

No. 865,272.

PATENTED SEPT. 3, 1907.

E. H. RYON.
SWIVEL LOOM.

APPLICATION FILED JUNE 22, 1905.

6 SHEETS—SHEET 2.

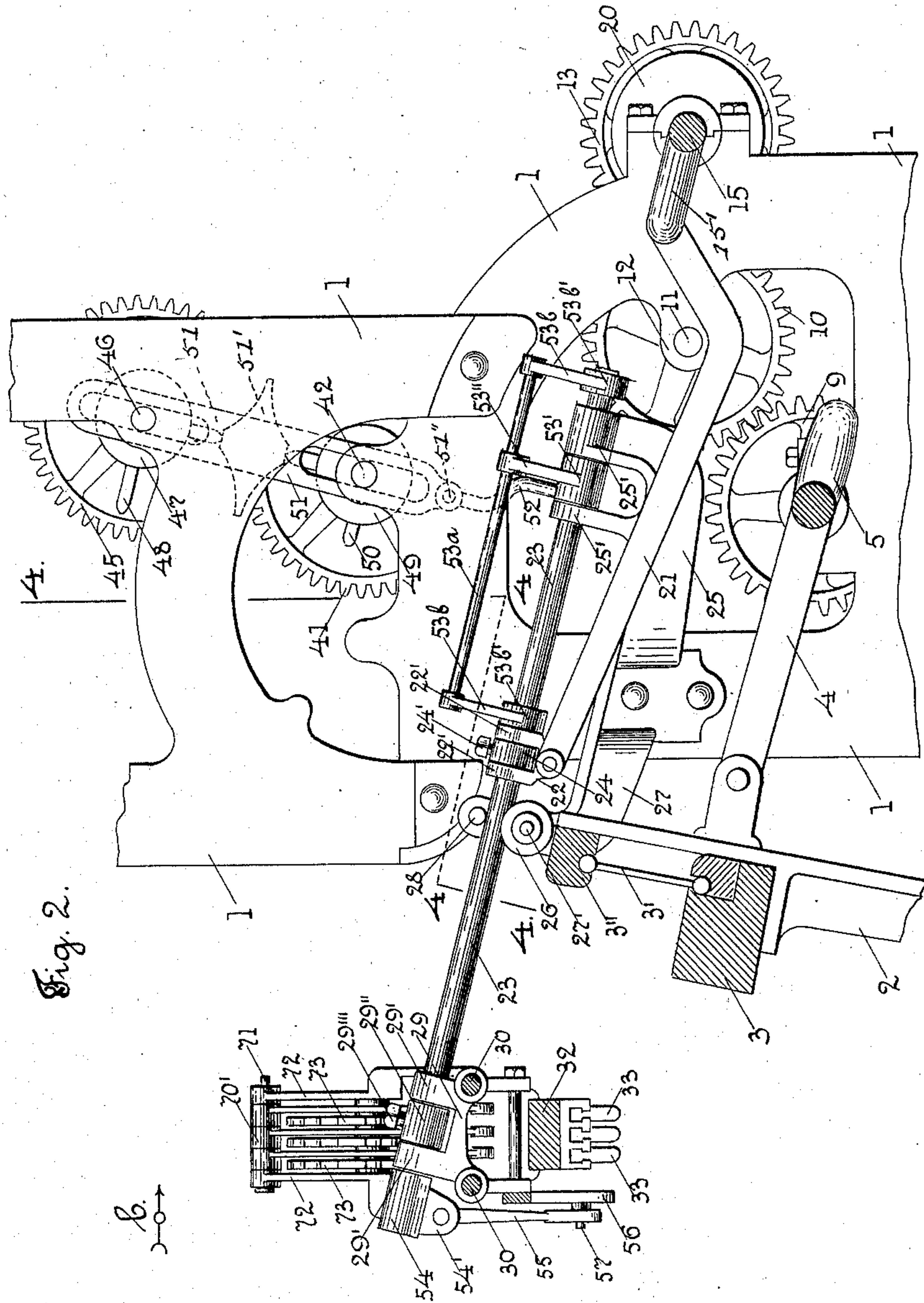


Fig. 2.

