

Aug. 26, 1924.

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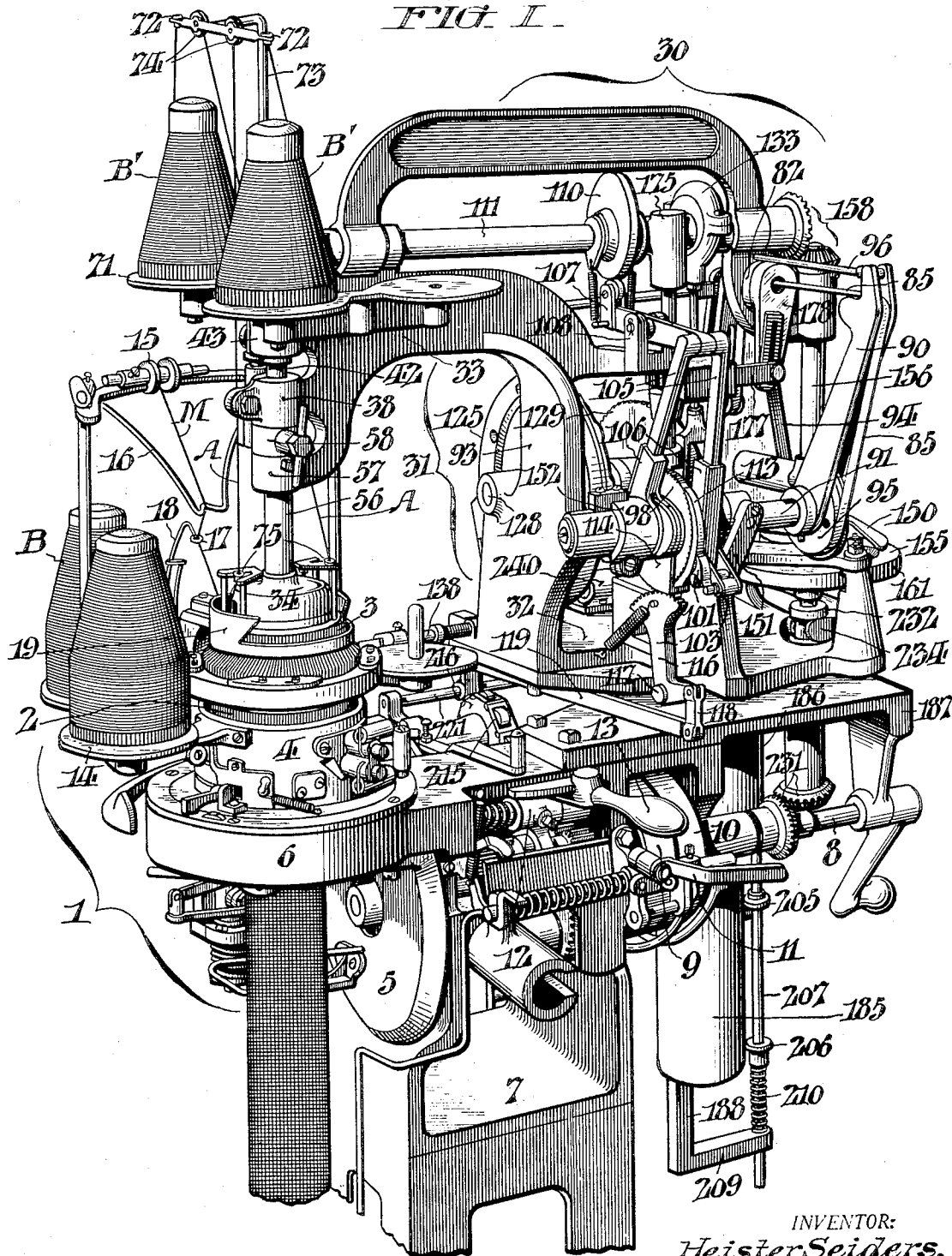
H. SEIDERS

KNITTING MACHINE

Filed Sept. 12, 1922

10 Sheets-Sheet 1

FIG. I.



WITNESSES:

Alfred E. Ischinger.
Thomas W. Kerr, Jr.

BY

INVENTOR:
Heister Seiders,

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Aug. 26, 1924.

1,505,973

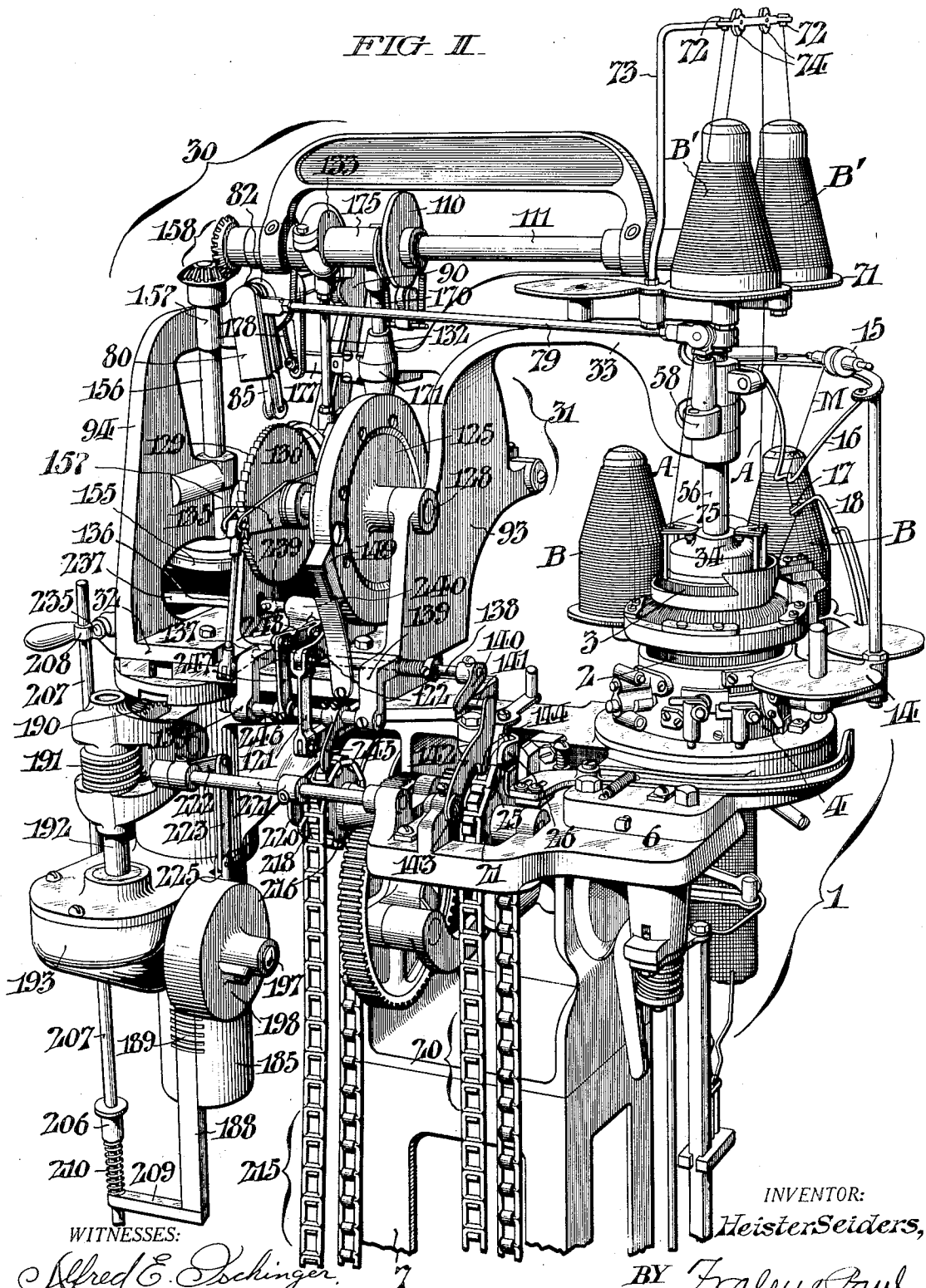
H. SEIDERS

KNITTING MACHINE

Filed Sept. 12, 1922

10 Sheets-Sheet 2

FIG. II.



WITNESSES:

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H. SEIDERS

KNITTING MACHINE

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10 Sheets-Sheet 3

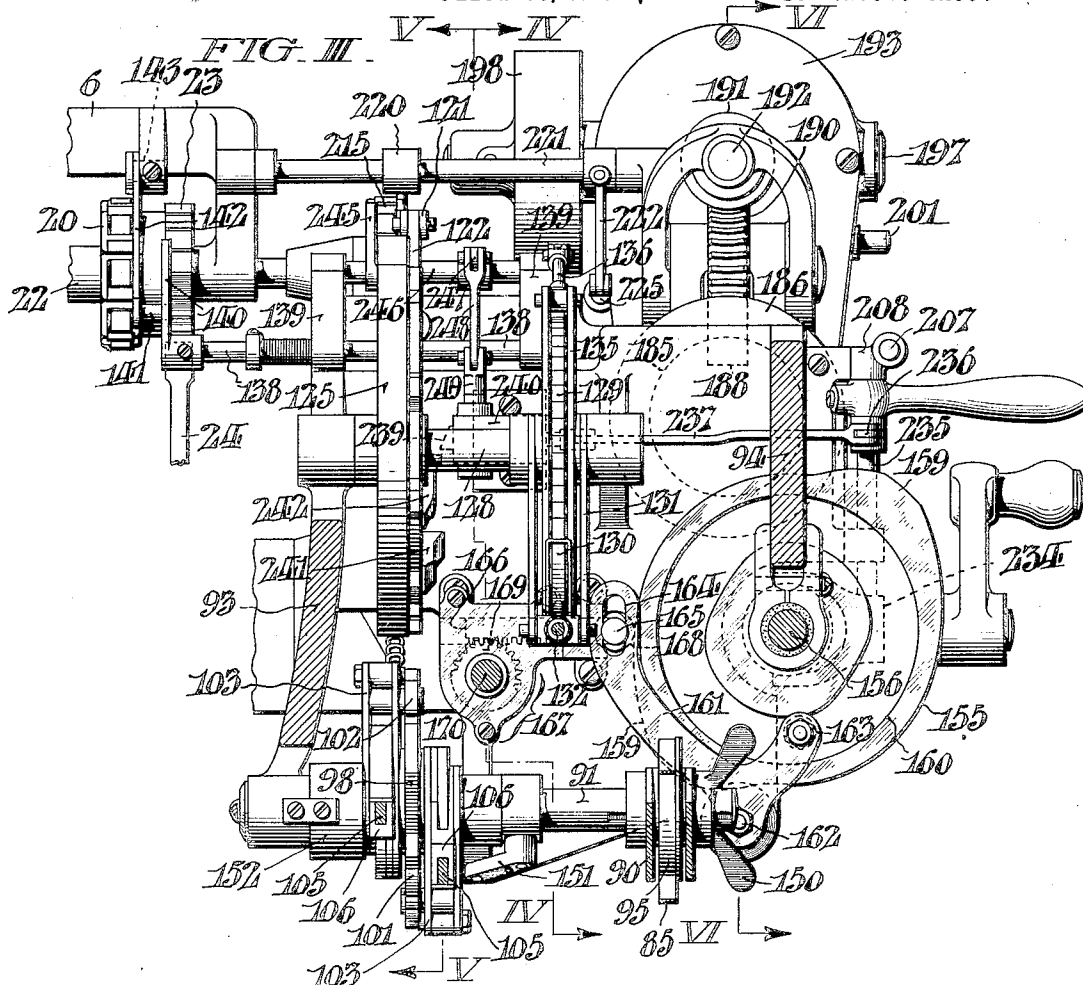
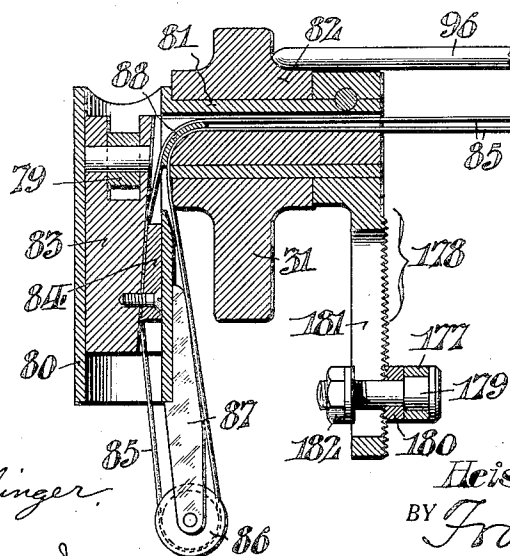


FIG. X.



