn package. Accordingly, the illustrated cycling cam 28 is formed with operating segments *a-b*, *b-c*, *c-d*, and *d-e*, to accomplish each of these steps, plus a final operating segment *e-a* for recovery movement to complete the builder motion cycle.

The several dotted circles spaced about the contour of the cycling cam 28 in FIG. 5 represent the relative posi-

tions at the operating segment boundaries of the follower roll 31 through which the traverse movement is delivered to the slide member 32. Assuming the builder motion to be set so that the cycling cam 28 has the follower roll 31 related at position *a* in preparation for starting a bobbin building operation, the start of operations will commence rotation of the oscillator cam 19 as the input drive is delivered through shaft 13 and the gearing 15-16 to the builder shaft 17, and rotation of the oscillator cam 19 will in turn commence oscillation of the cycling cam 28 about its axis through the connection of the follower yoke 39 with the worm 44.

Such oscillation will cause a repeating fall and rise of the follower roll 31 along the operating segment *a-b* of the cycling cam 28 that is provided for building the "feeler bunch" as indicated in FIG. 5, and this repeating fall and rise will actuate the slide member 32 correspondingly to deliver the traverse movement in an extent and at a rate dictated by the mechanical proportions of the previously described operating elements through which the cycling cam 28 is oscillated in response to rotation of the oscillator cam 19. Without more, however, the traverse movement would simply track itself at the same position so that no building displacement would be obtained along the bobbin barrel, and the builder motion is accordingly arranged for additionally actuating controlled indexing rotation of the worm 44 both at periodic intervals, to provide a letoff action comparable to that of the pick mechanism of conventional builders, and at selected intervals for supplementary indexing of the cycling cam 28 to bring its several operating segments successively into play with proper timing as the building operation progresses.

The arrangement to obtain periodic indexing rotation for letting off is illustrated in FIGS. 2 and 8 as being operated from the previously mentioned lateral sprocket wheel 25 that is driven through the chain 20 from the builder shaft sprocket wheel 18, so that the operation proceeds concurrently whenever the oscillator cam 19 is being rotated. The lateral sprocket wheel 25 is mounted on a stub shaft 49 that is supported by the main housing 10 to carry a bevel gear 50 as well. A mating bevel gear 51 is carried on a take-off shaft 52 that extends through bearing supports arranged in a sleeve portion 53' of an auxiliary housing plate 53 fitted on the main housing 10 and with an auxiliary housing cover 54 assembled thereon (compare FIGS. 8 and 9).

The auxiliary housing sleeve portion 53' also supports a rotatable sprocket member 55 in concentrically spaced relation about the take-off shaft 52, and a sprocket chain 56 is extended from the sprocket member 55 to a sprocket 57 fixed on the previously noted countershaft 48 at an end thereof extending to a supported disposition in a second sleeve portion 53'' of the auxiliary housing plate 53 (compare FIGS. 2 and 9). The extending end portion of the take-off shaft 52 has an outer cam plate 58 slidably keyed thereon with a bias spring 59 bottomed in adjacent retaining means 60 to urge the outer cam plate 58 toward the sprocket member 55 so that a tubular friction block 61 carried at the cam plate hub portion will be applied to cause rotation of the sprocket member 55 and thereby connect the take-off shaft 52 to rotate the countershaft 48 through the chain 56 and sprocket 57. The outer cam plate 58 is only allowed, however, to shift at periodic intervals toward the sprocket member 55, in the above noted manner, by the arrangement of a cam roll 62 on the auxiliary housing plate 53 which acts to maintain the outer cam plate 58 retracted against the force of the bias spring 59 during a portion of each revolution that it makes; and an inner cam plate 63 is nested with the outer cam plate 58 and made relatively adjustable thereon for setting the extent of the retracted positioning during each revolution (see FIGS. 9 and 10).

For operation in relation to the cam roll 62, each of the cam plates 58 and 63 are circularly shaped and have

a substantial circumferential portion thereof peripherally flanged (as indicated at 64 and 65 in FIGS. 9 to 12) at respective widths that will nest coextensively at a first camming width, and the remaining circumferential portion 66 and 67 of each cam plate 58 and 63 has a lesser  
5 respective width for nesting coextensively at a second lesser camming width; these first and second camming widths being such that the outer cam plate 58 is displaced to its retracted position while the cam roll 62 is ridden by the flange portions 64 and 65 forming the first cam-  
10 ming width and is released at the second lesser camming width for applying the friction block 61 to the sprocket member 55.

