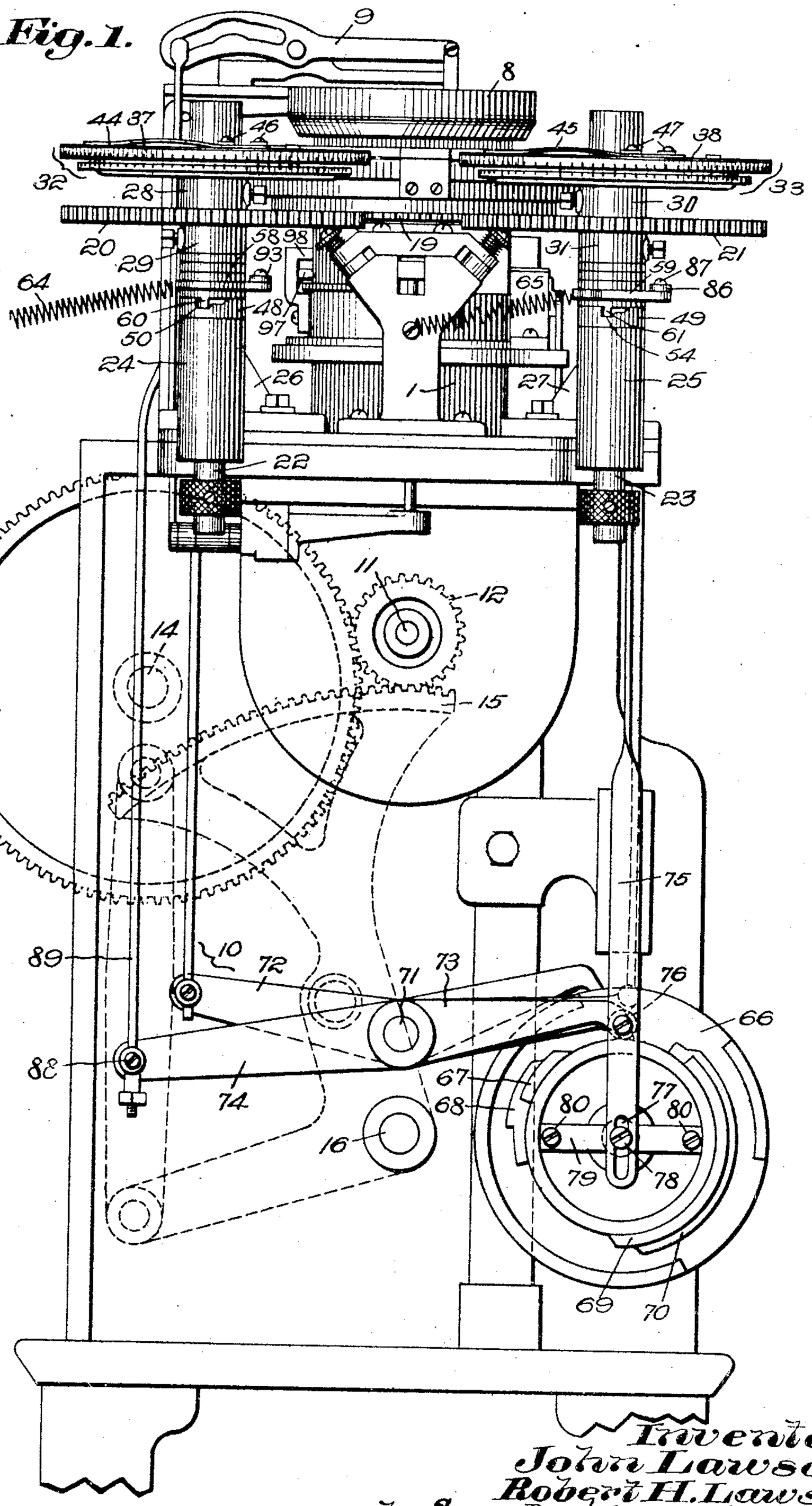
Feb. 14, 1933. J. LAWSON ET AL 1,897,130

MEANS FOR EFFECTING REVERSE PLATING

Filed Nov. 1, 1926 8 Sheets-Sheet 1

Fig. 1.



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MEANS FOR EFFECTING REVERSE PLATING

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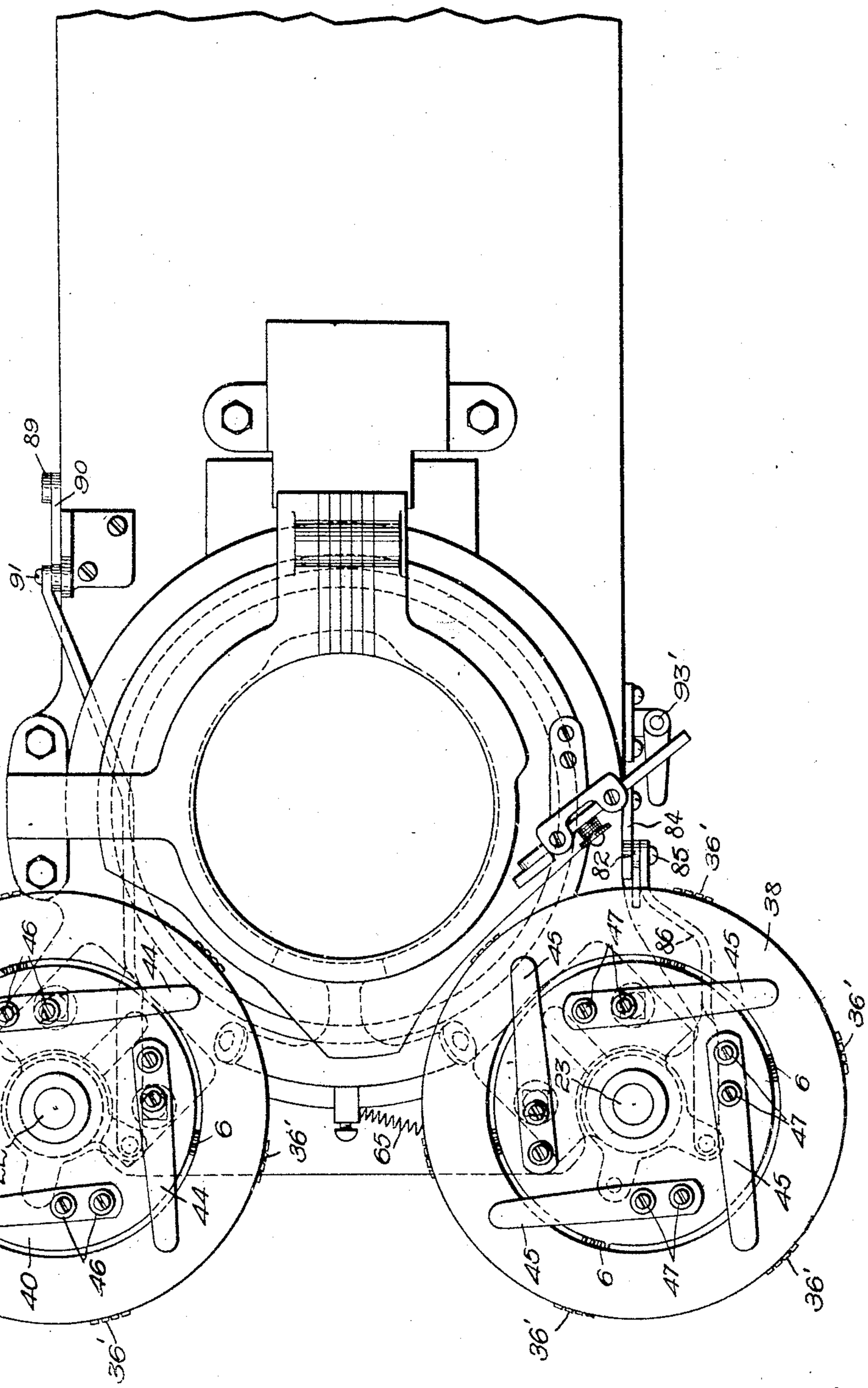
Fig. 2.