WITNESSES:

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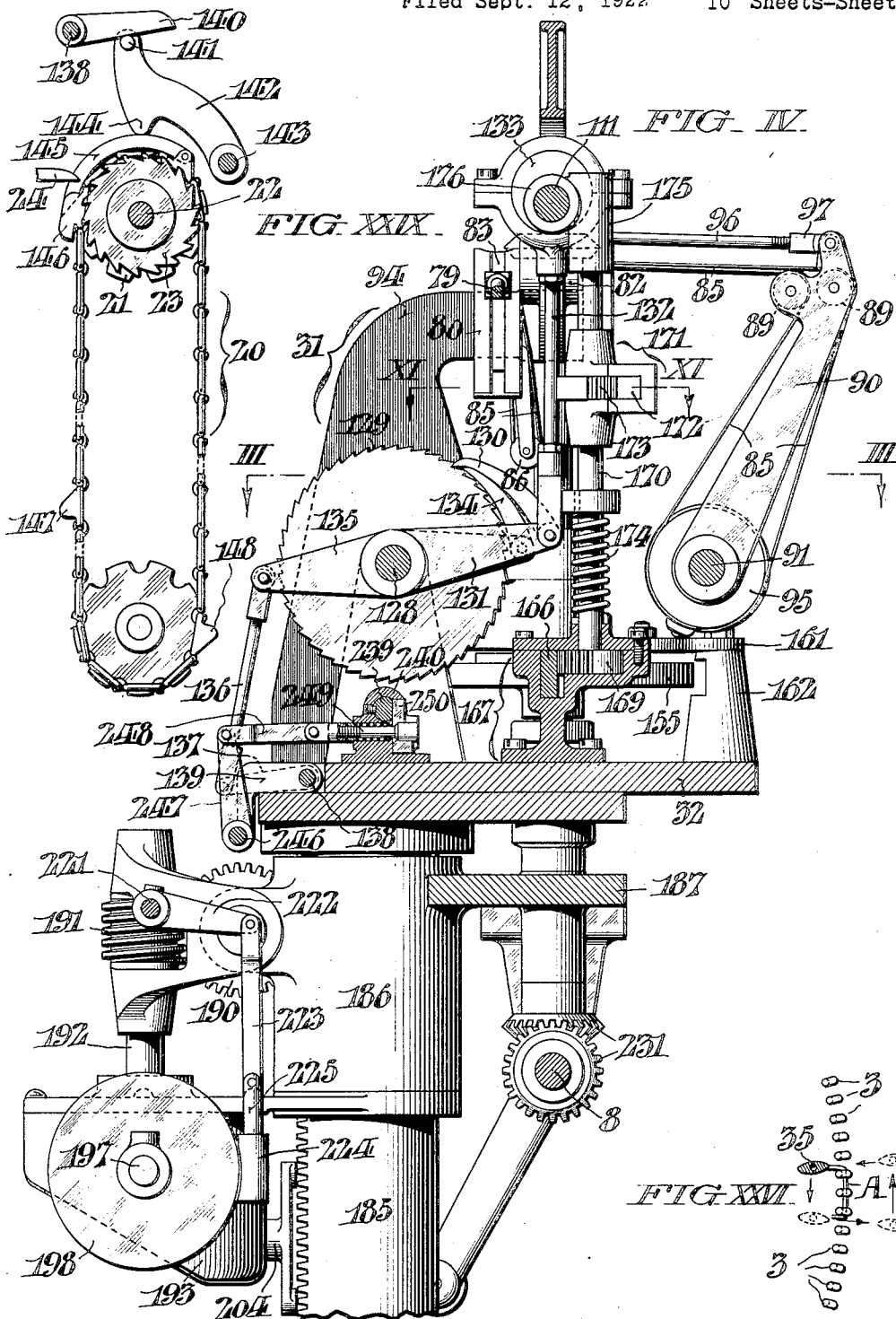
1,505,973

H. SEIDERS

KNITTING MACHINE

Filed Sept. 12, 1922

10 Sheets-Sheet 4



WITNESSES:

Alfred E. Ischinger.
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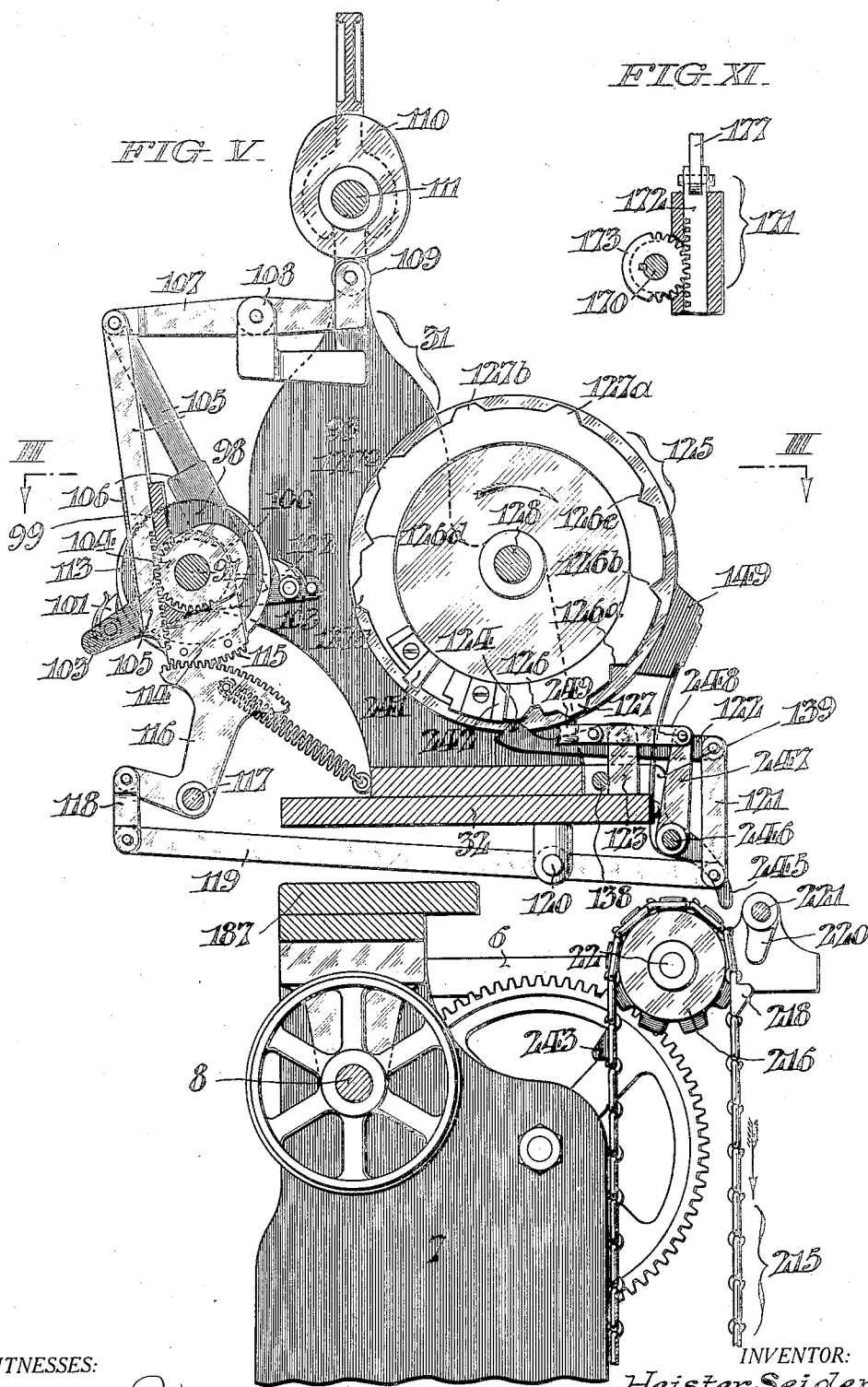
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1,505,973

H. SEIDERS
KNITTING MACHINE

Filed Sept. 12, 1922 10 Sheets-Sheet 5



WITNESSES:
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Aug. 26, 1924.

1,505,973

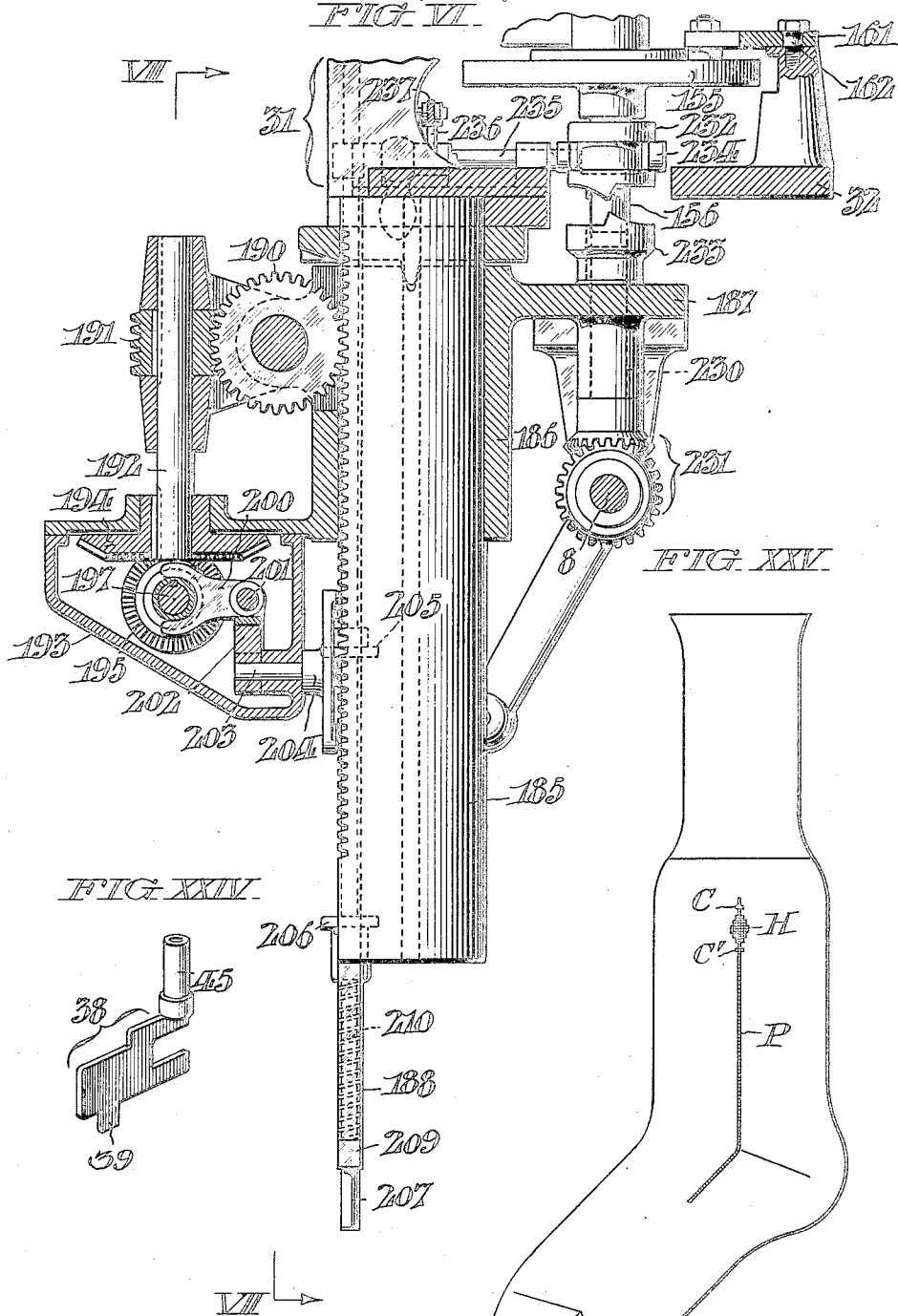
H. SEIDERS

KNITTING MACHINE

Filed Sept. 12, 1922

10 Sheets-Sheet 6

FIG. VI



WITNESSES:

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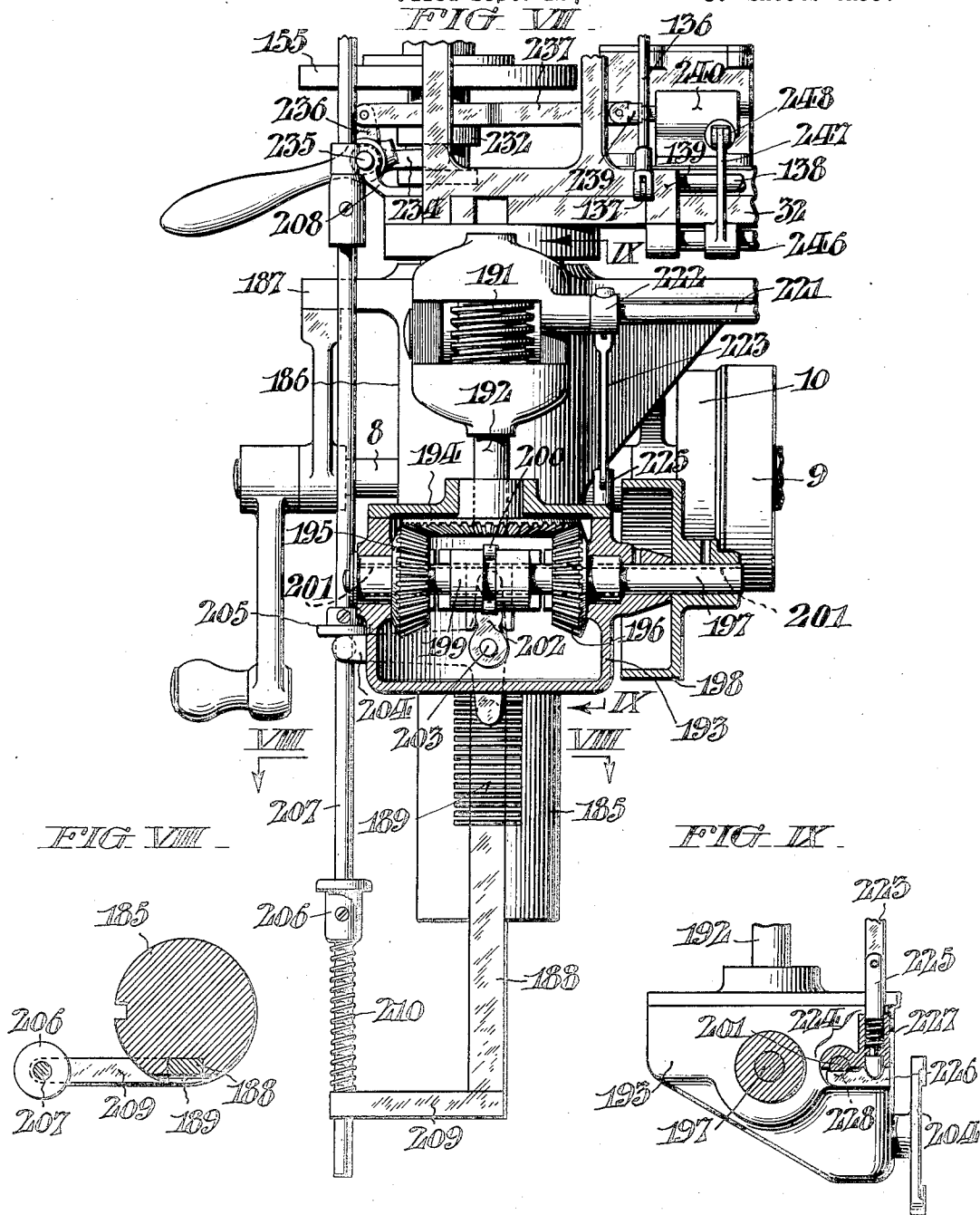
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H. SEIDERS

KNITTING MACHINE

Filed Sept. 12, 1922

10 Sheets-Sheet 7



WITNESSES:
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Aug. 26 , 1924.

1,505,973

H. SEIDERS

KNITTING MACHINE

Filed Sept. 12, 1922

10 Sheets-Sheet 8

FIG. XIII.

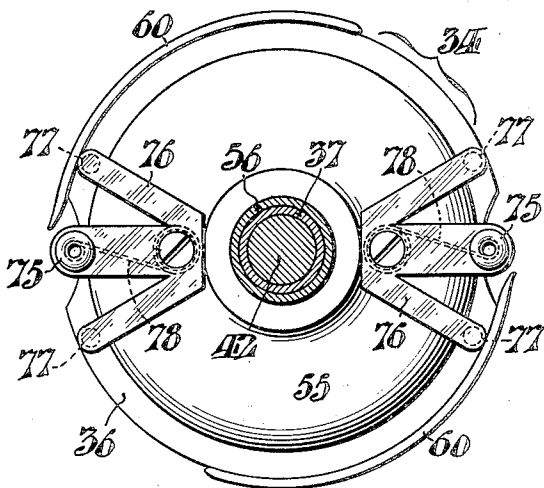


FIG. XII.

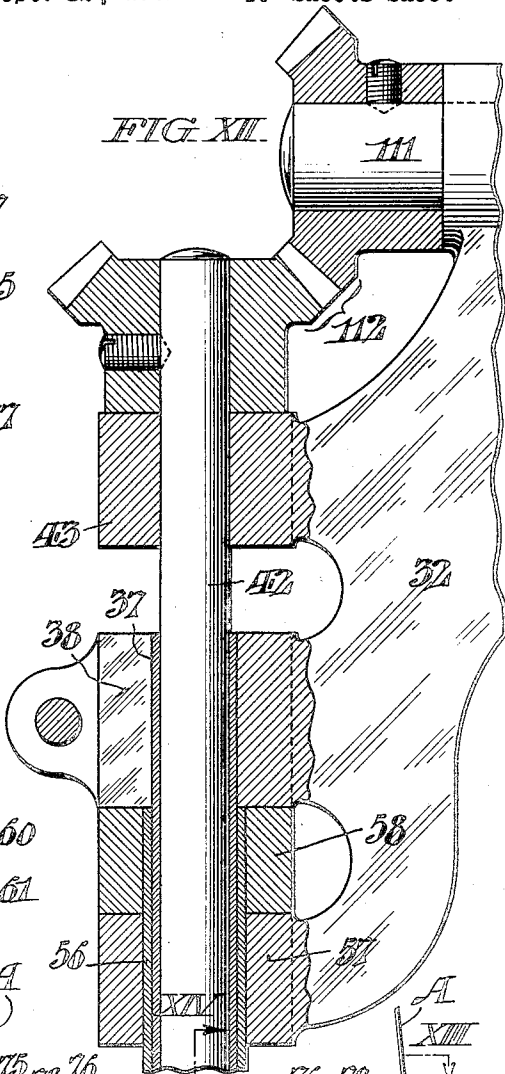


FIG. XIV.

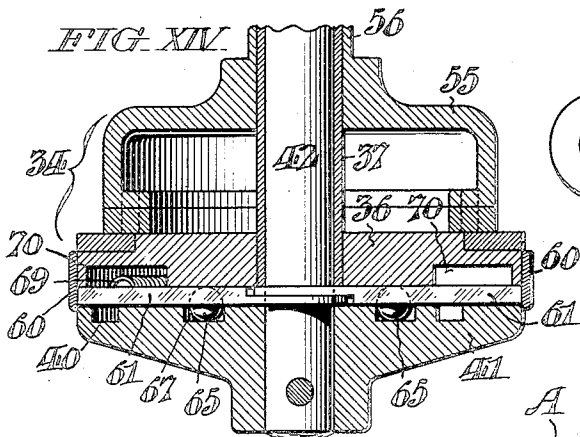
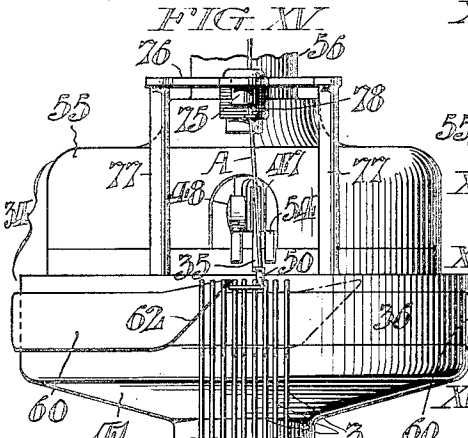


FIG. XV.



WITNESSES:

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H. SEIDERS

KNITTING MACHINE

Filed Sept. 12, 1922

10 Sheets-Sheet 9

FIG. XVI.

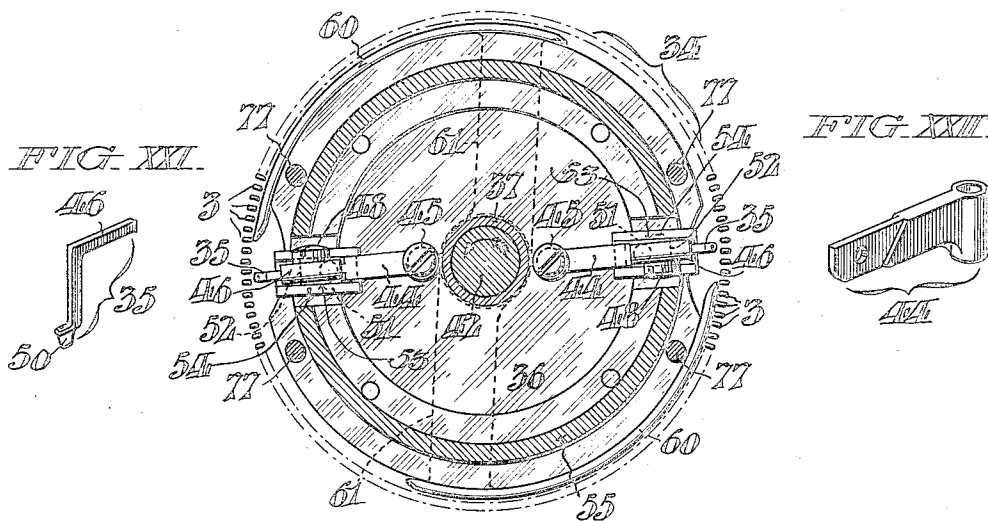


FIG. XVII.

FIG. XVIII.

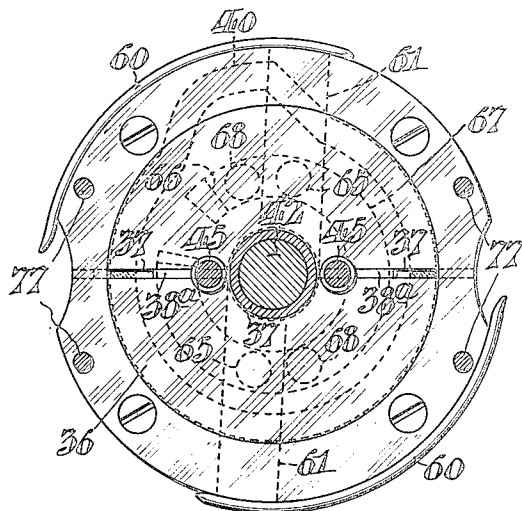


FIG. XIX.