In order to set the periodic interval at which the outer cam plate 58 is thus released to engage the sprocket member 55, the inner cam plate 63 is assembled at its nested position by clamping means 68 fitted with tightening screws 69 that allow adjustment of the cam plates 58 and 63 to a selected circular relation for presenting desired  
15 circular extents of the first and second camming widths to the cam roll 62 during each revolution. For use in selecting the proper circular relation for particular conditions, the inner cam plate 63 may advantageously have an accurate scale 70 laid out thereon at a suitable calibration, such as in terms of the yarn count for the bobbins to be built,  
20 with a related aperture 71 and indicator marking 72 on the outer cam plate 58 to gauge the setting as illustrated best in FIG. 10.

At any selected setting, however, the operating result of the above described mechanism is to drive the countershaft 43 periodically so that a periodic indexing rotation of the worm 44 is effected through the spur gear 47 that acts in turn through the worm wheel 27 to cause a periodic  
25 letoff indexing of the cycling cam 28 concurrently with the previously mentioned oscillation resulting from the action of the oscillator cam 19, and thereby provide the progressive positioning or displacement of the traverse movement required by the building operation.

As this periodic letoff indexing of the cycling cam 28 takes place, the previously mentioned radial arm member 30 fixed at the end of the hub portion of worm wheel 27 will follow with a corresponding motion, and this following motion of the arm member 30 is employed to actuate the supplementary indexing of the cycling cam that has been referred to above. For this purpose, a timing drum  
30 73 (see FIGS. 1, 7 and 8) is mounted concentrically in relation to the radial arm member 30; a mounting plate 74 being attached to the slideway structure 33 with a positioning ring 75 and friction collar 76 carried thereon to receive an inwardly directly lateral flange portion of the timing drum 73 so that the drum 73 may be rotated but will normally remain stationary unless caused to rotate. For causing the timing drum 73 to rotate an abutment lug  
35 77 is fixed interiorly thereof so as to lie in the path of the radial arm member 30 and, therefore, to follow the advance of this arm member 30 as it in turn follows the indexing rotation of the cycling cam 28.

Exteriorly, the timing drum 73 has circumferential undercut grooves 78 formed therein so that cam lugs, such as 79, 80 and 81, may be secured therein at selected circumferential spacings, a lateral groove 82 being cut in the drum surface for allowing access to the grooves 78. A housing cover 83 is fitted on the mounting plate 74 to enclose the timing drum 73, and this housing cover 83 is arranged so as also to contain a series of microswitches,  
40 such as 84, 85 and 86, positioned for tripping by the cam lugs 79, 80 and 81 as the timing drum 73 is rotated by the radial arm member 30; the microswitches 84-86 being wired as indicated at 87 for connection in a suitable electrical actuating circuit (not shown).

The particular arrangement of microswitches 84-86 and cam lugs 79-81 that is employed will depend on the number of building cycle steps to be timed and the indexing means provided for timed actuation to bring the several cycle steps into play properly. The drawings illus-

trate (see FIG. 2) the provision of an auxiliary electric motor 88 connected through an electric clutch unit 89 to drive the indexing countershaft 48 for this purpose. Alternatively, the motor 88 might be replaced by any other  
5 suitable power means, such as a take-off drive from the machine on which the builder motion is installed, or an air-powered device might be used if desired. With the illustrated arrangement of cycle motor 88 and electric clutch 89, the three microswitches 84-86 shown are employed respectively for starting the motor 88 sufficiently in advance of each connection to the countershaft 48 to bring it up to speed before hand; for energizing the electric clutch 89 to effect driving connection of the motor 89 in accordance with the required cycle timing;  
10 and for related control of the motor driving the machine on which the builder motion is installed so that it may be cut off as the building operation is completed and the recovery movement of the builder motion is accomplished.

Connection of the cycle motor 88 through the electric clutch 89 to drive the countershaft 48 results in supplementary indexing rotation of the worm 44 beyond the periodic letoff indexing previously described. This supplementary indexing rotation is caused to take place rapidly, and in overriding relation to the letoff indexing, so that the several operating segments of the cycling cam 28 are brought successively into play by indexing transitions that occur instantaneously during the building operation to allow control of the several building steps in an  
15 orderly and precise manner.

To review a complete cycle of operation, let it be assumed that the builder motion of the present invention is installed on a spinning frame for building a bobbin such as is illustrated in FIG. 6, and that the spinning frame ring rail has been released from its doffing position after all preparations have been made to start a new building cycle. Under these conditions the cycling cam 28 will have been set at the position *a* indicated in FIG. 5, and starting of the spinning frame motor will cause the builder motion to commence operation in the segment  
20 *a-b* of the cycling cam 28 for controlling the traverse movement in building the "feeler bunch" adjacent the bobbin base as indicated in FIG. 6.