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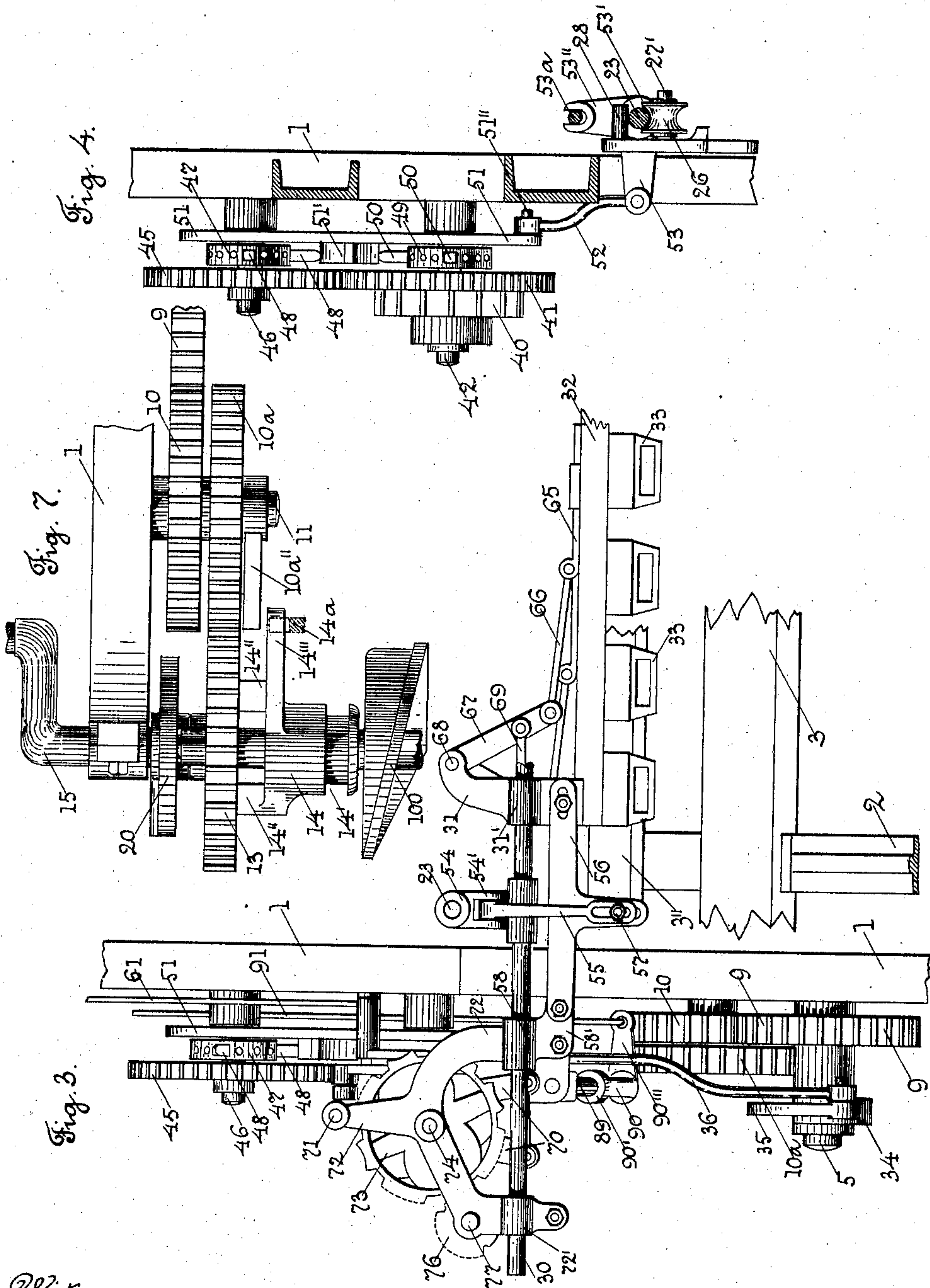
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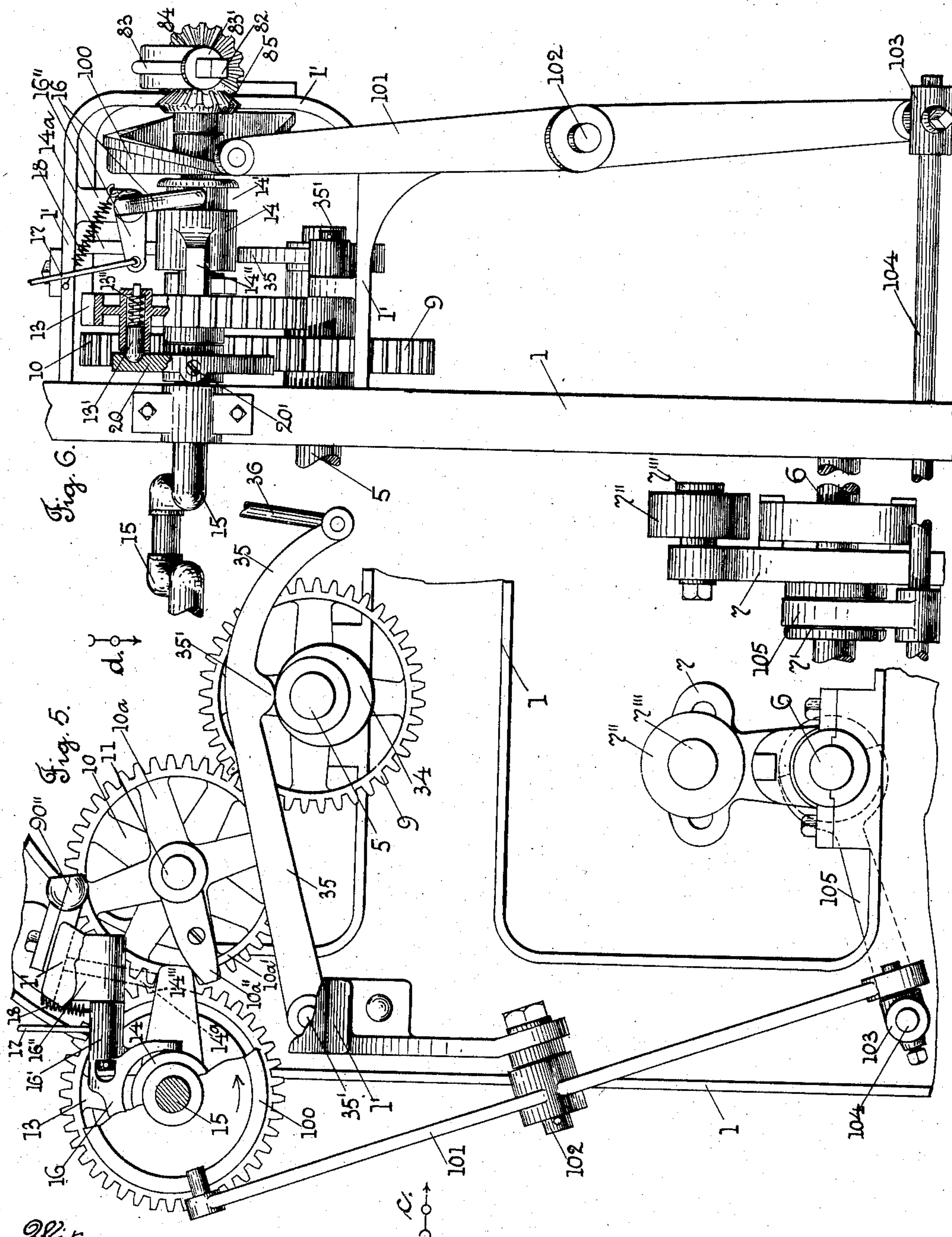
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6 SHEETS—SHEET 4.