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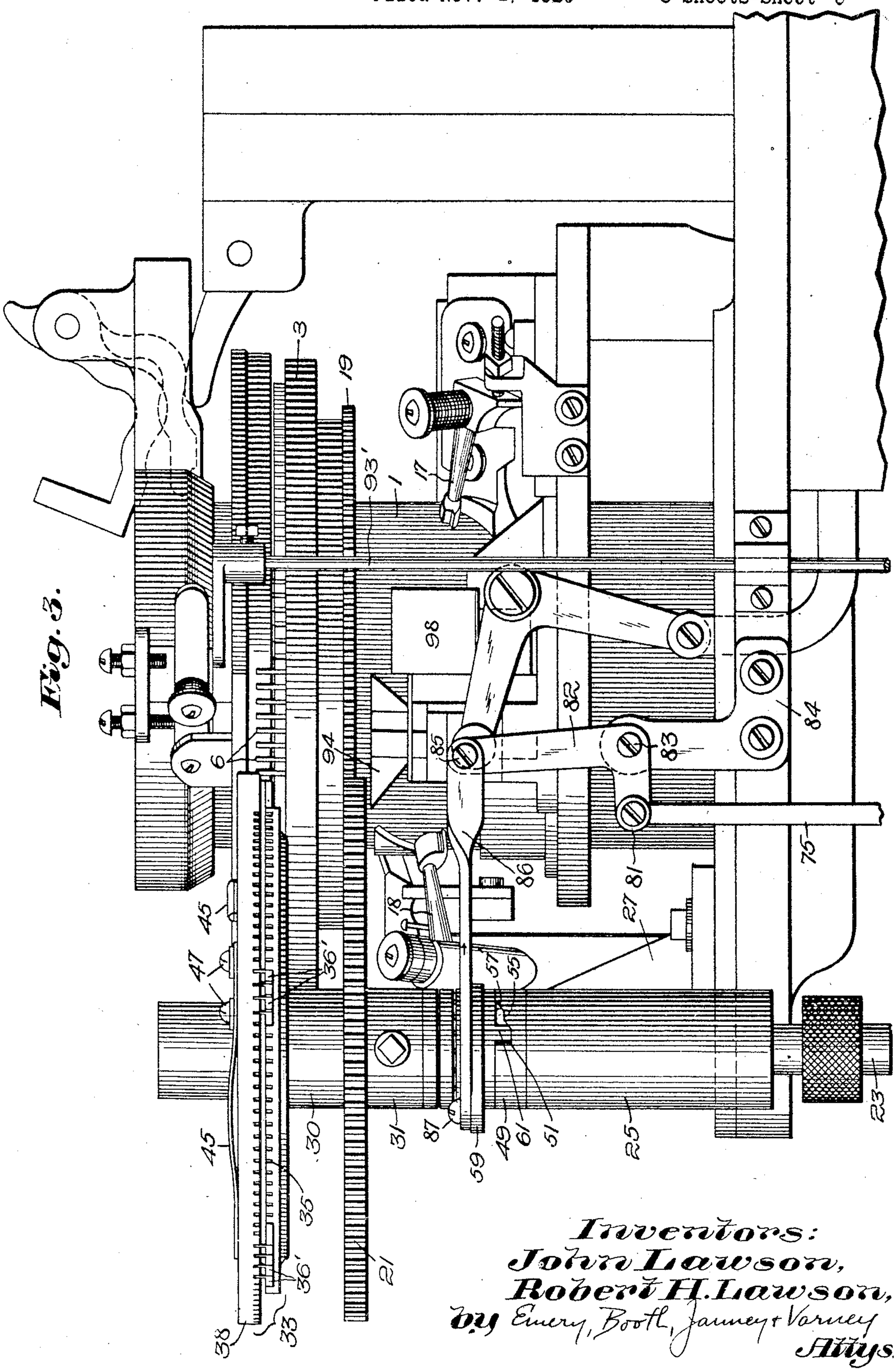

Fig. 3.

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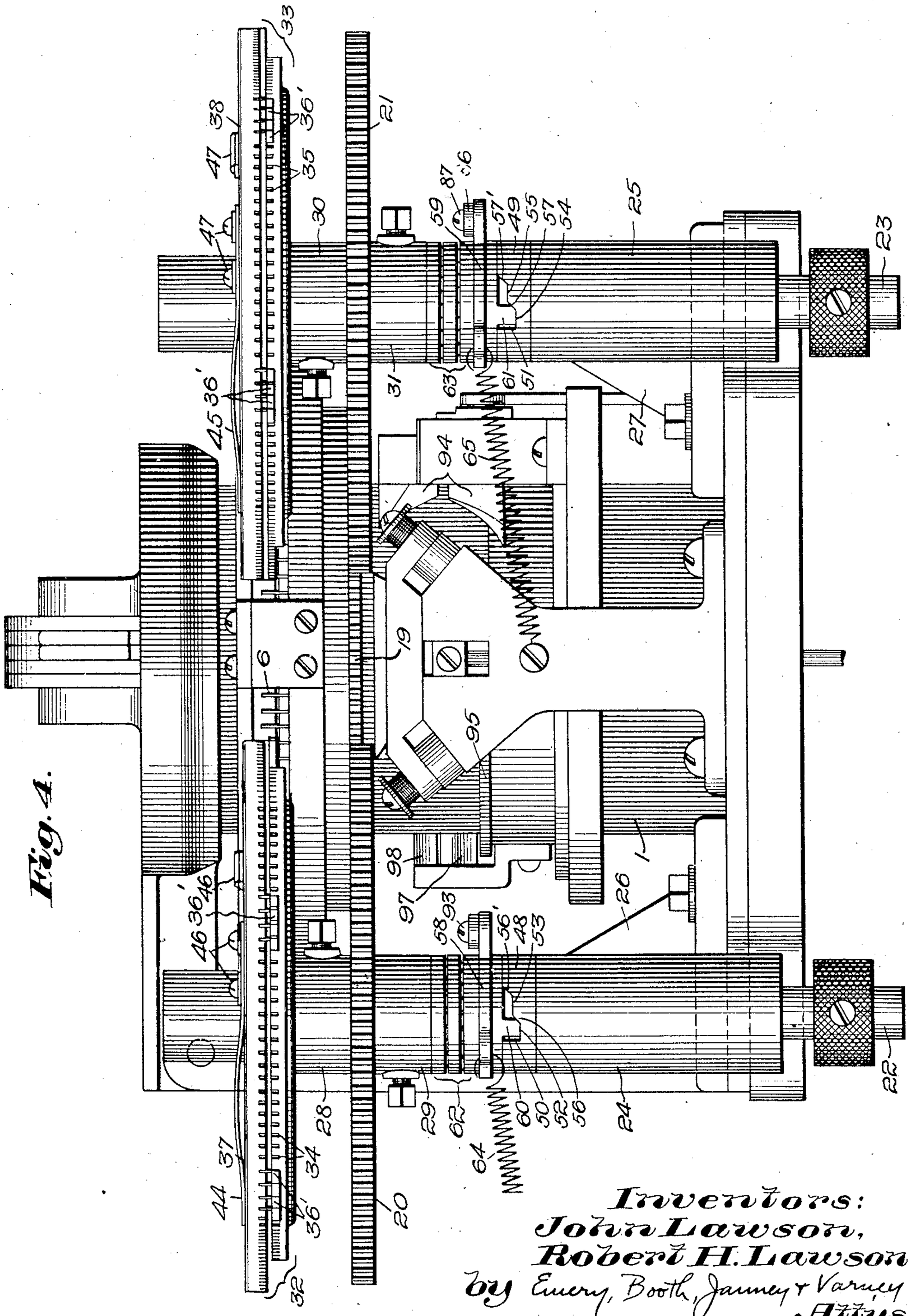

Fig. 4.

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Fig. 5.