FIG. XX.

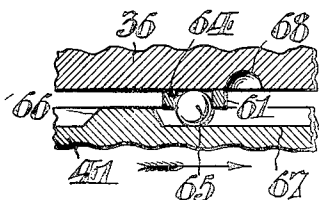
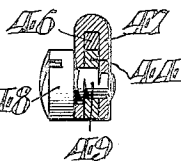


FIG. XXII.

WITNESSES:

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INVENTOR:

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Aug. 26, 1924.

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H. SEIDERS

KNITTING MACHINE

Filed Sept. 12, 1922

10 Sheets-Sheet 10

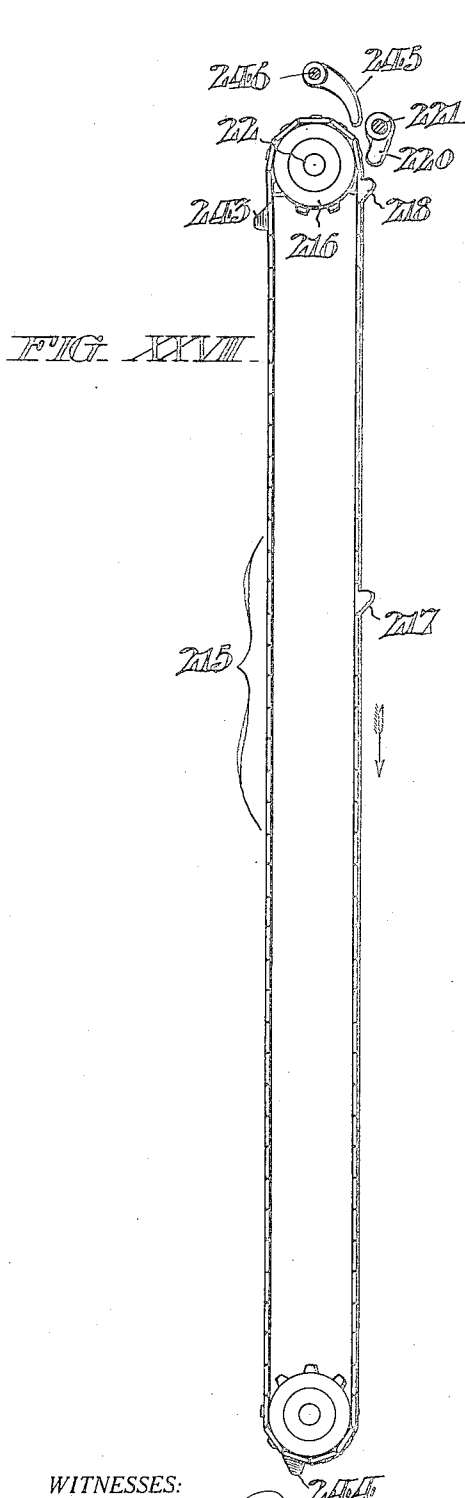


FIG. XXVII

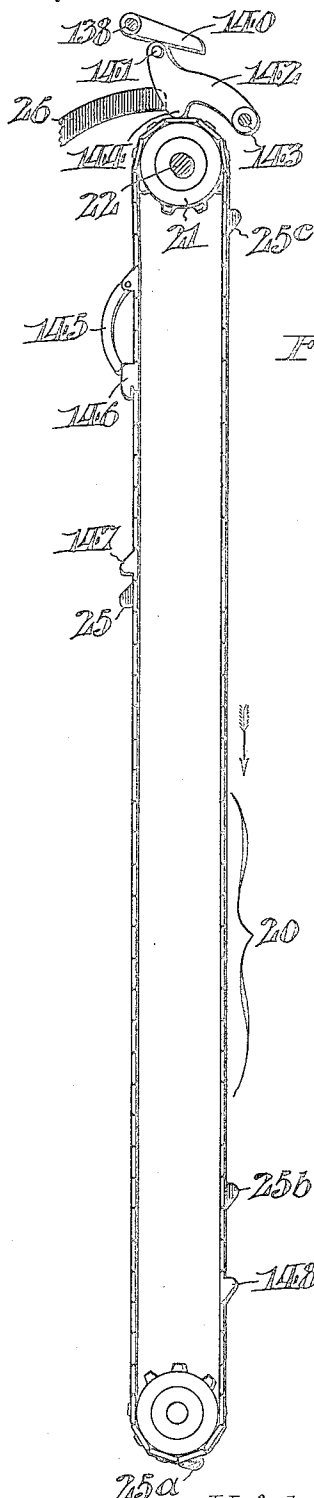


FIG. XXVIII

WITNESSES:
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UNITED STATES PATENT OFFICE.

HEISTER SEIDERS, OF READING, PENNSYLVANIA.

KNITTING MACHINE.

Application filed September 12, 1922. Serial No. 537,386.

To all whom it may concern:

Be it known that I, HEISTER SEIDERS, a citizen of the United States, residing at Reading, county of Berks, and State of Pennsylvania, have invented certain new and useful Improvements in Knitting Machines, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to knitting machines and its primary object is to enable production of ornamentation such for example as so-called clock stripes upon hosiery concurrently with the knitting of the fabric so that an attractive and salable product may be obtained without the objectionable protuberances characteristic of hosiery where such ornamentation is subsequently applied. This end I obtain by provision of means whereby auxiliary yarn is fed to the needles simultaneously with the main yarn employed to produce the body of the fabric, and means whereby the feeding of the auxiliary yarn may be so governed as to obtain variety of ornamentation either in lieu of clock stripes or in conjunction with them. In obtaining such ornamentation, yarns of different colors or qualities such as silk and cotton combinations may be employed, the effect varying according to the contrasting properties of the material selected.

Another object of my invention is to provide in addition to auxiliary yarn feeding instrumentalities, means for causing auxiliary yarn to be fed to the needles in definite relation to the feeding of the main yarn so as to insure the plating of the auxiliary yarn upon the body structure, or in other words to insure the appearance of the ornamentation upon the outside face of the knitted web.

Still another object of my invention is to provide auxiliary yarn feeding mechanism for producing ornamental effects for use in conjunction with machines especially adapted for the manufacture of men's full or half hose in which after a ribbed top, knit on a special machine, is transferred, for completion of the leg and foot portions in prolongation. With the end in view I provide means for automatically withdrawing the auxiliary yarn feeding means from a normal position in proximity to the knitting elements so as to permit access to the needle cylinder necessary in effecting transfer, together with means for controlling the opera-

tion of the auxiliary feeds to determine the point of commencement of the clock stripes, production of ornamentation at the ends of the clock stripes, cessation of the operation of the auxiliary feeds during the knitting of the heel pocket, and resumption of the activity of the feeds at the completion of the heel pocket so that the clock stripes or ornamentation may be continued along the foot portions of the stockings.

Other objects and attendant advantages of my invention will be readily apparent from the detailed description that follows, while the scope of my invention will be manifested in the appended claims.

In the drawings Figure I is a perspective view of a knitting machine conveniently embodying my invention as it appears when viewed from the front, or that side at which the attendant or operator normally stands.

Figure II is a similar view of the machine viewed from the opposite side.

Figure III is a section along a horizontal plane taken as indicated by the arrows III—III in Figures IV and V.

Figure IV is a vertical sectional view of the machine taken as indicated by the arrows IV—IV in Figure III.

Figure V is a cross sectional view taken as indicated by the arrows V—V in Figure III.

Figure VI is a fragmentary sectional elevation, indicated by the arrows VI—VI in Figure III, showing more particularly the cooperative parts whereby the bracket which carries the auxiliary yarn feeding mechanism is elevated to permit access to the needle cylinder for transfer purposes.

Figure VII is a fragmentary sectional view taken as indicated by the arrows VII—VII in Figure VI further illustrating the parts shown in the latter figure.

Figure VIII is a detail section along a horizontal plane taken as indicated by the arrows VIII—VIII in Figure VII.

Figure IX is a detail sectional view taken as indicated by the arrows IX—IX in Figure VII.

Figure X is a fragmentary detail section of the rocker arm which is instrumental in imparting oscillatory motion to the auxiliary yarn feeds.

Figure XI is a detail sectional view taken as indicated by the arrows XI—XI in Figure IV.

Figure XII is an axial sectional view of

the housing for the auxiliary yarn feeds together with the means whereby it is supported.

Figure XIII is a sectional plan taken as indicated by the arrows XIII—XIII in Figure XII.

Figure XIV is an axial section indicated by the arrows XIV—XIV in Figure XII.

Figure XV is an elevation of the housing for the auxiliary yarn feeds as it appears when viewed from the left of Figure XII, and showing the manner in which the auxiliary yarn is fed to the knitting needles.

Figures XVI and XVII are sectional views taken as indicated by the arrows XVI—XVI and XVII—XVII respectively in Figure XII.

Figure XVIII is an inverted plan view taken as indicated by the arrows XVIII—XVIII in Figure XII.

Figures XIX and XX are diagrammatic fragmentary sectional views showing the means by which the depressors for the auxiliary yarn are actuated.

Figure XXI is a perspective view of one of the auxiliary yarn feeds in isolation.

Figure XXII is a similar view of the holder element to which the auxiliary yarn feed is adjustably attached.

Figure XXIII is a detail cross-sectional view showing the means whereby the auxiliary feed is clamped to the holder element after the proper adjustment has been secured.

Figure XXIV is a perspective view of one of the jacks whereto the holder for the auxiliary yarn feed is fulcrumed.

Figure XXV illustrates the appearance of a stocking produced by my improved knitting machine.

Figure XXVI is a diagrammatic view showing the manner in which the auxiliary yarn is wrapped about a definite group of knitting needles under sweeping action of the auxiliary yarn feed.

Figure XXVII is an illustration of the sprocket chain which determines the length of the stocking knitted on the machine.

Figure XXVIII is a similar view of the supplemental sprocket chain which controls the raising and lowering of the auxiliary yarn feeding mechanism also certain of the elements embodied in said mechanism; and

Figure XXIX is a fragmentary view of the measuring chain showing the same in the performance of one of the special functions allotted to it.