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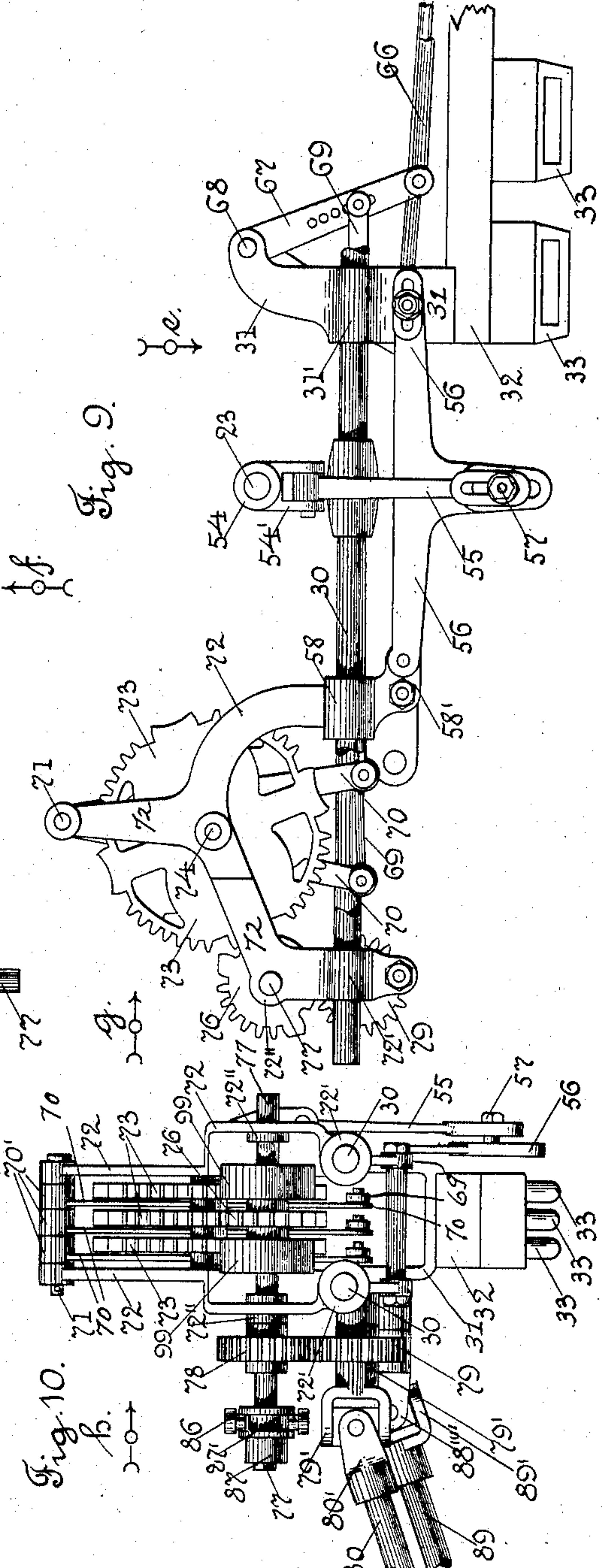
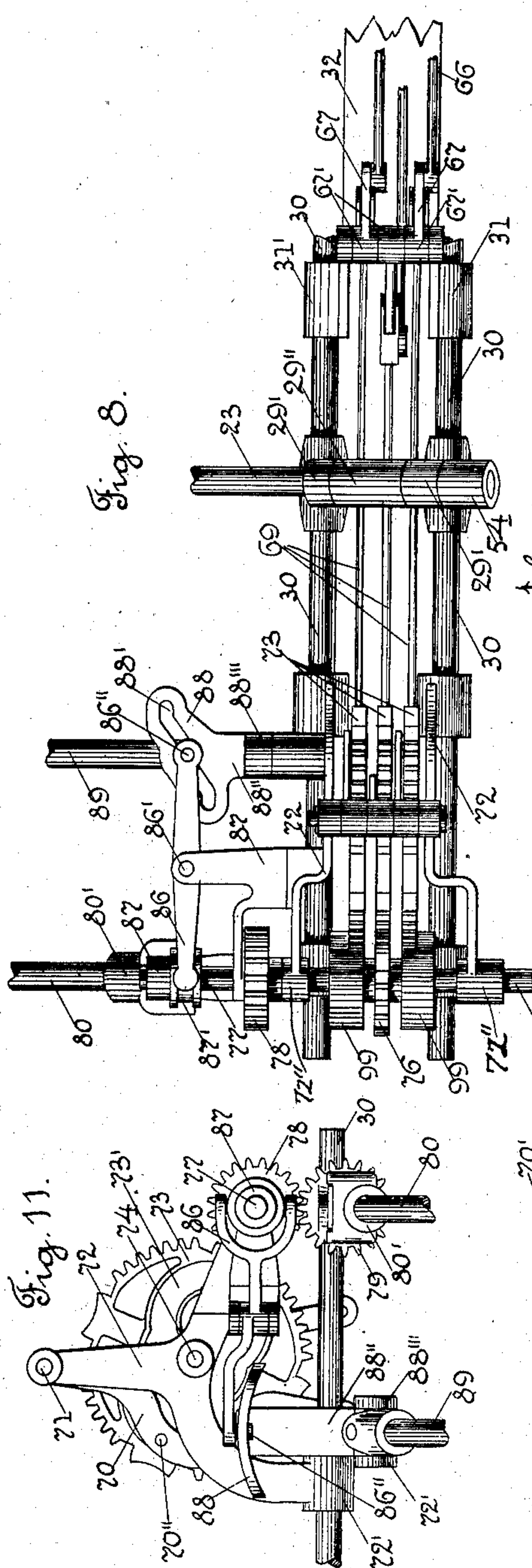
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6 SHEETS—SHEET 5.