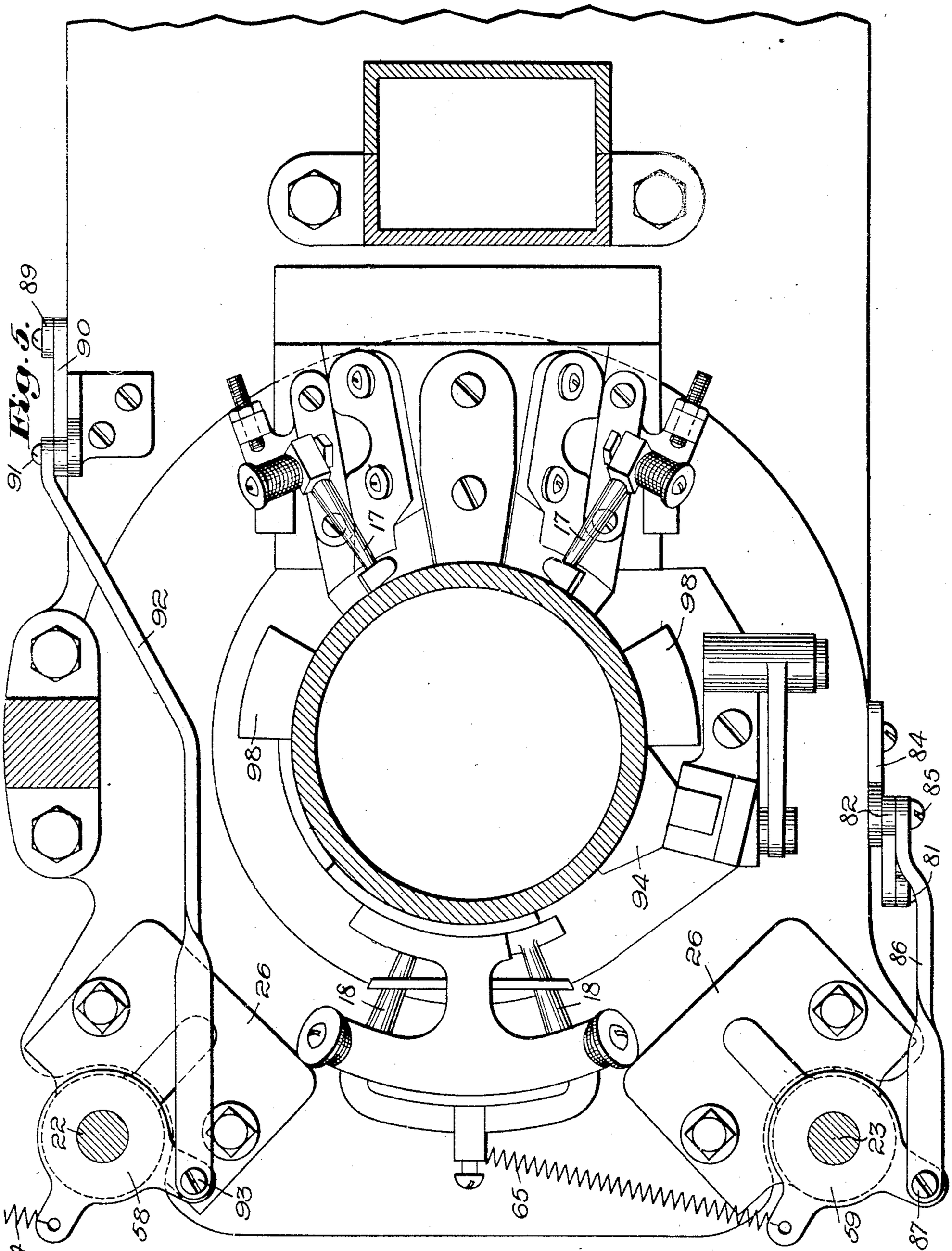

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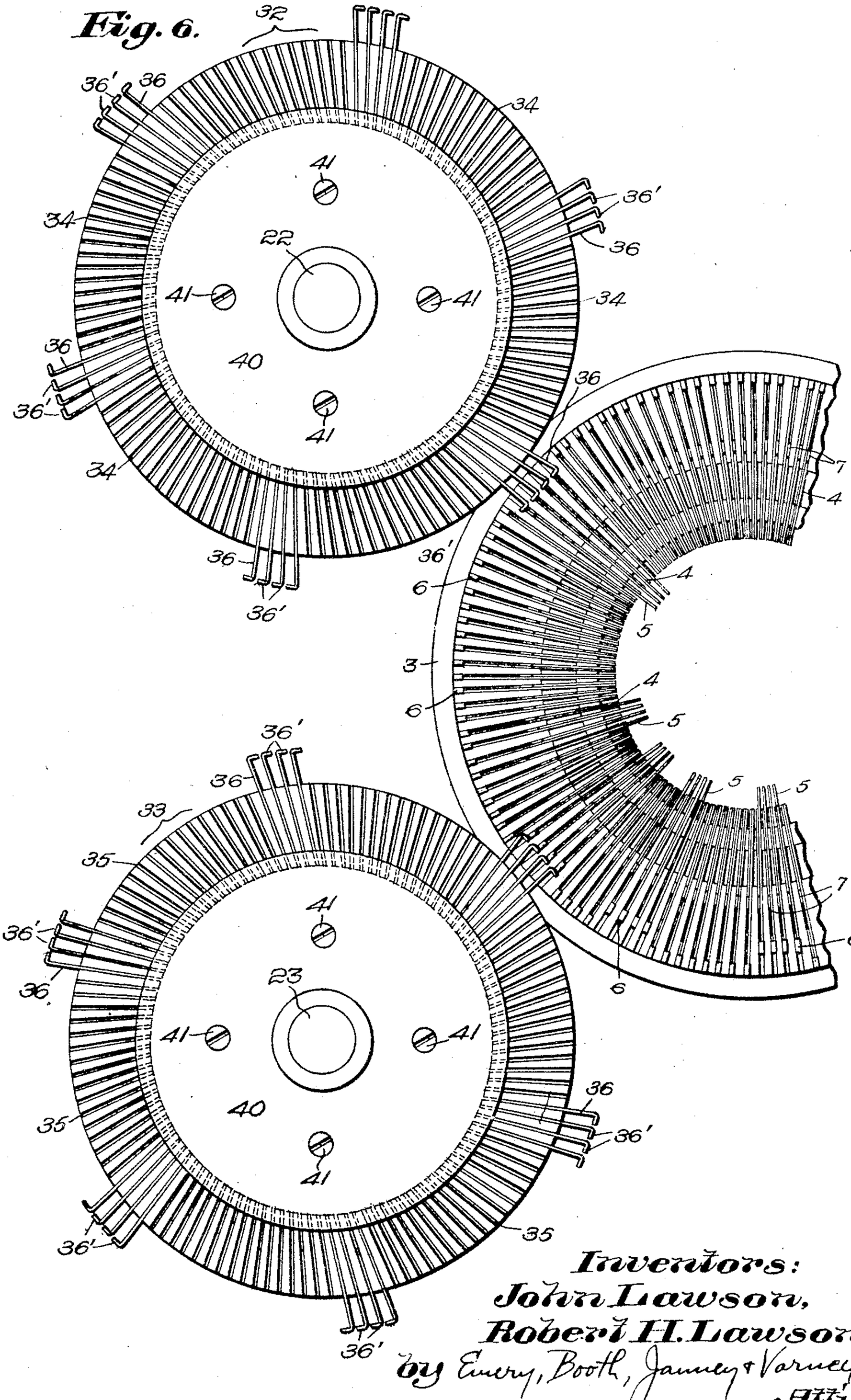
Fig. 6.



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MEANS FOR EFFECTING REVERSE PLATING

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Fig. 7.