Referring first to the general illustrations Figures I to V inclusive, it will be observed that the knitting machine therein shown comprises a knitting mechanism generally indicated by the numeral 1, and an auxiliary yarn feeding mechanism with appropriate control devices comprehensively indicated at 30. The knitting mechanism includes a

needle cylinder 2 in which the needles 3 are guided for vertical reciprocation in the well known manner. The needles 3 are actuated by a cam cylinder 4 rotatable about the needle cylinder 2 under drive of bevel gearing concealed within a casing 5 bolted beneath the bed plate 6 which supports said needle cylinder and various other parts of the knitting machine. The bed plate 6 is in turn mounted upon an appropriate standard 7 so as to be sustained at a convenient height from the floor. The drive for the cam cylinder 4 further includes a shaft 8 with tight and loose pulleys 9 and 10, respectively, adapted to be coordinated by means of a belt (not shown) with driving means which may be of any approved type suitable for the purpose. A trigger actuated belt shifting mechanism 11 capable of automatic operation as later set forth serves to transfer the driving belt from the tight pulley 9 to the loose pulley 10 to stop the machine at various stages in the knitting of a stocking. In order that the cam cylinder 4 may be oscillated in the production of heel and toe pockets, a suitable clutch organization 12 is also provided, the shifting of said clutch mechanism being controllable through a hand lever shown at 13 in Figure I. The clutch mechanism 12 aforesaid is of standard design and the details thereof have therefore been omitted from the drawings. The cam cylinder 4, in addition to the usual knitting cams has also associated with it, pickers which are operative upon the needles during the formation of the heel and toe pockets in a well known manner and other standard accessories usual as well as necessary to the production of hosiery. The main or body yarn M is supplied to the needles 3 from a bobbin B mounted with others upon a carrier 14 attached to the cam cylinder 4 and guided first between friction disks 15 supported by the carrier thence through a notch in a bow of bent wire 16 to an eyelet 17 at the end of a tension spring arm 18, and finally through a feed aperture in a latch guard ring 19 which encircles the protruding ends of the knitting needles 3, (see Figures I and II). The length of the stocking is controlled in a well known manner by a measuring chain 20 passing about a driving sprocket 21 which is mounted on a shaft 22 journaled in suitable bearings of the bed plate 6. Secured upon the shaft 22 with the sprocket 21 is a ratchet wheel 23 (see Figure III) arranged to be intermittently progressed by a pawl 24 reciprocated by an eccentric or analogous means coordinated with the main driving shaft 8 of the machine. The measuring chain 20 carries at one side, a series of high links 25, 25^a, and 25^b which cooperate with the trigger finger 26 (Figure II) of the belt shifting mechanism 11 aforesaid. The

parts thus far described are typical of what is ordinarily termed a semi-automatic machine for the production of hosiery wherein the leg portion of the stocking is continuously knit until a point is reached where the heel pocket is to begin. As is usual with these machines the driving belt is automatically shifted under control of the measuring chain to the loose pulley thereby stopping the machine so that the operator can adjust the pickers and shift the clutch for oscillatory knitting for production of the heel pocket. After completion of the heel pocket the machine again comes to rest automatically to permit the operator to restore the pickers, clutch, etc., to their normal positions so that round and round or circular knitting may be resumed in the production of the instep of the stocking which proceeds continuously as is the case with the leg portion of the stocking until the point is reached where the toe pocket is to begin. Here again the machine is brought to rest automatically so that the operator may perform the same functions as required preparatory to the knitting of the heel pocket, this cycle of operations being continuously repeated in the successive production of the stockings. In the present instance the machine is arranged for use as a footer, or in other words, to complete half hose, the tops of which are prepared as rib fabrics on other machines and subsequently transferred to the machine under consideration for completion of the leg and foot portions in accordance with established practice. In order to permit withdrawal of the feeds by which the auxiliary yarns are fed in the production of ornamental effects in the stocking, special considerations had to be taken into account to make transfer possible. These will become apparent as the description proceeds.

Coming now to the auxiliary yarn feeding mechanism, as a support for this mechanism I have provided a frame structure comprehensively indicated by the numeral 31 and shown as comprising a horizontal portion 32 normally occupying a position directly above the bed plate 6 of the machine and having integrally formed therewith a bracket extension 33 designed to overhang the needle cylinder 2. Suspended from the end of the bracket extension 33 is a housing 34 in which the operating mechanism for the auxiliary yarn feed 35 is concealed and protected. Referring now more particularly to Figures XII to XVIII inclusive, it will be noted that the housing 34 includes a supporting member 36 which is generally circular in form and secured to the lower end of a sleeve 37 axially aligned with the needle cylinder 2. This sleeve 37 is held, with provisions for adjustment, in a split clamp boss 38 forming part of the overhanging exten-

sion of the frame 31. The supporting member 36 has radial slots 36^a for guidance of jacks 38^a from which depend integral butts or spuds 39 for actuation by a cam groove 40 in a disk 41 secured to the lower end of a vertical shaft 42, the latter being journaled for rotation within the sleeve 37 aforementioned. The portion of the shaft 42 above said sleeve 37 has support in a bearing 43 also forming a part of the overhanging bracket 32. From Figure XVII it is to be especially observed that the configuration of the cam groove 40 in the disk 41 is such as to determine reciprocatory motion of the jacks 38^a. This motion is imparted to holders for the auxiliary feeds 35 in the form of arms 44 by virtue of the pivotal connection of the latter at 45 to the jacks 38^a. The auxiliary yarn feeds 35 (Figure XXI) have rearwardly projecting shanks 46, so that they may be clamped in adjusted positions to the ends of the arms 44 Fig. XXII by means of straddle clips 47 which embrace said arms, (see Fig. XXIII). The clamping action referred to is effected by rotatable clamping devices 48 having eccentric portions 49 engageable within apertures adjacent the ends of the arms 44, and concentric portions similarly engaged in aligned apertures in the straddle clips 47. By cooperation of the means just described, the yarn feeds 35 are projected and retracted to pass through or cut the circle of needles whereby the auxiliary yarns A fed through the eyes in the ends of said feeds are brought to the front of the needles 3 in a manner which will be more clearly described later. In order to facilitate forward and backward passage between and through the needles 3, the depending portions or tips 50 of the auxiliary feeds 35 are made of oval configurations with comparatively sharp ends, as best shown in Figure XXVI. In addition to the reciprocatory motion imparted to the auxiliary yarn feeds 35 in the manner explained, said feeds are given an oscillatory motion such as to comprehend and feed auxiliary yarn A to groups of one or more of the needles 3 as may be desired in the production of ornamental pattern effects in the knit tube. This oscillatory motion is brought about by swinging the holder arms 44 about their fulcrums 45. Accordingly these arms 44 are provided adjacent their outer ends with depending pins 51 which engage with slide blocks 52 guided for reciprocation radially in grooves 53 of guide pieces 54 which are set in the peripheral flange wall of a cover member 55 forming a part of the housing 34. This cover member 55 has an integral axial prolongation in the form of an upwardly extending sleeve 56 capable of moving independently about the fixed sleeve 37 of the supporting member 36 of the housing 34. The sleeve 56 terminates at a region between

the split clamp boss 38 and a bearing 57 of the overhang 32 and secured thereto at this point, is a lever arm 58 which, in being swung back and forth imparts oscillatory movement to the housing member 55 such oscillation being in turn transmitted to the auxiliary yarn feeds 35. These yarn feeds 35 are thus given a compound motion which, as will be best understood from Figure XXVI, begins with the full line position from whence said feeds are first shifted substantially concentrically with the needles 3 at the inside of the latter, thence projected forward through said needles. Immediately following this latter movement the feeds 35 are swept along the needles 3 to the outside of the latter and finally retracted radially to the original position of starting thereby laying or wrapping the auxiliary yarn about a number of said needles, the number comprehended in the sweep of the feeds being determined by governing mechanism yet to be explained.

The appearance of the auxiliary yarn A upon the face of the knitted fabric is predetermined by definitely controlling the laying of said yarn at the time of its feeding to the needles 3 with respect to the feeding level of the main or body yarn M; or, in other words, in order to obtain the desired effect it is necessary that the auxiliary yarn A be placed on the shanks of the needles 3 below the level at which the body yarn M is fed. I accordingly provide for depressing the auxiliary yarn A immediately upon its being wrapped about the needles 3 as previously explained and before the region of the feeding of the main or body yarn M is reached. The means which I employ to this end comprises arcuate depressors 60 curved in conformity with the periphery of the housing 34 to move in close proximity to the latter. These depressors 60 are secured to the ends of arms 61 mounted to swing independently about the shaft 42 as an axis. The forward or leading ends of the depressors 60 are beveled as at 62 to afford inclined edges which, as said depressors are moved to pass over the portions of the auxiliary yarn A wrapped about the needles 3 and in reaching a position indicated in dot and dash lines in Figure XV, depress said auxiliary yarn A to a level slightly above the tips of the needle latches when in open position, thereby allowing ample leeway for feeding of the main or body yarn M above the same. The arms 61 of the depressors 60 move within recesses 63 in the bottom face of the member 36 of the housing 34. At a point approximately midway of their lengths, the arms 61 are apertured as at 64 to receive balls 65 of such a diameter that they normally project beyond said arms at the lower side as clearly shown in the diagrammatic illustrations of Figure XIX, so

as to be engageable by an upstanding projection or interruption 66 in a concentric groove 67 formed in the cam disk 41 previously referred to. Considering the direction of rotation of the cam disk 41 to be that indicated by the arrow in Figure XIX it will be apparent that the projection 66 will successively engage the balls 65 thereby carrying along the arms 61 in the direction of rotation of said cam disk to an extent limited by the recession of the balls 65 into receiving cavities 68 in the recesses 63 as clearly shown in Figure XX. See also Figure XVIII. After the passage of the projections 66 beyond the regions of the pockets 68, the balls 65 are released so that the depresser arms 61 may be retracted to normal position against stop shoulders of the recesses 63 at one side under the pull of helical springs 69 accommodated in cavities 70.

The auxiliary yarn A is supplied from bobbins B' supported upon a carrier 71 supported by the bracket extension 32 of the frame 31. Beginning with the bobbins B' the course of the auxiliary yarn threads is first through guide eyelets 72 supported by a tree 73 thence through friction disks 74. The auxiliary yarn threads are next directed to guide eyelets 75 supported by plates 76 sustained by short posts 77 at an elevation from the housing 34 for the auxiliary yarn feeds 35 as clearly shown in Figures II, XII, XIII and XV. In addition to the eyelets 75 said plates carry spring tension devices 78 which assist in maintaining the auxiliary yarns taut enroute to the eyes of the auxiliary yarn feeds 35.

For the purpose of controlling the action of the auxiliary yarn feeds 35 so that the extent of their oscillation and hence the scope of their feeding may be varied to produce corresponding variations in the ornamental design effects, I have provided control or governing mechanism which comprises instrumentalities as follows:

The lever arm 58 previously described as being secured to the sleeve 66 of the movable housing member 36 is coordinated through the medium of a link 79 with a rocker arm 80. This arm 80 is formed with an integral rock shaft 81 for journalling in a bearing boss 82 of the bracket 31. The rocker arm 80 (see Figure X) is made hollow to receive a block 83 capable of being moved longitudinally of said arm in order that the effect of the latter upon the amplitude of oscillation of the auxiliary yarn feeds 35 may be correspondingly varied. The upper end of the block 83 has a clevis formed therein for reception and pivotal attachment of the rear end of the link 79. The block 83 is secured by means of a clamp plate 84 to an endless belt 85 of flexible material preferably steel passing over a re-di-

recting idler pulley 86 rotatably mounted in a bracket arm 87 depending from the rocker arm 80 thence horizontally through an opening in the rock shaft 81 of the rocker arm 80 where it parallels its return run. Uddue friction between the parallel runs of the belt 85 at the region of directional change is avoided through separation by an arcuate plate 88.