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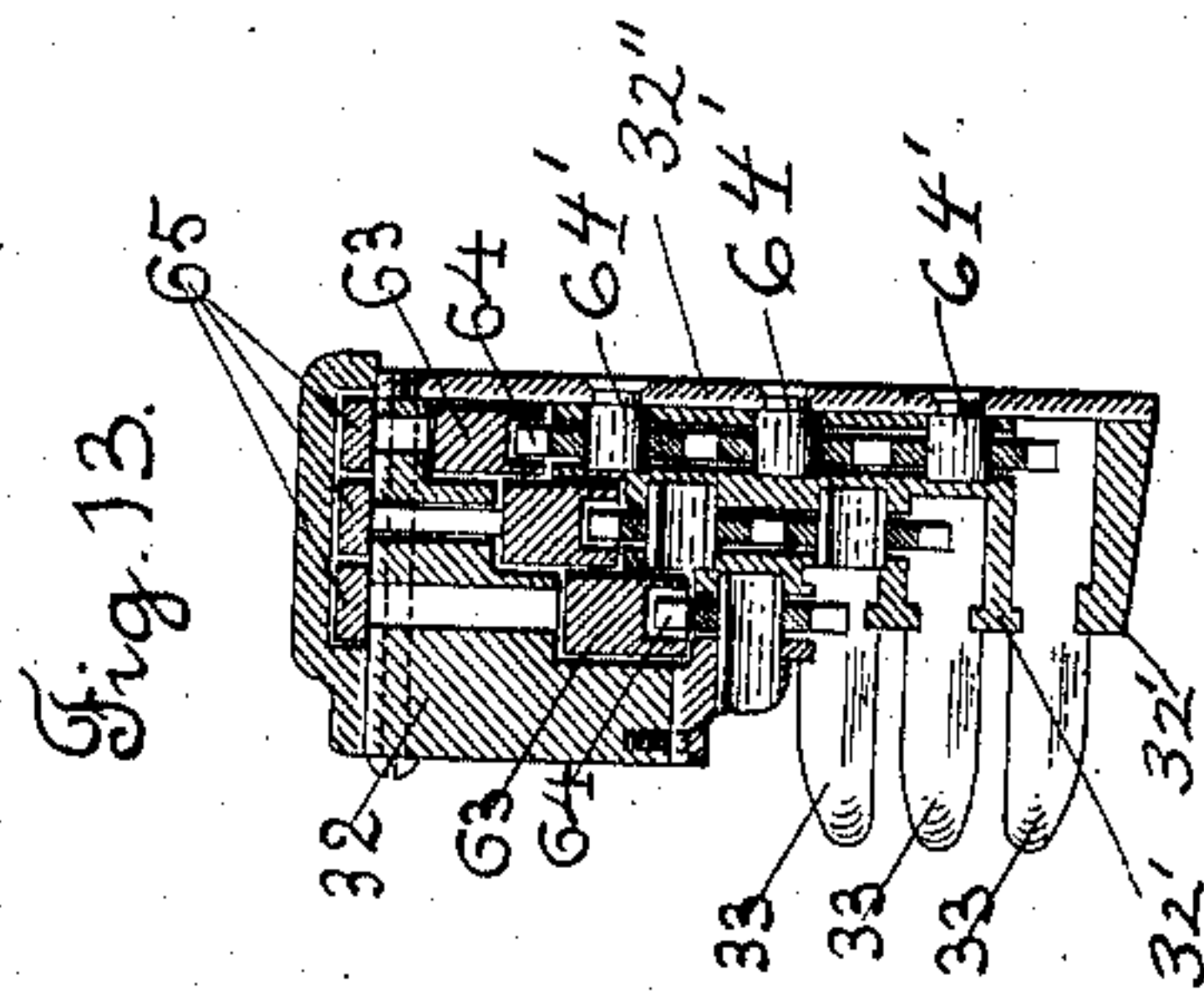
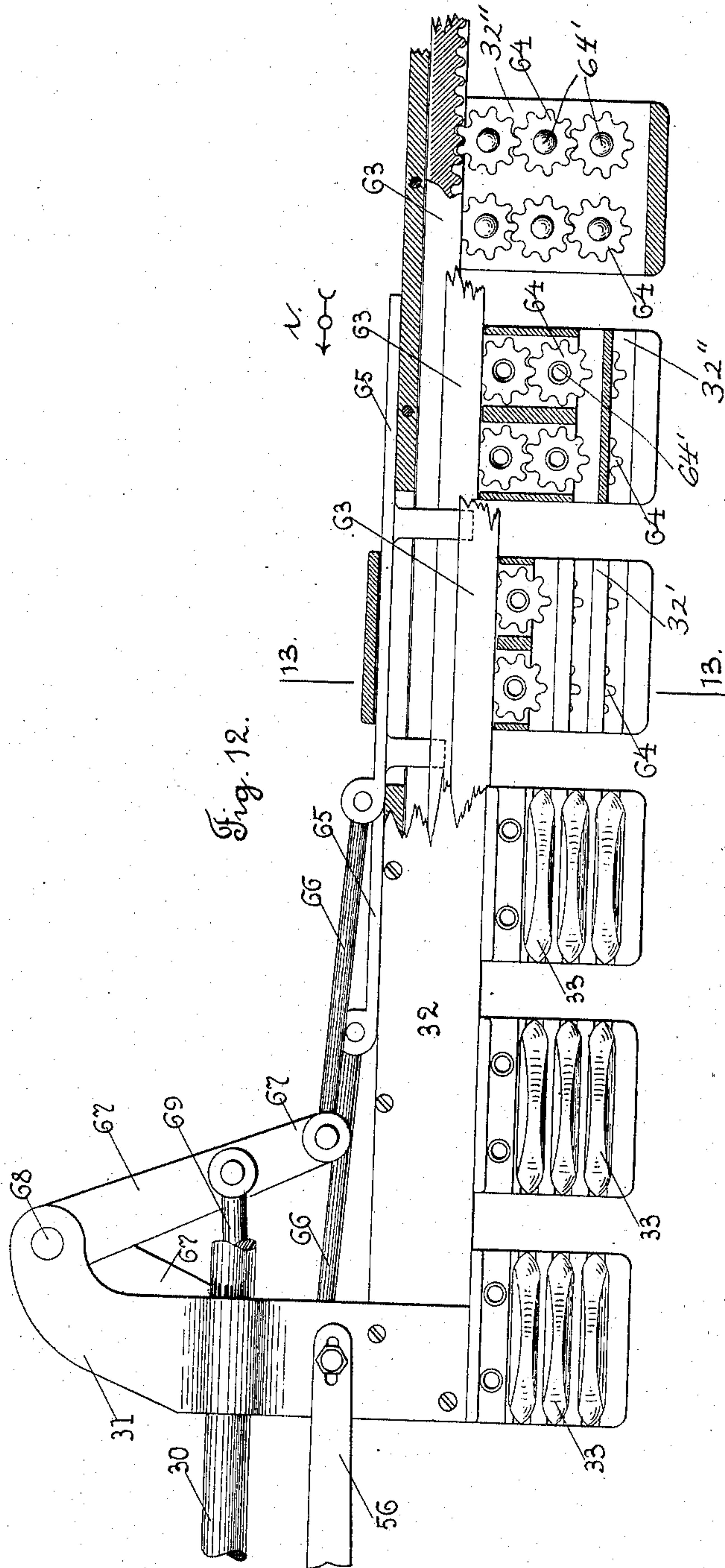
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6 SHEETS—SHEET 6.