Completion of the "feeler bunch" will be timed by lugs, such as 79 (see FIG. 7), arranged on the timing drum 73 to set the cycle motor 88 and electric clutch 89 in operation for indexing to the cycling cam position *b* from which the segment *b-c* is presented to modify the traverse movement appropriately for building the main yarn package during a further interval timed by additional timing drum lugs, such as 80, set to index the cycling cam 28 from the segment *b-c* to the position *d* for spacing after the main package is completed to control the building of a "tip bunch" at the cam segment *d-e* in concluding the building operation. Thereupon, timing drum lugs of extended length, such as 81, are set to connect the cycle motor 88 and electric clutch 89 for indexing the cycling cam 28 through the segment *e-a* so that its recovery movement is executed to the position *a* in readiness for starting a new cycle.  
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It should be noted, in connection with the foregoing operating cycle description, that no attempt has been made in FIG. 7 to show the timing drum lugs 79-81 at the relative spacings they would need to have for timing the building steps described, as these lugs are adjustable about the circumference of the timing drum 73 and the matter of setting them at proper spacings must be done in relation to the particular specifications for the bobbin to be built as a preliminary adjustment in making the builder motion ready for operation in accordance with given specifications. Once the setting has been made, however, the operation of the builder motion will continue in precisely the same pattern cycle after cycle as long as desired, while remaining readily resettable for operation in a different pattern whenever the occasion arises.  
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It should also be noted that the cycling cam 28 might be employed additionally to run the spinning frame rail down to doffing position by incorporating a run down hump therein ahead of the position *a*. Such a modification has not been shown, however, because it will usually be more advantageous to provide auxiliary rail run down means for preparing the spinning frame to doff following each building operation. It is further notable, nevertheless, that the arrangement of the timing drum 73 lends itself to equally effective timing control of such auxiliary run down means, it being only necessary to add further cam lugs for actuating the auxiliary means and controlling disconnection of the spinning frame motor at the timing required to effect a proper return to doffing position.

Accordingly, the builder motion of the present invention not only provides a completely automatic building cycle, but lends itself as well to operation of automatic ring rail lowering means. Additionally, this builder motion is adapted for installation and use readily in place of the builder motions commonly available heretofore; it is constituted as a completely sealed unit arranged to operate in an oil bath without the slightest complication from lint accumulation; and it affords infinite flexibility in adjustment to varied bobbin specifications, while providing uniquely precise control of the building operation at any particular specifications to which it may be adjusted.

This invention has been thus described at length above for purposes of illustration only and is not intended to be limited by this description or otherwise except as defined in the appended claims.

I claim:

1. A builder motion for actuating a winding traverse comprising a driven oscillator cam, a cycling cam having a worm wheel assembled coaxially therewith, slide means disposed for rectilinear following motion at said cycling cam to deliver movement to said traverse, means mounted in following engagement with said oscillator cam for oscillation thereby, a worm mounted for rotation and for axial sliding, and selectively operable means operatively connected to said worm for selectively rotating said worm, said worm being engaged by said following means for oscillation in response to said oscillation of said following means and engaging said worm wheel for angularly oscillating and selectively rotating said cycling cam.

2. A builder motion for actuating a winding traverse comprising a driven shaft, an oscillator cam fixed for rotation with said shaft, a cycling cam and coaxially assembled worm wheel carried freely on said shaft, means slidably mounted transversely of said shaft in following engagement with said oscillator cam for rectilinear oscillation thereby, a worm mounted for rotation and for engagement with said oscillated following means for axial sliding in response to said oscillation of said following means and engaging said worm wheel for angularly oscillating said cycling cam, and selectively operable means for rotating said worm to cause indexing rotation of said cycling cam.

3. A builder motion for actuating a winding traverse comprising a rotatable oscillator cam, drive means for rotating said oscillator cam, a rotatable cycling cam, slide means disposed for rectilinear following motion at said cycling cam to deliver movement to said traverse, follower means disposed at said oscillator cam and connected to said cams for oscillating said cycling cam about its axis of rotation in response to rotation of said oscillator cam, and selectively operable means operatively connected with said cycling cam and with said oscillator cam and operating in relation to the rotation of said oscillator cam by said drive means for causing periodic concurrent indexing rotation of said cycling cam in accordance with a predetermined traverse pattern.

4. A builder motion as defined in claim 3 and further characterized in that said last mentioned means includes a first shaft rotated concurrently during rotation of said

oscillator cam, a second rotatable shaft, and means operated by rotation of said first shaft for rotating said second shaft at periodic intervals.