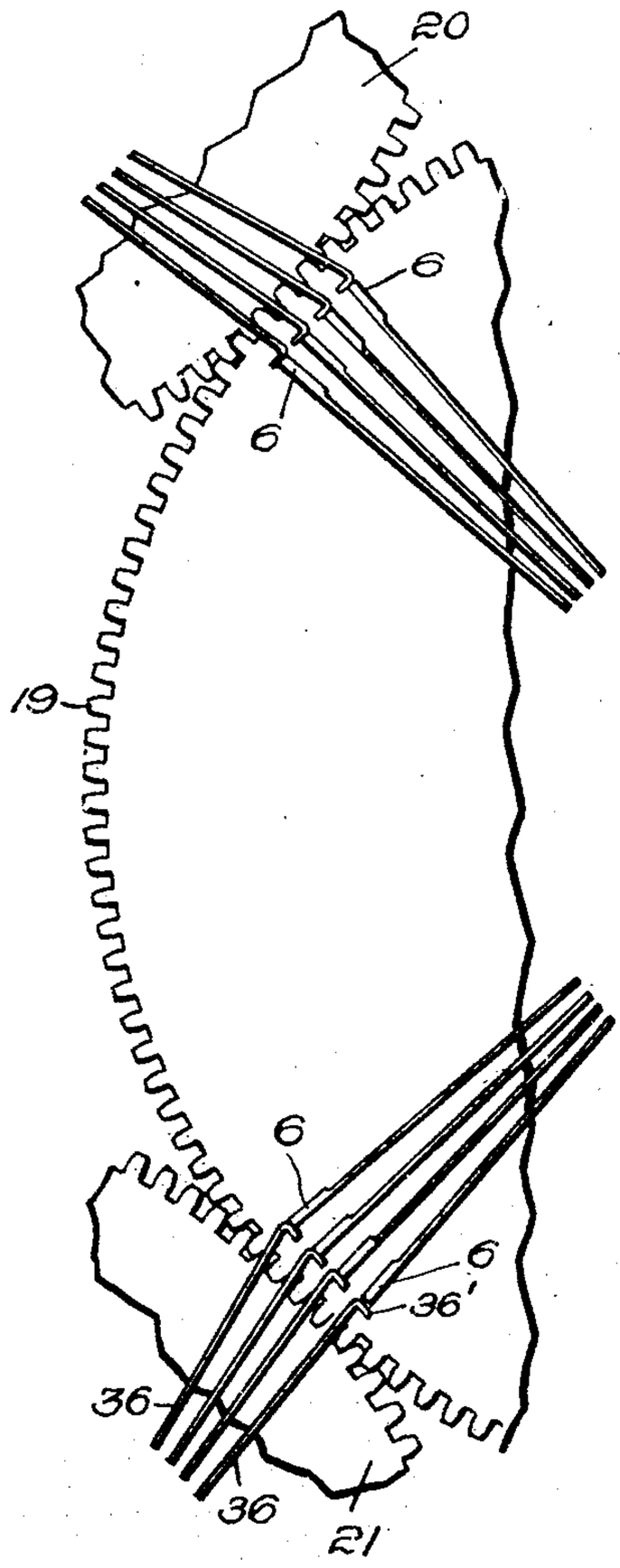
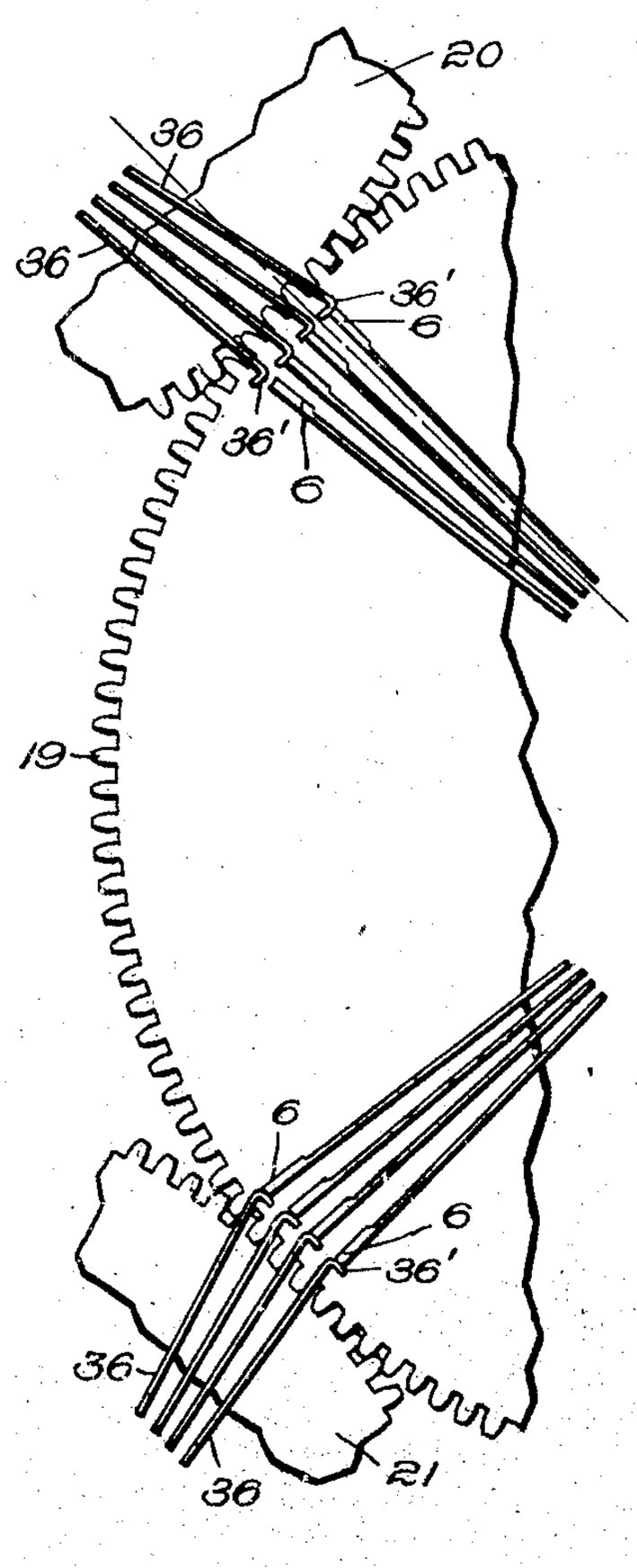


Fig. 8.



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MEANS FOR EFFECTING REVERSE PLATING

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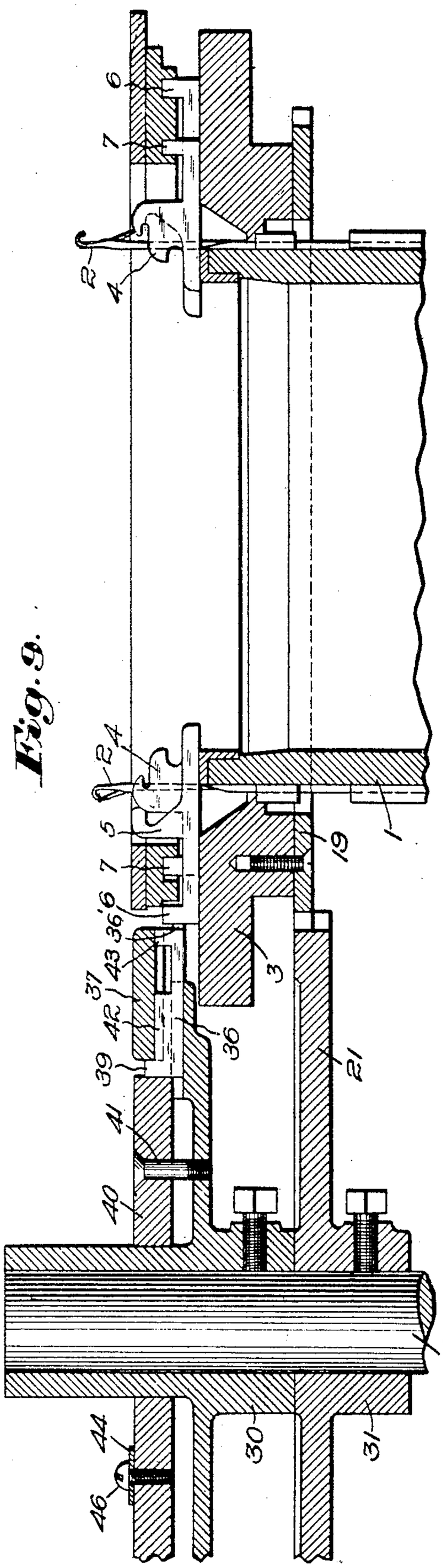

Fig. 9.