Referring now to Figures I, II and IV, the belt 85 will be observed to emerge from the opening through the rock shaft 81 and to pass over idler pulleys 89 at the end of a supporting arm 90 fulcrumed about a shaft 91 which is journaled in the upright portions 93—94 of the bracket frame 31. The idlers 89 serve in their turn to re-direct the two strands of the belt toward a drive pulley 95 fixed upon the shaft 91. The flexible belt 85 is maintained under tension by a strut interposed between the upper end of the supporting arm 90 and the bracket 31 said strut being in the form of a rod 96 with one end threaded for longitudinal adjustment in a sleeve member 97 whereby said rod is pivotally attached to the arm 90. The shaft 91 is rotated in one direction or the other by a reversible ratchet mechanism including a ratchet wheel 98 having two sets of teeth 99 and 100 which are oppositely pitched as clearly shown in Figure V for selective picking by pawls 101 and 102 respectively. These pawls 101, 102 are spring pressed in a direction toward the ratchet wheel 98 and pivoted adjacent the ends of lever arms 103 freely rotatable about the shaft 91. The segmental gears 104 secured to the pawl arms 103 are engaged by racks 105 slidable in guide members 106 also freely movable about the shaft 91 and connected at their upper ends by a common pivot pin to the outer end of a lever 107 which is pivoted intermediate its ends to a lug 108 of the bracket 31. The free end of the lever 107 carries a roller 109 designed to engage a rotary cam 110 appropriately configured to impart rocking motion to said lever. The cam 110 is secured to a shaft 111 which extends in a direction longitudinally of a machine under support of journal bearings of the bracket 31, and which serves to drive the shaft 42 of the auxiliary yarn feed mechanism through a miter gear couple 112, see Figure XII. Activity of the pawls 101—102 is selectively controlled by a guard 113 whose opposite ends are adapted to uncover one or the other set of teeth 99, 100 of the ratchet 98. The pawl guard 113 is also mounted for independent rotation about the shaft 91 by virtue of attachment to a plate 114 hung from said shaft. The gear teeth 115 of this plate are in mesh with an oscillating sector 116 fulcrumed about a fixed pin 117 engaged in the bracket 31. The sector 116 is in a form of a bell crank lever with its shorter extremity connected by

means of a link 118 to a lever arm 119 fulcrumed at 120 to a post depending from the horizontal portion 32 of the frame 31, see Figure V. The opposite end of the lever 119 is in turn connected by a link 121 to a tappet arm 122 pivoted to an upstanding post 123 also secured in the plate 32. The free end of the tappet arm 122 is beveled as at 124 for co-operation with a pattern wheel 125 having peripheral notches comprehended by the numeral 126 with subscripts, and elevations or projections similarly designated generally by the numeral 127. This pattern wheel 125 is fixed to a shaft 128 journaled in bearing bosses of the upright portions 93 and 94 of the bracket 31 and extends in parallelism to the shaft 91 aforementioned. The shaft 128 has also mounted upon it a driving ratchet wheel 129 arranged to be intermittently actuated by a pawl 130 upon the free end of an arm 131 independently swingable about the shaft 128. The arm 131 is oscillated by reason of being connected through interposition of a rod 132 with an eccentric 133 on the horizontal overhead shaft 111 so that as the latter is rotated, continuous oscillatory motion is imparted to the pawl 130. The action of said pawl 130 is however controlled by a guard 134 pivotally attached to one end of a double armed lever 135 free upon the shaft 128, the opposite end of said lever being in turn coordinated by a link 136 with an arm 137 secured to a rock shaft 138, see Figures IV and V. The latter shaft 138 is supported for rotation in bearing pieces 139 secured to the plate 32 of frame 31 and extends forward toward the knitting mechanism 1 to afford attachment for a finger 140 normally occupying a position within the path of movement of the pin 141 secured in the outer end of a dog 142 which is swingable about a stud 143 fixed in a lug of the bed plate 6 of the knitting mechanism 1. The dog 142 has a projection 144 which rides upon the links of the measuring chain 20. To one of the links of the chain is pivotally hung a bow shaped engaging member 145 whose free end rests upon a special high link 146 several plain links intervening. Other special cam links 147 and 148 also serve to engage the dog 142 as will be later explained. The curvature of the member 145 is such as to be concentric with the sprocket wheel 21 in passing about the latter as clearly shown in Figure XXIX, and its length is such as to determine several successive pickings of the ratchet wheel 129. The pattern wheel 125 is thus directly subject to the measuring chain 20. In accordance with the present arrangement, the pattern wheel 125 is normally inactive and, as a consequence of this and since the point of attachment of the link 79 to the rocker arm 80 normally occupies the position shown in Figure II oscillatory

motion of unvarying amplitude will be imparted to the auxiliary feeds 35 through a range say over one or two needles 3 so that the ornamentation is preordered as clock stripes. However, when the bow member 145 of the measuring chain 20 encounters the dog 142, the pattern wheel 125 is set in motion since through the movement of said dog and the motion imparted through intervening elements, the guard 134 for the pawl 130 is retracted thereby permitting progressive rotation of the driving ratchet 129 for the pattern wheel 125.

Pausing for a moment at this juncture to study the function of the pattern wheel 125 it will be noted that as the same turns in the direction of the arrow in Figure V, the free end 124 of the tappet 122 first encounters the notch 126 in the periphery of said wheel as a consequence of which the sector 116 connected by the linkage 118—119 and 121 already explained to said tappet is shifted to uncover a number of the teeth 99 of the ratchet 98 thus permitting the pawl 101 to progress said ratchet in a clockwise direction. This movement is communicated through the medium of the shaft 91 and the driving pulley 95 to the elastic band 85 thereby shifting the block 83 in the rocker arm 80 and hence lowering the pivotal connection with the link 79. This results in impartation of a greater throw to the oscillation of the auxiliary yarn feeds 35 with correspondingly greater range of feeding so that the needles 3 supplied in each special group is increased. When the tappet 122 encounters the first projection 127 of the pattern wheel 125 as considered with reference to the direction of rotation, (Figure V), the pawl guard 113 is swung to uncover the teeth 100 with the result that the ratchet wheel 98 is shifted counterclockwise thereby restoring the pivotal connection of link 79 to the rocker arm 80 to its original position. The operation of the pattern mechanism up to this point determines the formation of a cross bar C in the clock stripe P as illustrated in Figure XXV. The three notches 126^a, 126^b, 126^c are functional in magnifying the amplitude of oscillation of the auxiliary yarn feeds 35 for the next three courses of the knitting while the three succeeding projections 127^a, 127^b, 127^c reverse the process thereby determining an ornamental head H at the top end of the pin stripe P. The last of the notches of the pattern wheel 125 indicated at 126^d determines the production of a second cross bar C' in the clock stripe P, while the last of the projections 127^d effects restoration of the parts of the control mechanism to normal so that from this point on the oscillations of the auxiliary yarn feeds 35 are unvaried thereby determining the production of plain stripes in continuation. Overbanking in the course of the shiftings of the pattern wheel 125 is

obviated by a spring pressed brake shoe 149, see Figure II and V. In case the normal position of the shaft 91 is disturbed by accident or otherwise it may be restored to such position by turning a winged collar 150 provided for the purpose until arrested by the engagement of a stop finger 151 with a portion of the frame 31, see Figure I and III. A brake collar 152 effective upon the shaft 91 prevents impartation of excess movement in the course of the operation of the reversible pawling mechanism.

Motion of the rocker arm 80 is induced by a disk cam 155 (Figure III) fixed upon a vertical shaft 156 supported within bearings 157 of the upright member 94 of the frame 31', said shaft serving also to drive the shaft 111 by a bevel gear couple indicated at 158. The cam 155 has peripheral protuberances 159 and also a groove 160, said protuberances and groove operating in concert to effect oscillation of a bell crank lever 161. This lever 161 is fulcrumed about a fixed pivot post 162 and at its shorter arm carries a roller 163 which engages with the cam groove 160 while its longer end is slotted as shown at 164 to engage with a pin 165 mounted in the end of a slide bar 166 comprised in a motion translating device indicated by the numeral 167 in Figure III. To the lower end of the pin 165 aforesaid is secured a roller 168 which engages the periphery of the cam 155. The bar 166 is slidably guided within a casing of the device 167 which is screwed to the plate 32 and, at its inner end, has gear teeth in mesh with a segmental pinion 169 concealed within said casing. This pinion 169 is secured to a shaft 170 which extends upwardly from the casing to a second motion translating device 171 whose details are shown in Figure XI. The latter device 171, like the first, comprises a toothed slide bar 172 to which motion is imparted by virtue of intermeshing with another segmental pinion 173 also secured to the vertical shaft 170. A coiled spring 174 surrounds the shaft 170 and imparts torsion to maintain the rollers 163 and 168 of the bell crank lever 161 in engagement with the cam 155. The upper end of the shaft 170 is journaled in a bearing member 175 formed with a boss 176 which embraces the horizontal shaft 111, hereinbefore mentioned, and which is held from displacement thereon between the cam 110 and the eccentric 133. Movement of the slide bar 172 is in turn imparted, through an interposed link 177, to a lever 178 attached to the end of the shaft of the rocker arm 80 which protrudes to the opposite side of the bearing 82. As best shown in Figure X, the pivotal connection between the link 177 and the lever 178 consists of a pin 179 carried in a block 180 whose rear face is serrated for engagement with the complementarily serrated face of said lever, see Figure X. The

block 180 may be shifted within the limits of a slot 181 provided in the lever 178 for the pivot pin 179 and clamped in any desired adjusted position by means of a nut 182 threaded to the protruding rear end of said pivot pin. This adjustable construction affords a means whereby the motion derived from the cam 155 may be amplified in its transmission to the arm 178, such amplification being directly communicated to the auxiliary feeds 35 so that further variations may be obtained in the ornamental effect produced by them.

Although the machine as herein arranged is adapted to production of clock stripes upon hosiery, it is apparent that in lieu of such stripes various ornamental design patterns may be produced by successive rotations of the pattern wheel 125 and also by varying its peripheral configuration in accordance with the design or ornamentation desired. Also, if desired the number of stripes may be increased simply by employment of additional auxiliary yarn feeds 35. As previously stated, I have shown my invention in association with a so-called semi-automatic machine of the type used in completing half hose after transfer of ribbed tops to the machine. Therefore, in order to make such transfer possible it becomes necessary to effect withdrawal, or as in the present case, elevation of the housing 34 of the auxiliary yarn feeds 35 above the top of the needle cylinder 2 so that either the latter may be removed for transfer or the ribbed top applied to the needles 3. This desideratum I secure by mounting the bracket frame 31 which carries the auxiliary yarn feeds 35, together with their operating mechanism, upon a vertical post 185 which is slidable in a bearing 186 formed as an integral part of an extension plate 187 bolted to the main bed plate 6 of the machine. At one side, said post 185 is longitudinally grooved to accommodate with provision for independent movement a slide rod 188—Fig. VII—with gear teeth 189 which are engaged by a gear pinion 190 (Fig. VI) appropriately journaled adjacent the bearing 186. This gear pinion 190 is in turn, in mesh with a worm 191 fastened upon a vertical shaft 192 whose lower end projects into a gear casing 193 for attachment thereto of a beveled gear 194, see Fig. VII. The bevel gear 194 is arranged to be driven by one or the other of two intermeshing pinions 195, 196 mounted for independent rotation upon a shaft 197 journaled in the gear casing 193. To the right hand or protruding end of the shaft 197 (Fig. VII) is secured a drive pulley 198 which may be co-ordinated by belt with the source of power which drives the machine proper, and is constantly rotated. In order that the pinions 195 and 196 may be selectively

coupled to the shaft 192 according as to whether the post 185 is to be elevated or lowered, I have provided a clutch sleeve 199 whose opposite ends are appropriately configured to engage with projections on the contiguous faces of the pinions 195—196. The clutch sleeve 199 has a central circumferential groove for engagement by a shifting fork 200 secured to a slide rod 201. An actuating finger 202 engages within a bifurcation formed in a depending lug of the fork 200, and is secured to a rock shaft 203 which protrudes to the exterior of the gear casing 193 for attachment thereto of a lever 204. The end of this lever 204 lies within the path of collars 205—206, secured upon a rod 207 free to slide in guides 208—209, of which the first is secured to the horizontal portion 32 of the frame 31 while the other projects laterally from the lower end of the toothed bar 188. A spring 210 whose function will be later disclosed encircles the rod 207 and is interposed between the collar 206 and the guide 209. The operation of the means whereby the bracket frame 31 with its adjuncts is elevated, is initiated under control of a sprocket chain 215 which is progressed synchronously with the measuring chain 20 and moves about a sprocket wheel 216 mounted upon the shaft 22 with the sprocket wheel 21. The chain 215 has at one side, cam projections 217, 218 which pass beneath the finger 220 secured upon a rock shaft 221 supported jointly by a lug on the main frame 6 of the machine, and a similar lug formed on an integral appendage of the guide bearing 186 for the post 185. The movements of the rock shaft 221 are imparted through a lever 222 secured to said shaft and a connecting link 223 to a lock mechanism 224 shown in detail in Fig. IX of the drawings. This lock mechanism 224 consists of a rod 225 with a latch blade 226 which is urged upwardly under the pressure of a spring 227 toward the clutch actuating slide rod 201 which is notched at 228 to receive said latch blade. Upon withdrawal of the latch blade 226 from the notch 228 the slide rod 201 after being released is drawn to the left (Fig. VII) as a result of gravity acting upon the arm 204. The consequent engagement of the clutch sleeve 199 with the bevel pinion 195 results in the rotation of the worm gear 190 in a direction to elevate the bracket frame 31. In the course of the upward movement of the latter, the collar 206 on the rod 207 engages the lever 204 and is arrested until the spring 210 is fully compressed whereupon further yielding ceases. As a consequence, with forced shifting of the rod 207 which takes place immediately the lever 204 is swung upwardly until its movement is intercepted by engagement of the latch blade

226 of the locking mechanism 224 with the notch 228 in the shifter rod 201. The clutch sleeve 199 is thus restored to and held in the normal neutral position with the bracket 31 fully elevated and at rest, with the housing 34 which supports the auxiliary yarn feeds 35 entirely clear of the needle cylinder 2 so that the latter is accessible for transfer purposes. It is important to note that at this time, the spring 210 is still compressed in readiness to effect shifting of the clutch lever 204 for subsequent lowering of the auxiliary yarn feeding mechanism 30 as later explained in connection with the operation of the machine.