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UNITED STATES PATENT OFFICE.

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SWIVEL-LOOM.

No. 865,272.

Specification of Letters Patent.

Patented Sept. 3, 1907.

Application filed June 22, 1905. Serial No. 266,398.

To all whom it may concern:

Be it known that I, EPPA H. RYON, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Swivel-Looms, of which the following is a specification.

My invention relates to swivel looms in which, in addition to the ordinary fly shuttles, swivel shuttles are used to weave spots or figures on the fabric in the well known way, and to that class of swivel looms in which two or more sets of swivel shuttles are used, and in which each set of swivel shuttles may have a different colored thread, and my invention more particularly relates to certain novel features of construction of the several parts of the swivel shuttle mechanism of a swivel shuttle loom.

The object of my invention is to improve upon the construction of swivel shuttle looms, as ordinarily made, and to provide swivel shuttle mechanism of improved construction and operation, and my invention consists in certain novel features of construction of my improvements as will be hereinafter fully described.

I have only shown in the drawings detached parts of a swivel shuttle loom with my improvements applied thereto, sufficient to enable those skilled in the art to understand the construction and operation thereof.

Referring to the drawings:—Figure 1 is an end view of the left hand side of a loom frame, showing the operating mechanism of the swivel shuttle rail on the outside of the loom frame, and the swivel shuttle rail in its outward raised position; the broken lines show the swivel shuttle rail in its inward lowered position. Fig. 2 is a sectional view, looking from the inside of the loom frame, and showing some of the parts not shown in Fig. 1. Fig. 3 is a front view of some of the parts shown in Fig. 1, looking in the direction of arrow *a*, same figure. Fig. 4 is a section, on line 4, 4, Fig. 2, looking in the direction of arrow *b*, same figure. Fig. 5 shows the operating mechanism of the crank shaft for the swivel shuttle bar, shown at the left in Fig. 1, and also shows the sliding pick motion. Fig. 6 is a rear view of the parts shown in Fig. 5, looking in the direction of arrow *c*, same figure. Fig. 7 is a plan view of the mutilated gear mechanism, shown in Fig. 5, looking in the direction of arrow *d*, same figure. Fig. 8 is a plan view of the driving mechanism of the swivel shuttle racks, looking in the direction of arrow *e*, Fig. 9. Fig. 9 is a front view of the parts shown in Fig. 8, looking in the direction of arrow *f*, same figure; some of the parts shown in Fig. 8 are broken away in this figure. Fig. 10 is an end view of the parts shown in Fig. 9, looking in the direction of arrow *g*, same figure. Fig. 11 is a rear view of the parts shown in Fig. 10, looking in the direction of arrow *h*, same figure; some of the parts shown in Fig. 10 are left

off in this figure. Fig. 12 shows a front view of the swivel shuttle-rail, detached, and partially in section, with the swivel shuttles extending in a horizontal plane, and, Fig. 13 is a section on line 13, 13, Fig. 12, looking in the direction of arrow *i*, same figure. Figs. 4 to 13, inclusive, are shown on an enlarged scale.

In the accompanying drawings, 1 is the left hand loom side or frame, 2 is the lay-sword, pivotally mounted at its lower end and carrying the lay-beam 3, reed 3', and hand-rail 3''. The lay-sword 2 is connected through a crank connector 4 to the crank shaft 5, in the ordinary way, see Fig. 2. The picking shaft 6, Figs. 5, and 6, is mounted in suitable bearings on the loom frame, and carries the picking arm 7 fast thereon, having a stud 7''' on which is mounted the picking roll 7'', in the usual way.

I will now describe my improvements.