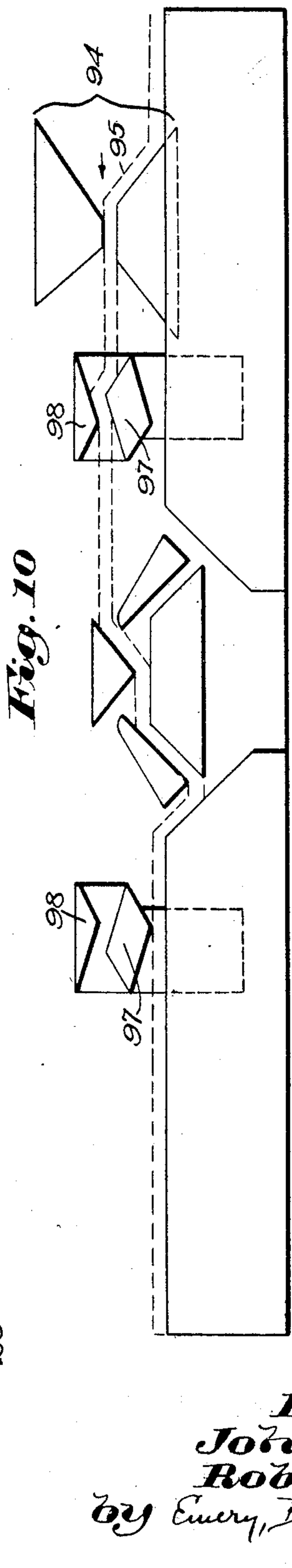

Fig. 10

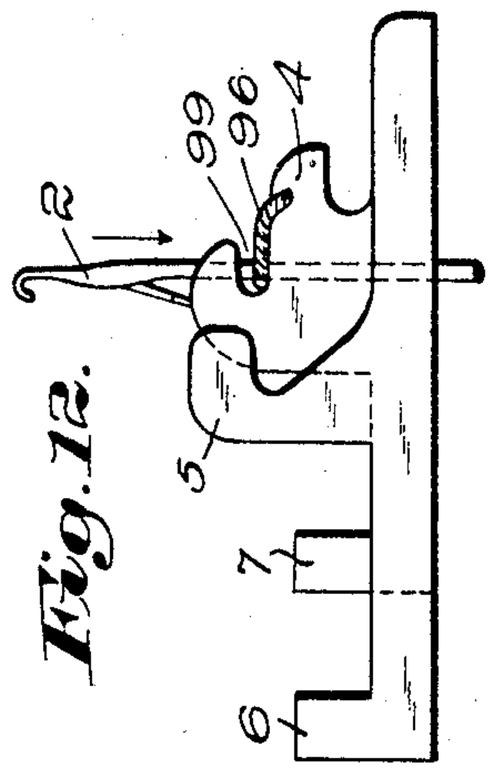

Fig. 12.

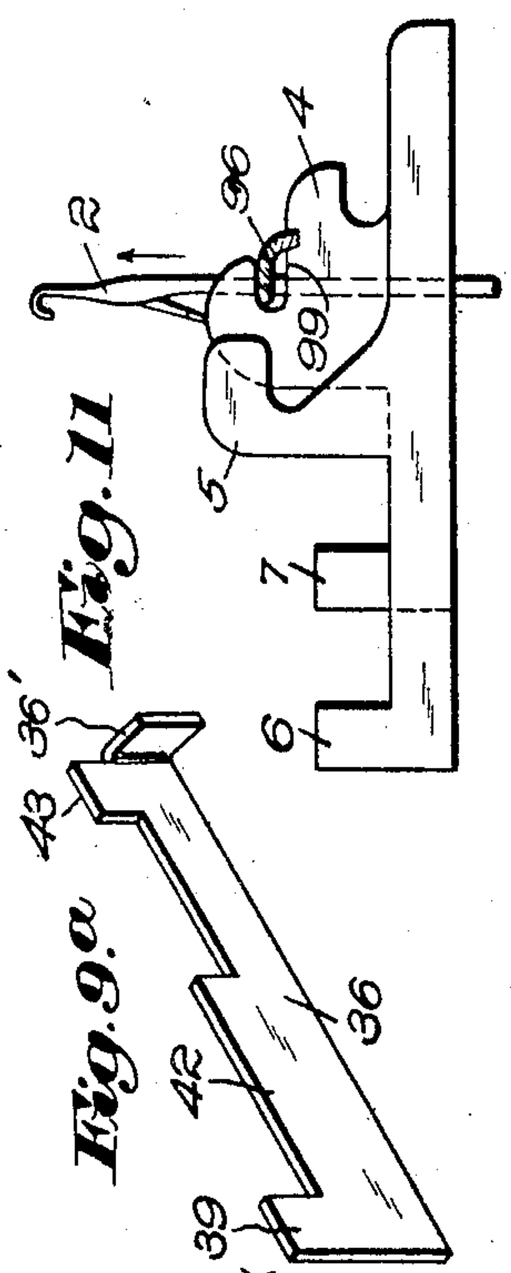

Fig. 11

Fig. 9a.

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Patented Feb. 14, 1933

1,897,130

UNITED STATES PATENT OFFICE

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MEANS FOR EFFECTING REVERSE PLATING

Application filed November 1, 1926. Serial No. 145,512.

This invention relates to means for effecting reverse plating.

In order that the principle of the invention may be readily understood, there is disclosed a single embodiment of means in the accompanying drawings, whereby reverse plating may be effected in accordance with the invention.

In the drawings:

Fig. 1 is an end elevation of a circular knitting machine having the invention applied thereto;

Fig. 2 is a plan view showing the knitting head and the pattern disks geared to the knitting organization and controlling the instrumentalities whereby the reverse plating is effected;

Fig. 3 is a front elevation of the upper portion of the knitting machine and showing the knitting head and the parts immediately associated therewith in the practice of the invention;

Fig. 4 is an end elevation of the head of a knitting machine as indicating the manner in which the pattern disks are driven from the knitting organization;

Fig. 5 is a plan view, with parts in section, but taken below the latch ring;

Fig. 6 is a plan view with parts broken away of the sinker bed ring and the pattern disks with their jacks, the cap plates of said disks being removed;

Figs. 7 and 8 are details in plan with parts broken away showing the geared relation of the pattern disks with the knitting organization;

Fig. 9 is a vertical transverse section taken through the upper end of the needle cylinder and the sinker head, and one of the pattern disks;

Fig. 9*a* is a perspective view of one of the jacks of a pattern disk;

Fig. 10 is a development showing the instep cam, the knitting cams and certain other cams employed in the practice of this invention;

Figs. 11 and 12 are side elevations representing the yarn in its relation to each needle in action in the heel and toe, and the adjacent web holder and special instrumentality, in reciprocating knitting.

In the patent to Robert H. Lawson, No. 1,605,896, dated November 2, 1926, there is disclosed means for effecting reverse plating through the action of special instrumentalities associated with the web holders and with the needles, together with means for shifting or altering during the knitting operation the point or points at which reverse plating is effected. By such means various patterns can be produced and among other patterns there may be produced inclined lines of reverse plating, all extending in the same direction along parallel lines or so arranged as to cross each other, thereby producing diamond or like effects. It is the purpose of the present invention to improve upon the mechanism disclosed in the said patent, and particularly to provide means whereby the pattern means may be readily and quickly altered or rearranged.

In this application, as in the said Lawson patent, there is provided a series of special instrumentalities, one for each needle, and each such instrumentality is controlled or subject to control by pattern mechanism, so that according to the dictates of the pattern mechanism, reverse plating may be effected at any needle, and there may be a change by progression, recession or otherwise in the point or area where the reverse plating is effected.

In the practice of this invention, a series of independent needles is provided desirably in a circular knitting machine. A needle cylinder 1, of the Banner or Hemphill type, is herein shown provided with needles 2, which are represented as latch needles, but which, when desired, may be of any other suitable independent needle type. In the web holder bed ring 3 there are provided the usual grooves, in each of which is inserted for in and out or radial movement a web holder 4 desirably of usual type. Desirably in each such groove a special instrumentality 5 is provided, which may be of the form shown in the said Lawson patent. The said instrumentalities 5, being placed side by side in the grooves with the web holders, are capable of sliding longitudinally with respect to the web holders. Said instrumen-

talities 5 do not function as web holders, but they are provided with butts 6 that are adapted to be controlled by circumferentially positioned cams radially outside of the cam in the sinker cam ring that controls the butts 7 of the web holders 4.

The needles here shown being of the latch needle type, a latch ring 8 is employed equipped with suitable binder mechanism generally indicated at 9 and controlled by link and lever mechanism generally indicated at 10 and which need not be further described otherwise than to state that the same is controlled from the pattern drum. The entire mechanism is driven from the main drive shaft 11 having thereon the usual pulleys and also suitable gearing including the pinion 12 for driving the large gear 13 (known in the art as the "104" gear), which is mounted upon the shaft 14. From said main drive shaft is also driven in usual manner a quadrant 15 pivoted at 16, whereby the machine is reciprocated during the knitting of the heel and toe. The mechanism is also provided with the usual narrowing pickers, one of which is indicated at 17, and the usual widening pickers one of which is indicated at 18 in Fig. 3. These pickers are desirably those of the said Banner machine and require no further description. The needle cylinder 1 is provided with the usual needle grooves receiving the needles 2, and, as already stated, the usual web holder bed ring 3 is provided with radial grooves receiving not only the web holders or so-called sinkers 4, but also the special instrumentalities 5, said elements 4 and 5 being wholly disconnected from each other and capable of independent radial movement in said grooves, and are reciprocated therein by the cams referred to, which are the same as those shown in said Lawson patent. That is to say, an inner circumferentially extending cam is provided to act upon the butts 7 of the web holders 4, and radially outside thereof are provided two cams, and radially outside of said two cams is provided a third cam, all to act upon the butts 6 of the special instrumentalities 5, so as in the relative rotation or movement of the needle cylinder and cam ring to move the said web holders and special instrumentalities in and out.