The vertical propulsion shaft 156 is arranged to be driven by an aligned short shaft section 230 journaled in the extension member 187 of the main frame 6 and coordinated with the main shaft 8 of the machine through a bevel gear couple 231. Interposed between the shaft 156 and the aligned section 230 is a clutch comprising the members 232 and 233, the former being splined for shifting on the shaft 156, while the latter is secured directly to the companion section 230. The clutch member 232 is shifted by means of a fork 234 secured upon a shaft 235 where to is also secured an arm 236 which is connected by a link 237 with a push rod 239 slidably mounted in a guide bearing 240 screwed to the plate 32 of bracket extension 31. This push rod 239 is subject to a spring concealed within the bearing 240 which urges the protruding chamfered end of the rod (Fig. III) toward the pattern wheel 125 and into the path of lateral cam projections 241, 242 of the latter. To said pattern wheel 125 is thus assigned the additional function of actuating the clutch for the propulsion shaft 156 for the auxiliary yarn feed drive. This clutch shifting is however subject to the control of the sprocket chain 215 which carries on the side opposite the cam projections 217—218, additional projections 243—244 for engaging a finger 245, said finger being secured upon a shaft 246 journaled with the shaft 138 in the brackets 139, see Fig. II. An arm 247 fixed to the shaft 246 is coupled by means of a link 248 with the slide pin 249 of a lock mechanism which is identical with the lock mechanism 224 and shown in Figs. II, III, V, and VII as incorporated in the guide bearing 240 for the push rod 239. The slide pin 249 is spring-pressed so that the appended latch plate 250 is urged toward the push rod 239 which is provided with a notch for engaging said plate, see Fig. IV. When locked, the push rod 239 is held retracted with its chamfered end out of the path of the lateral cam projections 241, 242 of the pattern wheel 125 and with the clutch collars 232—233 disengaged as illustrated in Fig. VI.

The operation of my invention is as follows:

In the drawings, the parts of the organization are shown in the positions which they occupy after the machine has been set in motion by manual shifting of the driving belt to the tight pulley 9 on the main drive shaft 8, and in the process of knitting the leg portion of the stocking in direct continuation with a ribbed top previously applied to the needles 3. Concurrently with the rotation of the main shaft 8, the sprocket chains 20 and 215 are continuously progressed by picking of the ratchet wheel 23. Plain knitting proceeds until the cam projection 243 on the sprocket chain 215 engages the finger 245 which results in the unlatching of the lock mechanism, 238, release of the push rod 239 to spring action, and, through the intervening parts already understood, the clutching of the propulsion shaft 156 with the short shaft section 230 for direct actuation by the main shaft 8 of the machine. The auxiliary yarn feeding mechanism 30 is thus set in motion for plain stripe production which proceeds for but a few courses when the arcuate element 145 on the measuring chain 20 engages the dog 142 to initiate pawling of the pattern wheel 125, with consequent production of the ornamentations H at the tops of the clock stripes as shown in Fig. XXV. The length of the element 145, it will be remembered is such that the pawling of the pattern wheel 125 continues only until the lateral cam projection 141 is positioned in readiness to engage the push rod 239. In this position the pattern wheel 125 rests while plain stripes are continued down to the point at which the heel pocket is to begin. When this point is reached the link 147 of the chain 20 engages the finger 142 to cause the single stepping of the ratchet wheel 129, and with it the corresponding movement of the pattern wheel 125, to bring the cam projection 141 on said wheel into engagement with the push rod 239 for effecting separation of the clutch collars 232, 233. As a result of this disconnection, the auxiliary yarn feeding mechanism 30 is rendered inactive. Simultaneously with the events just described, the cam projection 25 of the pattern chain 20 engages the trip finger 26 in causing the driving belt to be shifted from the tight pulley 9 to the loose pulley 10, with consequent stoppage of the machine. As previously stated this stoppage enables the operator to perform the function necessary or desirable in preparing the machine for oscillatory knitting in the production of the heel pocket which immediately follows. The driving belt is then shifted manually and the knitting of the last mentioned portion of the stocking takes place automatically until the cam projection 25^a of the

measuring chain 20 encounters the trigger finger 26 to effect stoppage of the machine a second time. Here the operator is given the opportunity to make restorations necessary to circular knitting so that the knitting of the foot portion of the stocking may follow. About the same time that the high link 25^a of the chain 20 functions, the projection 244 on chain 215 engages the finger 245 to permit restoration of the clutch members 232 and 233 into activity so that upon subsequent restarting of the machine, by manual shifting of the driving belt, continuations of the clock stripes are produced simultaneously with the knitting of the stocking foot. The length of the segments of the clock stripe along the stocking foot is determined by the positioning of the high link 148 on the measuring chain 20 which in engaging the dog 142 causes another single picking of the ratchet wheel 129 and with it the corresponding shifting of the pattern wheel 125 whereby the lateral cam projection 242 of said pattern wheel is brought into engagement with the push rod 239 to effect separation of the clutch collars 232 and 233 and final inactivity of the auxiliary yarn feeding mechanism 30. From this point on the stocking foot is knit as a plain tube in the usual manner until the projection 25^b of the measuring chain 20 causes stoppage of the machine to permit the operator to again make the necessary adjustments necessary to oscillatory knitting, to produce the toe. This, like the knitting of the heel, proceeds automatically to completion, when a high link 25^c on the pattern measuring chain 20 again effects the shifting of the driving belt to bring the machine to a stop at the completion of a stocking. In the course of the knitting of the toe pocket the cam projection 217 on the sprocket chain 215 engages the arm 220 which is coordinated with the lock mechanism 224 for the clutch mechanism which controls the raising and lowering of the auxiliary yarn mechanism 30. This clutch mechanism 30 is operated to bring the bracket 31 with its appendages to a raised position in the manner previously described. The finished stocking may then be removed from the needle cylinder 2 and replaced by a ribbed top for a new stocking. Immediately after the machine is started a cam projection 218 on sprocket chain 215 engages the finger 220 thereby tripping the lock mechanism 224 and through the intermediate parts releasing the clutch shift lever 204 to the action of the spring 210 placed in compression during the elevation of the bracket 31. The raising of this lever 204, it will be noted by reference to Fig. VII, will result in the engagement of the clutch collar 199 with the pinion 196 so that the bevel gear 194 and the worm gear pinion 190 are driven in a direction

reverse of that of the previous action, thereby bringing about the lowering of the auxiliary yarn feed mechanism 30 to the position shown in the drawings. The bracket 31 of the latter mechanism comes to rest upon the top of bearing 186 and immediately thereupon the collar 205 on rod 207 engages the clutch lever 204 to depress the same to the normal or neutral position with clutch collar 199 retracted from the pinion 196. Any excess motion of the gearing is absorbed by virtue of the freedom accorded the bar 188 in the post so that the various parts of the last described mechanism are protected against derangement or possible breakage.

While I have particularly described one practical embodiment of my invention, it will be apparent the same is susceptible of considerable detail modification and variation without departing from the spirit and intent of said invention as specifically defined by the appended claims.

Having thus described my invention, I claim:—

1. A knitting machine comprising a needle cylinder and a main yarn feed, a number of auxiliary yarn feeds, a support for said auxiliary feeds co-axial with the needle cylinder, and independently rotatable means for oscillating the support to cause said auxiliary feeds to supply yarns to definite groups of the needles.

2. A knitting machine comprising a needle cylinder and a main yarn feed, a number of auxiliary yarn feeds, a support for said auxiliary feeds co-axial with the needle cylinder, independently rotatable means for oscillating the support to cause said auxiliary feeds to supply yarn to definite groups of the needles, and pattern means for controlling said oscillating means to effect variation in the number of needles fed.

3. A knitting machine comprising a needle cylinder and a main yarn feed, a number of auxiliary yarn feeds, a support for said auxiliary feeds co-axial with the needle cylinder, independently rotatable means for oscillating the support, and means for incidentally reciprocating said auxiliary yarn feeds radially of the support to cause yarn to be wrapped about definite groups of the needles.

4. A knitting machine comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting tubular fabric; in combination with a multiplicity of auxiliary yarn feeds, fulcrumed for horizontal oscillation to slides in turn mounted for radial guidance in a fixed support concentrically disposed within the needle cylinder, means for actuating the slides to project and retract the auxiliary feeds with respect to the needles, and means for swinging the feeds about their fulcrums to wrap auxiliary yarn about definite groups

of the needles to produce ornamental pattern effects in the knitted web.

5 5. A knitting machine comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting tubular fabric; in combination with a multiplicity of auxiliary yarn feeds, fulcrumed for horizontal oscillation to slides in turn
10 element concentrically disposed within the needle cylinder, a rotatable grooved cam engaging butts on said slides to effect projection and retraction of the auxiliary feeds with respect to the needles, and a housing
15 member oscillatable independently of the supporting element provided with means for engaging the yarn feeds to swing the same about their fulera to wrap auxiliary yarn around definite groups of needles in order to
20 produce ornamental pattern effects in the knitted tube.

6. A knitting machine comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting tubular fabric; in combination with a multiplicity of auxiliary yarn feeds mounted in a support concentrically disposed within the
25 needle cylinder, means for actuating the feeds to wrap auxiliary yarn about definite groups of the needles, and a depressor associated with each auxiliary yarn feed, said depressors being independently swingable about the axis of the aforesaid support so
30 as to move over the auxiliary yarn to depress the same well downward along the shanks of the needles to a position below the feeding level of the main or body yarn thereby to insure the auxiliary yarn appearing on the face of the knitted web in
35 producing ornamental pattern effects.

7. A knitting machine comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting a tubular fabric; in combination with a multiplicity of auxiliary yarn feeds mounted in a support concentrically disposed within the
45 needle cylinder, means for actuating the feeds to wrap auxiliary yarn about definite groups of needles, and depressors, one associated with each auxiliary yarn feed, the depressors being independently swingable about the axis of the said support, and means for actuating the depressors so as to
50 move over the auxiliary yarn to depress the same well downward along the shanks of the needles thereby to insure its appearing on the face of the knitted web in producing ornamental pattern effects, the last mentioned means including a rotating element
55 with a cam projection adapted to successively engage protruding portions of balls seated in lever arms of the depressors to carry the latter along to an extent limited by recession of the balls into cavities in the support aforesaid whereupon the depressors

are freed to retract to normal position under spring action.

8. A knitting machine comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting a tubular fabric; in combination with a multiplicity of auxiliary feeds supported in a housing concentrically disposed within the circle of needles; and mechanism for oscillating the housing to cause the feeds to supply auxiliary yarn to definite groups of the needles for production of ornamental effects in the knitted tube including; a rocker arm coordinated with the housing through
75 a connecting link, and means whereby the point of pivotal attachment of the link is shifted longitudinally of the rocker arm so that the range of feeding the auxiliary yarn is increased or decreased with corresponding variations in the ornamental effect produced.