Near the end of the crank shaft 5, in this instance on the outside of the loom frame, is fast a gear 9, Figs. 1 and 2, which meshes with a gear 10, see Fig. 7, loosely mounted on a stud 11 fast in a stand 12, on the loom side 1, see Fig. 2. The gear 10 is connected with a gear 10^a, mounted on the stud 11, said gear 10^a has a portion of its periphery 10^{a'} without teeth, see Fig. 5, to give a dwell motion to a third gear 13; said gear 13 is in line with the gear 10^a, see Fig. 7, and is without teeth for a portion of its periphery. A clutch 14 has its hub loosely mounted on the extended end of a second crank shaft 15 suitably journaled on the loom frame, and is provided with an annular groove 14' therein to receive the pins on the forked end of an angle or bell crank lever 16, the hub 16' of which is pivotally mounted on a stud in an arm 16'', see Fig. 5. The other arm of the angle lever 16 has attached thereto the lower end of a connector 17.

A spring 18, attached to the angle lever 16 and to the frame, acts to hold the clutch 14 in its outward position.

The clutch 14 has two side projections 14'' thereon, which extend into openings in the gear 13, and act to hold the clutch in proper position relative to the gear. The clutch 14 has an engaging arm 14''' extending out therefrom, which, when the clutch 14 is in its outward or inoperative position, is adapted to engage a stop 14^a on the inside of the stand 1', shown by dotted lines in Fig. 5, and also shown in Fig. 7 to stop the rotary movement of the clutch 14, and parts connected therewith. When the clutch 14 is moved inwardly, through the operation of the jacquard mechanism, not shown, acting through the connector 17, the arm 14''' on the clutch will be moved out of the path of the stop 14^a and into the path of the starting tooth 10^{a'} secured to the mutilated gear 10^a, so that the revolution of said gear 10^a, through the revolution of the gear 10 and gear 9 on the driven crank shaft 5, will, through the starting tooth 10^{a'} engaging the arm 14''' on the clutch 14, rotate

said clutch, and cause the rotation of the gear 13, until the teeth 10^a' on the gear 10^a mesh with the teeth on the gear 13, and cause said gear 13 to rotate.

The gear 13 is loosely mounted on the crank shaft 15, and carries a pin 13', actuated by a spring 13'', see Fig. 6, to yieldingly hold the end of the pin 13' in a recess in a plate or disk 20, which is adjustably secured on the shaft 15 by a screw 20', see Fig. 6, to yieldingly connect the gear 13 through disk 20 with the shaft 15, and cause said shaft 15 to rotate with the gear 13, and the spring actuated pin 13' forms a give-way device, so that in case of accident to the swivel shuttle mechanism, the pin will yield, allowing the shaft 15 to remain at rest, and thus prevent breakage.

The crank shaft 15 has two cranks therein, one of which, 15', is shown in Fig. 2. Each crank 15' is connected, through a crank connector 21, with a yoke 22, which has bosses 22' mounted on a longitudinally sliding rod 23. A collar 24, secured on the rod 23 by a set screw 24', extends between the bosses 22' of the yoke 22, and acts to hold the yoke 22 in place on the rod 23. The rod 23 is mounted at its rear end in bearings 25' on a stand 25, secured to the loom frame, see Fig. 2, and at its forward end is, in this instance, supported on a grooved roller 26 mounted on a stud 27' on the stand 27. A pin 28 extends over the rod 23, see Fig. 4.

On the forward end of each rod 23 is a yoke 29, having bosses 29' mounted on the rod 23. A collar 29'' on the rod 23 extends between the bosses 29' on the yoke 29, and is secured in place by a set screw 29''', and secures the yoke 29 in place on the rod 23, see Fig. 2. The two yokes 29, one on each rod 23, at opposite ends of the loom, support two longitudinal parallel rods 30, on each of which, at each end, (only one end is shown in the drawings,) is mounted a hub 31' on a bracket 31 see Fig. 9. The lower end of the bracket 31 has secured thereto the end of the shuttle rail 32, see Fig. 10.

Through the rotation of the crank shaft 15, at predetermined intervals, and for a predetermined length of time, according to the indications of the pattern mechanism, through the operation of the gears 9, 10^a and 13, and the clutch mechanism above described, a longitudinal motion is communicated to each rod 23, at each end of the loom, through the crank connectors 21, to carry the swivel-shuttle-rail 32, and the swivel shuttles 33 supported thereon, from its forward or outer position, when the lay is in its rear position, as shown in Fig. 1, to its rear position, as shown by dotted lines in Fig. 1, when the lay is in its rear position, and in which position the swivel shuttles are operated to weave figures or spots on the fabric.

I will now describe the mechanism for communicating a longitudinal motion to the swivel shuttle-rail 32, carrying all the swivel shuttles 33, to vary the position of the spots or figures on the fabric, in the direction of the width of the fabric.

On the outer end of the crank shaft 5 is fast a cam 34, which is adapted to engage a projection 35' on a cam lever 35 pivoted on a stud 35'' on the stand 1', see Fig. 5. The lever 35 has pivotally attached to its front end a link 36, connecting said lever 35 with one arm of a bell crank lever 37, pivotally mounted on a stud 38, see Fig. 1. The other arm of the bell crank lever 37 carries a pawl 39, which is adapted to engage and turn a ratchet wheel 40, attached to a gear 41 loose on a stud

42. A friction device, comprising in this instance two jaws 43, mounted on the stud 38, and held in yielding engagement by a spring 44, with the hub portion of the ratchet 40, acts to yieldingly hold said ratchet and the gear 41. The gear 41 meshes with and rotates a gear 45 loosely mounted on a stud 46. Connected with the gear 45 is a disk 47, carrying pattern pins or indicators 48, of different lengths, see Fig. 1. A disk 49 carrying pattern pins or indicators 50, see Fig. 2, is connected to the gear 41. The pattern pins on the disks 47 and 49 are adapted to engage a cam projection 51' on a bar 51, which has slots therein, through which the studs 42 and 46 extend, see Fig. 2, to support said bar. The bar 51 is moved into different positions, in this instance into three different positions, by the pattern pins 48 and 50, and through intermediate mechanism to be described, causes the swivel shuttle-rail 32 to be moved into three different positions.