Pattern means of the general type shown in said Lawson patent are provided, but improved as hereinafter set forth to move the special instrumentalities 5 and herein push them radially inward so as to bring them within the control of the proper cam of the sinker cam ring. When the special instrumentalities 5 are moved inward by the cams of the sinker cam ring, they so engage the proper yarn of the two yarns being fed in normal plating relation as to reverse the plating, but if not so moved radially inward, then normal plating continues or is effected at the needles pertaining to such special instrumentalities.

The pattern means is of such type as will permit every needle to have reverse plating effected thereon. Desirably there is employed a part or parts rotating with the rotating part of the knitting organization. Assuming for purposes of description merely that the needle cylinder is to be rotated, it is evident that the rotating part might mesh with the needles so that in the movemen of the mechanism the proper relation may be preserved. It is preferable, however, to provide teeth either upon the sinker cam ring or the needle cylinder, and herein are represented teeth 19 upon the sinker cam ring (see Fig. 4) extending entirely about the same. Meshing therewith there is desirably provided two gears 20, 21 respectively fast for rotating movement upon spindles 22, 23 received in bearings 24, 25 formed with or carried upon brackets 26, 26 mounted upon the bed plate of the machine. The teeth of the said gears 20, 21 are desirably of greater height than are the teeth 19 with which they mesh, since provision is made for removing the pattern disks out of engagement with some at least of the butts of the special instrumentalities 5 without disengaging the gears 20, 21 from the teeth 19. The number of teeth 19 for best results is equal to that of the needles of the machine, but might be of some number bearing some other fixed ratio to the number of needles, as, for example, one third or one half.

Upon the spindles 22, 23 are fast the collars 28, 29 and 30, 31 respectively, and fast upon the upper ends of the spindles 22, 23 are the pattern disks generally indicated at 32, 33 respectively. As shown most clearly in Fig. 2, said pattern disks 32, 33 are arranged at one side of the machine, but in transverse alignment with each other and slightly spaced apart.

In the said Lawson patent the pattern disks are provided with fixed, though adjustable, members therein indicated at 46, 47 to engage the butts of predetermined special instrumentalities and move the same radially inward. Instead of employing such fixed members, there are provided the two pattern disks 32, 33 with grooves 34, 35, in the upper face of an outer annular portion of the said disks, as most clearly shown in Fig. 6, for the ready reception and ready removal therefrom of a series of jacks. The said grooves are not radial with respect to the centers of the said disks, but are inclined at a considerable angle thereto for a purpose which will presently clearly appear. Within the said grooves or such of them as are required for the production of the particular pattern that is to be produced, there are inserted jacks 36 which do not reciprocate in the said grooves but are held in position

therein by the overlying rings or annuli 37, 38 therefor, as shown in section in Fig. 9 and in plan in Fig. 2. The said jacks 36 are of the form shown in Fig. 9*a*, being provided with an upstanding portion 39 taking between the ring or annulus 37 or 38, as the case may be, and an inner disk or cap piece 40 shown in Fig. 9, secured in position by screws 41, one of which is shown in Fig. 9, said screws 41 extending into the web of the disk like portion that receives the said jacks 36. Said jacks 36 also have upstanding portions 42, 43, which are received within grooves formed in the under face of the ring or annulus 37, 38, so as to hold the said jacks 36 from all lateral movement, said jacks being held from endwise movement by reason of the fact that their projections 39 are received between the ring or annulus 37, 38, and the disk or cap 40. The grooves in the under face of the ring or annulus 37, 38 are of course inclined to a radius to correspond to the inclination of the grooves 34, 35.

The rings or annuli 37, 38 are held in fixed position in any suitable manner but desirably so as to permit them quickly to be removed when the pattern is to be changed, thereby permitting access to the jacks 36 and permitting a different distribution of the jacks or the employment of a different number thereof. For the purpose of holding the rings or annuli 37, 38 fixedly but removably in position, there are here provided for each disk four springs 44, 45 respectively, held in position by screws 46, 47 respectively, the said springs extending at their outer or free ends over the rings or annuli 37, 38, thereby holding them firmly but removably in position. To remove the rings or annuli 37, 38, it is merely necessary to remove one each of the pairs of screws 46, 47 and then to swing the outer ends of the springs 44, 45 inwardly to clear the rings or annuli 37, 38.

The outer ends of the jacks 36 are provided with heads or bent ends 36′ which as shown in Fig. 9*a* are not of the entire height of the outer ends of the jack. The said heads or bent ends 36′ are bent at slightly more than a right angle, being so bent that when positioned in all the grooves they would form a complete or accurate circle. Otherwise stated, the said ends or heads 36′ are bent on an arc from the center of the pattern disk, this being for the purpose of permitting them to act accurately each upon its own predetermined butt 6 of a special instrumentality 5. It is, of course, of the utmost importance that each jack 36 shall engage the special instrumentality intended and not also engage the one next thereto, but shall clear the same. It is for this purpose that the said jacks 36 are placed in grooves which are at an angle to a radius from the center of the pattern disk. The effect of the construction provided is very clearly illustrated in Fig. 6, where four of the jacks of each of the pattern disks 32, 33 are represented as engaging the proper butts 6 of the special instrumentalities 5 so as to push them radially inward for the purpose of effecting reverse plating. It is not necessary to state herein how the special instrumentalities 5 act upon one of the two yarns, namely, the back yarn, so as to push or move the same into a position where it becomes the face yarn, since that action is very fully described in the said Lawson patent.

The construction described, namely, the utilization of removable jacks in the grooved pattern disks instead of fixed, though adjustable, projections as in the said Lawson patent, permits a very quick change in pattern to be made, as obviously any distribution whatsoever of jacks may be provided. That is to say, there may be a maximum number of jacks filling all the grooves of the pattern disk or disks in which case reverse plating would occur upon all the needles, and any lesser number of jacks may be employed, and they may be positioned singly or arranged in groups according to the desired pattern.

The number of teeth 20, 21 upon the spindles of the disks 32, 33 is determined in the same manner as in the said Lawson patent. That is to say, if a single disk only were provided, as, for example, in producing stripes all extending in the same direction, if the number of teeth on the disk were equal to or divisible into the number of teeth on the singer cam ring or other toothed driving part, the stripes or reverse plating would extend parallel to the wales of the fabric. If the number of teeth on such single disk be not equal to or divisible into the number of teeth on the driving part, the plating stripes will be sloping, that is, they will cross wales. If two disks be employed, as here shown, and the number of teeth thereon differs with respect to each other, and the number of teeth on either disk is the same as or divisible into the number of teeth on the driving part, then different effects are secured. If, for example, as indicated in Figs. 7 and 8, the number of teeth 19 upon the rotating part be 120, and the number of teeth 20 for the disk 32 be 119 and the number of teeth 21 for the disk 33 be 121, the constant rotation of the disk 32 results in what may be termed an incremental gain and the constant rotation of the disk 33 results in what may be termed an incremental loss in the position of the reverse plating stripes produced or controlled thereby. That is to say, certain of the stripes of the stocking or other fabric represent a constant incremental loss and the other stripes represent a constant incremental gain as to the needles upon which such reverse plating is effected.

An important purpose in having a con-

stant mesh or driving relation between the gears for the pattern disks and the rotating element is that if a stocking be knitted, it is desirable to provide for throwing the reverse plating mechanism out of operation during the formation of the heel and toe. If the pattern disks 32, 33 were removed from functioning relation without retaining the meshing relation of the teeth, the parts could not readily be restored to action without impairing the pattern. Improved means are provided for moving the pattern disks out of functioning relation for the heel and the toe. As in the Lawson patent, substantially one half the special instrumentalities have long butts and the remainder short butts, corresponding in position respectively with the long and short butt needles. The pattern disks 32, 33 are lifted out of functioning position, and as in the said Lawson patent, in a two-step or two-part movement so as to move said disks first out of engagement with the short butts and then out of engagement with the long butts of the special instrumentalities 5. Improved means for accomplishing such lifting movement are here provided.