9. A knitting machine comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting a tubular fabric; in combination with a multiplicity of auxiliary feeds supported in a housing concentrically disposed within the circle of needles, and mechanism for oscillating the housing to cause the feeds to supply auxiliary yarn to definite groups of the needles for production or ornamental effects in the knitted tube including; a rocker arm coordinated with the housing through
95 a connecting link, a block slidable longitudinally in the rocker arm to which the link is pivotally connected, and a flexible band subject to governing mechanism controlling shifting of the block so that the range of feeding the auxiliary yarn is increased or decreased with corresponding variations in the ornamental effect produced.

10. A knitting machine comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting a tubular fabric; in combination with a multiplicity of auxiliary feeds supported in a housing concentrically disposed within the circle of needles; and mechanism for oscillating the housing to cause the feeds to supply auxiliary yarn to definite groups of the needles for production of ornamental effects in the knitted tube including; a rocker arm coordinated with the housing through
110 a connecting link, a block whereto the link is pivotally connected slidable longitudinally of the rocker arm, said block being secured to a flexible endless band arranged to be driven by a pulley disk rotatable in one direction or the other under actuation of a reversible ratchet mechanism, so that the range of feeding of the auxiliary yarn is thereby increased or decreased with corresponding variation in the ornamental effect produced.

11. A knitting machine comprising a needle

die cylinder and a main yarn feed cooperating with the needles thereof in knitting a tubular fabric; in combination with a multiplicity of auxiliary feeds supported in a housing concentrically disposed within the circle of needles, and mechanism for oscillating the housing to cause the feeds to supply auxiliary yarn to definite groups of the needles for production of ornamental effects in the knitted tube including; a rocker arm coordinated with the housing through a connecting link, a block whereto the link is pivotally connected slidable longitudinally of the rocker arm, said block being secured to a flexible endless band arranged to be driven by a pulley disk rotatable in one direction or the other under actuation of a reversible ratchet mechanism consisting of a ratchet wheel with two sets of teeth oppositely pitched for selective forward or backward turning by one or the other of two oscillating pawls, the direction of movement of the ratchet being determined through the medium of a shiftable guard effective upon the pawls under control of governing means whereby the range of feeding of the auxiliary yarn is increased or decreased with corresponding variations in the ornamentation produced.

12. A knitting machine comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting a tubular fabric; in combination with a multiplicity of auxiliary feeds supported in a housing concentrically disposed within the circle of needles, and mechanism for oscillating the housing to cause the feeds to supply auxiliary yarn to definite groups of the needles for production of ornamental effects in the knitted tube including; a rocker arm coordinated with the housing through a connecting link, a block whereto the link is pivotally connected slidable longitudinally of the rocker arm, said block being secured to a flexible endless band arranged to be driven by a pulley disk rotatable in one direction or the other under actuation of a reversible ratchet mechanism consisting of a ratchet wheel with two sets of teeth oppositely pitched for selective forward or backward turning by one or the other of two oscillating pawls, the direction of movement of the ratchet being determined through the medium of a shiftable guard effective upon the pawls, said guard being in geared engagement with a sector, while the movements of the latter are in turn governed through connection with a tappet lever cooperating with peripheral notches and elevations of a rotatable pattern disk, the concerted action of the correlated parts aforesaid resulting in increase and decrease of the range of feeding of the auxiliary yarn with corresponding variations in the ornamentation produced.

13. A knitting machine comprising a needle cylinder and a main or body yarn feed cooperating with the needles thereof in knitting a tubular fabric; in combination with a multiplicity of auxiliary feeds supported in a housing concentrically disposed within the circle of needles, mechanism for oscillating the housing to cause the feeds to supply auxiliary yarn to definite groups of the needles including; a rocker arm coordinated with the housing through a connecting link, a block slidable longitudinally of the rocker arm to permit shifting the center of pivotal attachment of the link, said block being secured to a flexible endless band arranged to be driven by a pulley disk rotatable in one direction or the other, a driving ratchet wheel for the pulley disk with two sets of teeth oppositely pitched for selective forward or backward turning by one or the other of two oscillating pawls, the direction of movement of the ratchet being determined by a shiftable pawl guard in geared engagement with a sector actuated through coordination with a tappet lever arranged to cooperate with peripheral notches and projections of a pattern wheel, said pattern wheel being normally at rest to permit induction of uniform oscillation of the auxiliary feeds in predetermining production of clock stripes in the knitted fabric, and means for controlling activity of the pattern disk so that the amplitude of oscillation of the auxiliary feeds is varied as the knitting proceeds to determine production of ornamental configurations at the ends of the clock stripes.

14. A knitting machine comprising a needle cylinder and a main or body yarn feed cooperating with the needles thereof in knitting a tubular fabric; in combination with a multiplicity of auxiliary feeds supported in a housing concentrically disposed within the circle of needles, mechanism for oscillating the housing to cause the feeds to supply auxiliary yarn to definite groups of the needles including; a rocker arm coordinated with the housing through a connecting link, a block slidable longitudinally of the rocker arm to permit shifting the center of pivotal attachment of the link, said block being secured to a flexible endless band arranged to be driven by a pulley disk rotatable in one direction or the other, a driving ratchet wheel for the pulley disk with two sets of teeth oppositely pitched for selective forward or backward turning by one or the other of two oscillating pawls, the direction of movement of the ratchet being determined by a shiftable pawl guard in geared engagement with a sector actuated through coordination with a tappet lever arranged to cooperate with peripheral notches and projections of a pattern wheel, said pattern wheel being normally at rest to permit in-

duction of uniform oscillation of the auxiliary feeds in predetermining production of clock stripes with knitted fabric, and means for controlling activity of the pattern disk so that the amplitude of oscillation of the auxiliary feeds is varied as the knitting proceeds to determine production of ornamental configurations at the ends of the clock stripes, the last mentioned means consisting of a ratchet wheel with an oscillating driving pawl, and a controlling pawl guard shiftable by a lever arranged to be actuated by high links on a measuring chain.

15. A stocking knitter comprising a needle cylinder, a main yarn feed cooperating with the needles thereof, a drive means whereby the needle cylinder and the knitting cams are relatively rotated in knitting tubular portions of the stocking and oscillated in knitting the heel and toe pockets, in combination with auxiliary yarn feeds and associated means for actuating said feeds to supply auxiliary yarn to definite groups of the needles in producing ornamental pattern effects on the stocking, said actuating means including a propulsion shaft with a clutch for connecting and disconnecting the same to and from the drive means of the machine, and a pattern wheel for controlling the behavior of the feeds in determining the character of ornamentation, said pattern wheel having cam projections for shifting the clutch aforesaid so that the auxiliary yarn feed mechanism is rendered temporarily inactive during knitting of the heel pocket and again after the ornamentation has been continued to the desired extent along the stocking foot.

16. A stocking knitter comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting stockings; in combination with auxiliary feeds for feeding auxiliary yarn to definite groups of the needles in producing ornamental pattern effects in the stocking, said feeds being supported in a housing normally disposed within the needle cylinder, and means for withdrawing the auxiliary feed housing from the needle cylinder after completion of each stocking to permit access to the needle cylinder for transfer purposes, including a bracket structure from which the housing is suspended, said bracket structure being guided for vertical movement with respect to the frame of the knitting machine, and mechanism for automatically controlling the movement of the bracket.

17. A stocking knitter comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting stockings; in combination with special feeds for supplying auxiliary yarns to definite groups of the needles in producing ornamental pattern effects in the stockings, said feeds being supported in a housing normally disposed

within the needle cylinder; and mechanism for raising and lowering the housing for the auxiliary yarn feed relative to the needle cylinder in permitting transfer; said mechanism including a bracket from which the housing is suspended, a gear drive associated with the bracket, instrumentalities whereby said gear drive may be selectively propelled in reverse directions, and automatic means for controlling such selection for the purpose stated.

18. A stocking knitter comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting stockings; in combination with special feeds for supplying auxiliary yarns to definite groups of the needles in producing ornamental pattern effects in the stockings, said feeds being supported in a housing normally disposed within the needle cylinder; and mechanism for raising and lowering the housing for the auxiliary yarn feed relative to the needle cylinder in permitting transfer; said mechanism including a bracket from which the housing is suspended, a gear drive associated with the bracket, means for initiating the activity of the gear drive, and separate means for controlling the periods of activity of the gear drive so that the bracket is brought to rest in its raised and lowered positions.

19. A stocking knitter comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting stockings; in combination with special feeds for supplying auxiliary yarns to definite groups of the needles in producing ornamental pattern effects in the stockings, said feeds being supported in a housing normally disposed within the needle cylinder; and mechanism for raising and lowering the housing for the auxiliary yarn feed relative to the needle cylinder in permitting transfer; said mechanism including a bracket from which the housing is suspended, a gear drive associated with the bracket, means for initiating the activity of the gear drive; and means incorporated with the bracket aforesaid in controlling the periods of activity of the gear drive so that the same is automatically brought to rest in its raised and lowered positions.

20. A stocking knitter comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting stockings; in combination with special feeds for supplying auxiliary yarns to definite groups of the needles in producing ornamental pattern effects in the stocking, said feeds being supported in a housing normally disposed within the needle cylinder; and mechanism for raising and lowering the housing for the auxiliary yarn feed relative to the needle cylinder in permitting transfer; said mechanism including a bracket from which the

housing is suspended, a gear drive associated with the bracket, an actuating bevel gear forming part of the gear drive, said bevel gear being in constant mesh with a pair of pinions normally free on a power shaft, and a clutch capable of being shifted for selective clutching of one or the other of the pinions in effecting reversals in the gear drive for the purpose stated.

21. A stocking knitter comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting stockings; in combination with special feeds for supplying auxiliary yarns to definite groups of the needles in producing ornamental pattern effects in the stocking, said feeds being supported in a housing normally disposed within the needle cylinder; and mechanism for raising and lowering the housing for the auxiliary yarn feed relative to the needle cylinder in permitting transfer; said mechanism including a bracket from which the housing is suspended, a gear drive associated with the bracket, an actuating bevel gear forming part of the gear drive, said bevel gear being in constant mesh with a pair of pinions normally free on a power shaft, a clutch sleeve splined to the power shaft, a locking device normally holding the sleeve in a neutral position intermediate the pinions, an actuating lever operable under influence of gravity upon release of the clutch sleeve, by tripping of the locking device, in shifting the latter into engagement with one of the pinions to effect raising of the bracket, a spring pressed stop carried by the bracket for engaging the actuating lever to restore the same to the neutral position with the bracket resting in its elevated position, said actuating lever being moved further in the same direction as last described upon subsequent release of said clutch by a second tripping of the locking device, under influence of energy stored in the spring operative upon the stop during

the previous action in shifting the clutch into engagement with the other of the two pinions aforesaid to effect lowering of the bracket, an additional stop carried by the bracket for engaging the actuating lever to again restore the clutch sleeve to the neutral position so that the bracket is brought to rest with the housing for the auxiliary yarn feeds back within the needle cylinder; together with automatic mechanism for controlling the locking device so that the bracket is elevated at the completion of each stocking and lowered immediately upon the starting of the machine when beginning a succeeding stocking.

22. A stocking knitter comprising a needle cylinder and a main yarn feed cooperating with the needles thereof in knitting stockings; in combination with special feeds for supplying auxiliary yarns to definite groups of the needles in producing ornamental pattern effects in the stocking, said feeds being supported in a housing normally disposed within the needle cylinder; and mechanism for raising and lowering the housing for the auxiliary yarn feeds relative to the needle cylinder in permitting transfer; said mechanism including a bracket from which the housing is suspended, a gear drive associated with the bracket, means for initiating activity of the gear drive; and separate means controlling the periods of activity of the gear drive so that the bracket is brought to rest in its raised and lowered positions, the latter mechanism being in the form of a sprocket chain with cam projections operative upon a finger coordinated with said locking device.

In testimony whereof, I have hereunto signed my name at Reading, Pa., this seventh day of September, 1922.

HEISTER SEIDERS.

Witnesses:

JAMES RICK, Jr.,
ALBERT RICK.