The lower end of the bar 51 has a pin 51'' thereon, to which is pivotally attached the upper end of a link 52, see Fig. 4, the lower end of the link 52 is attached to a lever 53, the hub 53' of which is loosely mounted on one of the rods 23, see Fig. 2, between the bearings 25' on the stand 25. Extending up from the hub 53' is an arm 53'', see Fig. 2, the upper end of which is forked or recessed, see Fig. 4, to receive a rod 53^a, the ends of which are secured in the ends of arms 53^b, the hubs 53^b' of which are fast on the rod 23, see Fig. 2.

The turning of the hub 53', through the vertical movement of the bar 51, see Fig. 2, will, through rod 53^a and arms 53^b, turn the rod 23, and through the collar 54 fast on said rod, and the arm 55 pivotally mounted in the yoked shaped extension 54' on said collar 54, see Fig. 9, communicate a longitudinal motion to the connector 56, having a downwardly extended slotted projection thereon, to which the lower end of the arm 55 is adjustably attached by a bolt 57, the connector 56, attached at one end to the supporting bracket 31 of the shuttle rail 32, and at its other end to a projection 58' on a collar 58, moves the bracket 31 longitudinally on the supporting rods 30, and also the shuttle-rail 32.

The rotary movement of the ratchet wheel 40, and the movement of the bar 51, and through intermediate mechanism the longitudinal movement of the shuttle-rail 32, is controlled by pattern mechanism.

In this instance the bell crank lever 37 has a pin 37' thereon, see Fig. 1, which, when the lever 37 is in its raised position, and the cam lever 35 on the highest part of the cam 34, is in position to be engaged by the hooked end of a bell crank lever or latch 59, see Fig. 1, to hold the cam lever 35 in its inoperative position. A spring 60, attached to the lever 59 and to a stationary part, acts to hold the lever 59 in engagement with the pin 37'. A cord 61, attached to the bell crank lever 59, passes over a guide sheave 62 to the jacquard mechanism, not shown, and operates, on the indication of the jacquard mechanism, to move the lever 59 to disengage it from the pin 37' releasing the cam lever 35, and allowing the cam 34 to operate said lever and cause the pawl 39 to turn the ratchet 40, and through intermediate connections communicate longitudinal movement to the swivel shuttle-rail 32, as above described.

I will now describe the mechanism for moving the swivel shuttle-racks independently of the movement of the swivel shuttle-rail.

The swivel shuttle-rail 32 carries a series of blocks or guides 32' see Fig. 13, which preferably have a metal back 32'' which is made separate from and attached to the rail 32, and has studs 64' secured thereto, on which are mounted a series of pinions 64 for communicating motion from the reciprocating racks 63, to the swivel shuttles 33, in the usual and well known way. In this instance there are three shuttle-racks 63, each operates through a system of pinions 64, the swivel shuttles 33 which are shown in Figs. 12 and 13, extending horizontally. In case the swivel shuttles extend in a vertical direction, as shown in the other figures, the racks 63 will operate the same through pinions, not shown, in the ordinary way.

Each swivel shuttle-rack 63 has a sliding bar 65 connected therewith, in the ordinary way, and each bar 65 is connected by a link 66 with a lever 67, having a hub 67' mounted on a pin 68, supported in the upwardly extending projections on the brackets 31, see Figs. 8, and 9. Each lever 67 is connected by a rod 69 to the lower end of a lever 70, see Fig. 9, having a hub 70' mounted on a stud 71, supported in the upper ends of the stands 72, having hubs 72' at their lower ends mounted to slide on the parallel rods 30, see Fig. 10. Each lever 70 has a movement communicated thereto, to communicate to the swivel shuttle racks a motion, to carry them from one extreme position to the other, and move the swivel shuttles, through the rotation of a master gear 73; loosely mounted on a stud 74, supported in the stands 72, and having a cam groove 73' therein to receive a pin 70'' fast in each lever 70, see Fig. 11.

Each one of the three master gears 73 has a partial rotation communicated thereto, at predetermined intervals, by a mutilated pinion 76, Fig. 9, fast on a longitudinally sliding shaft 77, mounted in suitable bearings 72'' on the stands 72. On the shaft 77 is splined a pinion 78, to rotate said shaft 77 and allow said shaft to move longitudinally. A pinion 79 on a sleeve 79', mounted on a stud secured to the inner stand 72, see Figs. 1 and 10, meshes with and rotates the pinion 78 and the shaft 77. The forked end of the sleeve 79' is pivotally connected with a head 80' on the forward end of a shaft 80, see Fig. 10. The rear end of the shaft 80 is pivotally connected through a connection 81 with the forward end of a square or non-circular shaft 82, see Fig. 1. The rear end of the shaft 82 extends loosely through a bearing 83' on a stand 83 secured to the stand 1' on the loom frame, see Fig. 1, so as to have a longitudinal motion in said bearing, as the swivel shuttle rail moves back and forth.

On the shaft 82 is a bevel gear 84, which rotates with the shaft 82, but is prevented from moving longitudinally with said shaft by extending between the bearings 83'. The bevel gear 84 meshes with and is driven by a bevel gear 85 fast on one end of the crank shaft 15, see Fig. 6.

A longitudinal motion is communicated to the shaft 77 carrying the mutilated pinion 76, through a lever 86 centrally pivoted at 86' on a stand 87, secured to the rear stand 72, see Fig. 8. The lever 86 is forked at one end and has pins thereon which extend into an annular groove 87' in a collar 87'' fast on the shaft 77, see Fig. 10. The other end of the lever 86 has a pin 86'' thereon which extends into a cam groove 88' in a plate 88 on the

upper end of an arm 88'' extending up from a collar 88''', see Fig. 11, loose on a stud, said collar has a forked end attached to a swivel block 88''', which block is also pivotally connected to a second fork fast on the end of a shaft 89. The shaft 89 is splined at its inner end in a hub 90' on a connection 90, see Fig. 1, to have a rocking motion with said connection, and also a longitudinal motion in said hub 90', as the swivel shuttle rail moves back and forth.