Upon the upper ends of the bearings 24, 25 are provided collars 48, 49 which are notched or recessed each at three preferably diametrical points. One of said notches or recesses of each of said collars is indicated at 50, 51 in Fig. 4 and the opposed notches are of similar shape. Each such notch or recess is stepped at its bottom as clearly indicated at 52, 53, 54, 55, such formations being connected by an incline or sloping portion 56, 57, and beyond the surfaces 53, 54 are the second sloping portions 56′, 57′. Just above each collar 48, 49 are positioned upon the spindles 22, 23 for turning movement relative to said spindles respectively two collars or rings 58, 59, each having three projections 60, 61 extending into each of said recesses 50, 51, the opposed recesses being provided to prevent twisting of the parts. Means are provided to impart a slight turning movement in two steps to the collars or rings 58, 59 so that as the several projections 60, 61 ride up the slopes 56, 57, then onto the surfaces 53, 54, then up the slopes 56′, 57′ onto the upper surfaces of the collars 48, 49, the disks 32, 33 are correspondingly elevated so as to move the jacks out of engagement with the butts of the special instrumentalities 5, but without removing the gears 20, 21 from meshing relation with the teeth 19. At the lower ends of the hubs 29, 31 are provided ball bearing cages 62, 63, so that the said disks 32, 33 may turn freely or readily through the action of the gears 19, 20, 21. Springs 64, 65 connected to the said collars 58, 59 and also to some fixed part of the machine are employed to return the said collars to the position shown in Fig. 4.

In order to impart turning movement to the said collars or rings 58, 59, there are provided upon the pattern disk 66 two pairs of cams 67, 68, 69, 70, and back of the same two other pairs of similar cams not shown in Fig. 1 as they are concealed by the parts. Said cams in the rotation of the said pattern disk 66 ride under the ends of certain parts so as through the described connections to lift the said pattern disks 32, 33 in a two-step movement.

In the disclosed embodiment of the invention, the following connections are represented between the said cams 67, 68, 69, 70, and the cams referred to as behind the same, and the collars or rings 58, 59.

At 71 there are pivoted the lever 72 for operating the binder and the lever 73, the latter having an arm 74, which is connected through means to be described to the pattern disk 32, said lever 73 having a nose which rides upon the two pairs of cams similar to but back of the cams 67, 68, 69, 70. In order to lift the pattern disk 33 through the action of the cams 67, 68, 69, 70, there is provided an upright rod 75, which upon one face thereof, so as to be acted upon by said cams 67, 68, 69, 70, is provided a roll 76 shown in dotted lines in Fig. 1. The said rod 75 extends downward past the axis of the pattern disk 66 and is there longitudinally slotted as shown at 77 for the reception of a pin or screw 78 constituting guiding means, said pin 78 being desirably supported upon a cross strip 79 secured to the face of the pattern disk 66 by screws 80. The said rod 75 at its upper end is connected as shown in Fig. 3 at 81 to a bell crank lever 82 pivoted at 83 upon a small bracket 84. Said bell crank lever 82 is pivotally connected at 85 to a link 86 which is connected at 87 to the ring or collar 59 for lifting the pattern disk 33.

The lever 73, 74 which rides upon similar cams (not shown) is pivotally connected at 88 to a vertically extending rod 89, which is connected at its upper end, as shown in Fig. 5, to a bell crank lever 90 that at 91 is pivotally connected to a transversely extending link 92, the other end whereof is pivotally connected at 93 to the ring or collar 58 for lifting the pattern disk 32.

The cams 67, 68 and the similar cams back of the same, are employed for moving the two pattern disks 32, 33 out of operation for the heel, and the cams 69, 70 and the two cams back thereof are employed for moving the said pattern disks 32, 33 out of operation for the toe. The said cams 67, 68, 69, 70 act with the bell crank levers 82, 90 to lift the pattern disks 33, 32. For both heel and toe work said pattern disks are lifted until the projections 60 rest upon the highest of the three levels of the collars 48, 49 (that is, on the upper surfaces of said collars). The springs 64,

65 tend always to return said collars to the position indicated in full lines in Fig. 4.

Means similar to that shown in the said Lawson patent are provided for withdrawing all of the long butt special instrumentalities 5 out of operation at certain times as described in said patent reference being made to said patent for full explanation, but as the means employed for this purpose is desirably the same as shown in said patent, it is unnecessary to refer thereto. The operating rod therefor is indicated at 93′ in Fig. 3.

It has been discovered that during the formation of the heel and toe, there is sometimes a tendency of the special instrumentalities 5 (operating as they do in the same grooves as the web holders 4) to bind and cut the yarn, especially after the needles in action in the heel and toe are elevated by the instep cam. In order to overcome this tendency, the means shown in Figs. 10, 11 and 12 are provided.

In Fig. 10 the instep cam is indicated at 94 and the series of needles is represented at 95 as elevated thereby. As these needles are thus elevated, and particularly the end needles of such series, the yarn is so tighty gripped about the end needle of the series that as such needle and succeeding needles are elevated the yarn is also correspondingly lifted instead of the needle or needles sliding through the loop or loops of the yarn. This brings the yarn as represented at 96 in Fig. 11 into such position that it is liable to be cut by the inner edge of the special instrumentality 5 in the same groove with the web holder 4 in question.

In order properly to position the yarn and to prevent such cutting and binding, a pair of special, fixed, two-part cams, shown at 97, 98 in Fig. 10, are provided. In either direction of reciprocation the needles in action ride up the slope of the cam 97 as indicated at the right in Fig. 10, so as to raise the said needles substantially one eighth of an inch. Immediately thereafter the same needles are lowered substantially one sixteenth of an inch by the slope of the cam 98, and the result is to bring the yarn 96 into the position shown in Fig. 12 at the bottom of the throat 99 of the web holder 5 in question instead of at the top thereof. Thus, the yarn 96 is in Fig. 12 brought into such position that it is not bound and severed by the special instrumentality 5, as might be the case if the said yarn 96 remained at the upper wall of the throat 99 as in Fig. 11.

While the jacks 36 are shown and described as moving special instrumentalities 5 so as to result in reversing the position of the back and face yarns, it is to be understood that the said jacks or equivalent means may be employed to operate upon parts other than special instrumentalities 5 in effecting change from normal plating to reverse plating, and therefore it is desired to cover the same broadly. For example, the said jacks might be employed to give suitable in or out movement or both to certain needles instead of to special instrumentalities 5, and thus result in reversing the position of the back yarn and face yarn, thereby securing reverse plating.

Having thus described one illustrative embodiment of the invention, it is to be understood that although specific terms are employed, they are used in a generic and descriptive sense, and not for purposes of limitation, the scope of the invention being set forth in the following claims.

We claim:

1. In selective means for effecting reverse plating in knitting mechanism, a receiving member having means to retain a series of narrow, elongated, jack like instrumentalities received by said member in fixed but readily removable position for respectively individual action upon substantially single sinkers or like yarn engaging devices to cause reversal in position of the two plating yarns, thereby to change from normal to reverse plating.

2. In selective means for effecting reverse plating in knitting mechanism, a receiving member having a series of grooves adapted respectively to receive elongated, narrow, jack like instrumentalities stationarily received in fixed but readily removable position for respective action singly upon substantially single sinkers or like yarn engaging devices to cause reversal in position of the two plating yarns, thereby to change from normal to reverse plating.

3. In selective means for effecting reverse plating in knitting mechanism, a receiving member supported in juxtaposition to the needle series, and having provisions for receiving upon a face thereof, according to the desired pattern, a plurality of elongated jack like instrumentalities stationarily or readily removably received for respectively individual action singly upon substantially single sinkers or like yarn-engaging devices to cause reversal in position of two plating yarns, thereby to change from normal to reverse plating.

4. In selective means for effecting reverse plating in knitting mechanism, a disk having upon one face thereof a series of grooves, a plurality of elongated, narrow, jack like instrumentalities stationarily but readily removably received in said grooves with their outer ends exposed for respectively individual action singly upon substantially single sinkers or like yarn-engaging devices to cause reversal in position of two plating yarns, and means to secure said jack like elements fixedly but removably in position in said grooves.