5. A builder motion as defined in claim 3 and further characterized in that said last mentioned means comprises a first shaft rotated concurrently during rotation of said oscillator cam, a second rotatable shaft, clutch means engageable for rotating said second shaft from the rotation of said first shaft, and means operated by rotation of said first shaft for engaging said clutch means at periodic intervals.

6. A builder motion as defined in claim 5 and further characterized in that said engaging means includes outer and inner cam plates that are circular in form and are peripherally flanged with said inner cam plate proportioned for nesting within the peripheral flanging on said outer cam plate, a substantial circumferential portion of each of said cam plates being peripherally flanged at respective widths that will nest coextensively at a first camming width, the remaining circumferential portion of each of said cam plates having lesser respective widths that will nest coextensively at a second lesser camming width, and means for fixing said inner cam plate in nested position on said outer cam plate with the peripheral flanging on said cam plates disposed at a selected circular relation for presenting desired circular extents of said first and second camming widths.

7. A builder motion for actuating a winding traverse comprising a rotatable oscillator cam, drive means for rotating said oscillator cam, a rotatable cycling cam, slide means disposed for rectilinear following motion at said cycling cam to deliver movement to said traverse, follower means disposed at said oscillator cam and connected to said cams for oscillating said cycling cam about its axis of rotation in response to rotation of said oscillator cam by said drive means, means operatively connected with said cycling cam and said oscillator cam and operating in relation to the rotation of said oscillator cam by said drive means for causing concurrent indexing rotation of said cycling cam at periodic intervals, and means operatively connected with said cycling cam and operating in relation to said periodic indexing rotation for causing supplementary indexing rotation of said cycling cam at selected intervals.

8. A builder motion as defined in claim 7 and further characterized in that said means operating in relation to said periodic indexing rotation to cause supplementary indexing rotation comprises a radial arm member mounted for oscillation and indexing rotation with said cycling cam, and means positioned progressively by said radial arm member upon indexing rotation thereof for actuating said supplementary indexing rotation at said selected intervals.

9. A builder motion as defined in claim 8 and further characterized in that said progressively positioned means comprises a circular timing cam mounted coaxially with respect to said radial arm member for following the advance of said radial arm member resulting from said indexing rotation.

10. A builder motion for actuating a winding traverse comprising a driven shaft, a rotatable cycling cam, a first means operated by said driven shaft for oscillating said cycling cam, a second means operated by said driven shaft for causing concurrent indexing rotation of said cycling cam at periodic intervals, and a third means operated in response to the indexing rotation caused by said second means for causing supplementary indexing rotation of said cycling cam at selected intervals.

11. A builder motion as defined in claim 10 and further characterized in that said second means and said third means include a common countershaft that is rotated by both of said second and third means for causing indexing rotation of said cycling cam, said second means acting regularly on said countershaft to cause indexing rotation at said periodic intervals, and said third means

acting selectively on said countershaft to override said second means and cause supplementary indexing rotation at said selected intervals.

12. A builder motion for actuating a winding traverse comprising a rotatable cycling cam, a worm wheel assembled coaxially with said cycling cam, an axially slidable worm engaging said worm wheel, a first means operating to cause regular rectilinear oscillation of said axially slidable worm, a second means operating regularly in relation to said first means to cause concurrent rotation of said worm at periodic intervals, and a third means operating selectively to cause supplementary overriding rotation of said worm at selected intervals.

13. A builder motion as defined in claim 12 and further characterized in that a main input drive connection is provided for operating said first and second means, and at least one auxiliary drive connection is provided for operating said third means.

14. A builder motion for actuating a winding traverse comprising a main driven shaft, an oscillator cam fixed on said shaft for rotation therewith, a cycling cam and coaxially assembled worm wheel carried freely on said shaft, a worm having the spiral thread thereof intersected by longitudinal grooves in the outline of a spur gear, a fixed shaft carrying said worm for rotation and axial sliding thereon and disposing said worm to engage said worm wheel, follower means in following engagement with said oscillator cam and connected with said worm to cause regular oscillation thereof axially of said fixed shaft, a countershaft parallel to said fixed shaft, a spur gear mounted on said countershaft to engage said worm at the longitudinal grooves thereof, means operated regularly from said main driven shaft for rotating said countershaft intermittently to cause rotation of said worm by said spur gear at periodic intervals, an auxiliary drive

means, and means operated selectively in relation to said periodic worm rotation for connecting said auxiliary drive means with said countershaft to cause supplementary overriding rotation of said worm by said spur gear at selected intervals.

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