The inner end of the connection 90 has in this instance a ball and socket joint connection 90'', with a stationary part of the frame, see Fig. 1, and an arm 90''' extending out therefrom, see Fig. 3, to which is attached a cord 91 leading to a lever 92, see Fig. 1, which is connected at its ends, through links 93, to levers 94 and 95, having hubs 94' and 95', pivotally mounted on a stud 96, and arms 97 and 98 extending from said hubs, and connected to the jacquard mechanism, not shown. Through the jacquard mechanism, and the connections to the connection 90, said connection and the shaft 89 is rocked, to move the plate 88 into three different positions, and in each of said positions, through the lever 86, the shaft 77 will be moved longitudinally to bring the mutilated pinion 76 in line with one of the master gears 73, and turn said gear a partial rotation, the other two master gears 73 being held stationary by the drums 99, on the shaft 77, see Figs. 8 and 10, engaging the blank spaces or dwell portions on the master gears 73.

At the time of the operation of the swivel shuttles, the picking motion of the fly shuttle, not shown, will be stopped, in any usual manner.

In this instance a cam 100, fast on the crank shaft 15, operates a cam lever 101, centrally pivoted at 102, and attached at its lower end by the collar 103 to a sliding rod 104, having fast thereon a forked arm 105 which engages an annular groove in the hub 7' of the picking lever 7 carrying the picking roll 7'', see Figs. 5 and 6. The picking roll 7'' is moved out of and into engagement with the picking shoes, not shown.

From the above description in connection with the drawings the operation of my improvements will be readily understood by those skilled in the art. By means of the two crank motions one for the lay, and one for the swivel shuttle rail, the swivel shuttle rail will remain stationary during the operation of the fly shuttle and the backward and forward movement of the lay. When the jacquard mechanism indicates, the swivel shuttle-rail, through the rotation of the crank 15 and the longitudinal movement of the sliding rods 23, will be moved back and forth, to carry the shuttles into and out of operative position, and the swivel shuttle-rail, carrying all the swivel shuttles, will be moved longitudinally at predetermined times, according to the indications of the jacquard mechanism, and each set of shuttles will be moved independently, according to the indications of the jacquard mechanism.

It will be understood that the details of construction of my improvements may be varied if desired.

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

1. In a loom of the class described, a lay, a swivel shuttle rail independent of the lay, a crank shaft operatively connected to said shuttle rail, a pattern mechanism, a driven gear on said crank shaft, a driving gear adapted to

mesh with said driven gear, operative means connected with said driving gear and driven gear, under the control of the pattern mechanism, to cause said driving gear to start and operate said driven gear.

5 2. In a loom of the class described, a lay, a swivel shuttle rail carrying a shuttle rack, a movable support for said rail independent of the lay, a shuttle rack operating mechanism attached to said support and movable therewith, to operate said shuttle rack, and a rotary shaft, 10 operated from a driven shaft of the loom, to operate said rack mechanism, and said driven shaft.

3. In a loom of the class described, a swivel shuttle rail, a shuttle rack, a rotary gear having a cam surface thereon and movable with said swivel shuttle rail, connections 15 from said cam to said shuttle rack, and means to operate said gear to communicate motion to said shuttle rack.

4. In a loom of the class described, a shaft, a mutilated gear thereon having a sliding tooth, a driving gear having an engaging arm fast thereon, means to move said sliding 20 tooth into the path of said engaging arm, and a stop for said sliding tooth, for the purpose stated.

5. In a loom of the class described, a swivel shuttle rail, a crank shaft connected thereto, picking mechanism to operate the fly shuttle, a swivel shuttle rack, and means 25 connected with said crank shaft to operate said swivel shuttle rack and control the operation of said picking mechanism.

6. In a loom of the class described, a swivel shuttle rail having two or more racks, a support for said rail, master 30 gears having cams thereon carried by said support to move said racks longitudinally, a sliding mutilated pinion adapted to mesh with said master gears, and means to communicate lateral and rotary motion to said pinion.

7. In a loom of the class described, a crank shaft, a

bevel pinion thereon, meshing with and operating a bevel 35 pinion having a sleeve bearing for a longitudinally sliding shaft, and said pinion, and said shaft, and pivotal or flexible connections from said shaft to the swivel shuttle motion on the swivel shuttle rail, and said swivel shuttle motion and swivel shuttle rail. 40

8. In a loom of the class described, a longitudinally moving shuttle rail, a movable support therefor, a rotatable shaft connected to and movable with said rail, a 45 second shaft pivotally or flexibly connected to said rotatable shaft, and means to rotate said second shaft.

9. In a loom of the class described, swivel shuttles, pinions for operating said shuttles, shuttle racks for operating 50 said pinions, gears having dwell portions thereon, and cam grooves therein, levers operated by said gears, and connections intermediate said levers and shuttle racks, a mutilated pinion to operate said gears, a cam plate, connections intermediate said plate and the pattern mechanism, to move said plate according to the indications of the 55 pattern mechanism, and connections intermediate said plate and the mutilated pinion, to move said pinion into and out of mesh with one or the other of said gears.

10. In combination, a ratchet wheel, a pawl to turn said ratchet wheel, a lever on which said pawl is fulcrumed, a cam, a lever operated by said cam, connections 60 between said cam lever and said pawl lever, a latch to engage the pawl lever and normally hold said pawl inoperative, and connections between said latch and pattern mechanism to release the latch.

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