5. In selective means for effecting reverse plating in knitting mechanism, a series of knitting needles, a series of sinkers or like yarn engaging instrumentalities movable transversely between said needles for effecting change from normal to reverse plating, a receiving member constituting a part of pattern means for controlling the movement of said instrumentalities, and means for positioning narrow, elongated, jack-like instrumentalities stationarily received in readily removable or shiftable position thereon for individual action upon substantially individual ones of said instrumentalities.

6. A circular knitting machine for effecting plating and reverse plating in a knitted fabric including a circular series of independent needles, thread engaging instrumentalities between the needles respectively and individually movable in and out between the needles to which a back thread and a face thread are fed in plating relation, and a pattern disk adapted to receive a series of jacks to be presented in accordance with the pattern to and act respectively individually upon substantially individual selected ones of said thread engaging instrumentalities to govern the movement of the latter.

7. For use in effecting reverse plating in a knitting organization, a jack adapted to be supported in position to present a part thereof individually to a substantially single sinker or like instrumentalitiy cooperating in effecting change from normal to reverse plating said jack being metallic, elongated and strip like in character.

8. For use in an organization for effecting change from normal to reverse plating, a jack having a body portion adapted to be supported in fixed relation and a head adapted to be presented individually and selectively to a substantially single sinker or like instrumentality cooperating in effecting change from normal to reverse plating said jack being metallic, elongated and strip like in character.

9. For use in mechanism for effecting reverse plating, a jack 36 which is metallic, elongated and strip like in character, said jack being adapted to be received fixedly upon a support of a pattern member and having a head 48 for selective presentation to substantially single instrumentalities acting at the knitting head for effecting change from normal to reverse plating.

10. A circular independent needle hosiery machine having means for making heel and toe pockets by a fashioning operation, a circular series of independent needles, a corresponding series of thread engaging instrumentalities movable in and out between the needles respectively, selective means cooperating with said thread engaging instrumentalities to effect change in the position of the threads and thereby to effect reverse plating at will, a main pattern drum and connections between said main pattern drum and said selective means to render the latter inactive during fashioning work, said connections including a part having a stepped formation and means ridable along said stepped formation to move said selective means out of functioning position.

11. A circular independent needle hosiery machine having means for making heel and toe pockets by a fashioning operation, a circular series of independent needles, a corresponding series of thread engaging instrumentalities movable in and out between the needles respectively, a disk having means to be presented selectively to said thread engaging instrumentalities to effect change in position of the threads, a main pattern disk and connections between said discs including a part having a stepped formation, and a part ridable along said stepped formation to move said first mentioned disk out of functioning position.

12. A circular independent needle hosiery machine having means for making heel and toe pockets by a fashioning operation, a circular series of independent needles, a corresponding series of thread engaging instrumentalities movable in and out between the needles respectively, a pattern disk having jack like elements for presentation to selected ones of said thread engaging instrumentalities, the main pattern disk and connections between said disks including a part having a stepped surface and a co-acting part ridable along said surface to effect movement of said first mentioned disk into and out of functioning relation.

13. In a knitting organization, a member grooved to receive web holder or like devices and in the same grooves respectively to receive special instrumentalities, a series of co-acting lengthwise movable needles, and means to impart a relative movement to said needles, web holders and special instrumentalities, thereby to prevent binding by said special instrumentalities of the knitting yarn in the knitting operation, which binding would occur by reason of the presence in said grooves respectively of said devices and instrumentalities were it not for the provision of said means to prevent binding.

14. In a knitting organization, a member grooved to receive web holder or like devices and in the same grooves respectively to receive special instrumentalities, a series of co-acting needles, and means to impart a special movement to knitting needles of the series, thereby to cause such location of the knitting yarn upon the stems of said needles as will prevent binding of said yarn by reason of the conjoint presence of said devices and instrumentalities.

15. In a knitting organization, a member grooved to receive web holder or like de-

vices and in the same grooves respectively to receive special instrumentalities, a series of coacting needles, an instep cam and a cam to act upon needles lifted by said instep cam to impart an additional movement to said needles, so as thereby to bring the loops upon said needles into a position where they will not be impaired by said special instrumentalities.

16. In a knitting organization, a member grooved to receive a web holder or like devices and in the same grooves respectively to receive special instrumentalities, a series of coacting needles, an instep cam and a pair of double cams 97, 98 located at opposite sides of the knitting cams and adapted to impart a special lengthwise movement of the needles for the purpose of bringing the loops thereon into such position that they cannot be impaired by the said special instrumentalities.

17. A circular knitting machine for effecting plating and reverse plating in a knitted fabric including a circular series of independent needles, thread engaging instrumentalities between the needles respectively and individually movable in and out between the needles to which a back thread and a face thread are fed in plating relation, and a pattern disk having a circular series of grooves for the reception of jack like members to be presented to selected ones of said instrumentalities, said grooves being at an angle to radii of said disk.

18. A circular knitting machine for effecting plating and reverse plating in a knitted fabric including a circular series of independent needles, thread engaging instrumentalities between the needles respectively and individually movable in and out between the needles to which a back thread and a face thread are fed in plating relation, and a pattern disk having a circular series of grooves for the reception of jack like members to be presented to selected ones of said instrumentalities, said grooves being so arranged upon the pattern disk as to cause the presentation of each jack like member only to the predetermined instrumentalities while clearing adjacent instrumentalities.

19. A circular knitting machine for effecting plating and reverse plating in a knitted fabric including a circular series of independent needles, thread engaging instrumentalities between the needles respectively and individually movable in and out between the needles to which a back thread and a face thread are fed in plating relation, and a circular pattern disk having upon one surface a circumferentially extending series of parallel grooves, each of which is at an angle to a radius of said disk to receive members to act upon said instrumentalities.

20. A circular knitting machine for effecting plating and reverse plating in a knitted fabric including a circular series of independent needles, thread engaging instrumentalities between the needles respectively and individually movable in and out between the needles to which a back thread and a face thread are fed in plating relation, and a circular pattern disk having upon one surface a circumferentially extending series of parallel grooves, each of which is at an angle to a radius of said disk for the individual reception of jack like members to act upon selected ones of said thread engaging instrumentalities.

21. A circular knitting machine for effecting plating and reverse plating in a knitted fabric including a circular series of independent needles, thread engaging instrumentalities between the needles respectively and individually movable in and out between the needles to which a back thread and a face thread are fed in plating relation, and a circular pattern disk having upon one surface a circumferentially extending series of parallel grooves, each of which is at an angle to a radius of said disk for the individual reception of jack like members to act upon selected ones of said thread engaging instrumentalities, each of said jack like members having a laterally bent head to engage selected ones of said thread engaging instrumentalities.

22. In a knitting organization employing independently lengthwise-movable knitting needles, a member grooved to receive web holder or like devices, and in the same grooves respectively to receive special instrumentalities, and means to impart during the knitting operation a relative movement to said needles and said special instrumentalities lengthwise the needles, whereby to prevent binding of the knitting yarn in the knitting operation, which binding would occur by reason of the presence in said grooves of the devices and the instrumentalities were it not for the said relative lengthwise movement.

23. In selective means for effecting reverse plating in knitting mechanism having a series of sinkers, a supporting disk having a series of formations adapted in their total capacity to receive a series, equal in number to said sinkers, of jack like members, each of which is individual to a sinker of the knitting head, and means to support said jack like members in fixed but readily removable position upon said disk for said individual action.

24. In selective means for effecting reverse plating in a knitting mechanism having a series of sinkers, a supporting disk having a series of formations adapted in their total capacity to receive a series, equal in number to said sinkers, of jack like members, each of which is individual to substantially one only of the sinkers of the knitting head, and means to support said jack like members in fixed but

readily removable position upon said disk for said individual action.

25. In selective means for effecting reverse plating in knitting mechanism, a supporting disk having a series of formations adapted to receive in their total capacity jacks, one for each sinker of the knitting head, whereby reverse plating would be caused to occur upon every needle if the said total capacity number of jacks were used at the same time, together with means for securing said jack like members in fixed but readily removable position for such respectively individual action.

26. In a knitting organization, a member grooved to receive web holder or like devices and in the same grooves respectively to receive special instrumentalities, a series of co-acting lengthwise movable needles, and means to impart relative movement to the enumerated movable elements to prevent binding of the knitting yarn in the knitting operation, which binding otherwise would occur by means of the presence in said grooves respectively of said devices and instrumentalities.

In testimony whereof, we have signed our names to this specification.

JOHN LAWSON.
ROBERT H. LAWSON.