M. O. STEERE.

NARROW WARE LOOM.

APPLICATION FILED APR. 19, 1909.

998,808. Patented July 25, 1911.

3 SHEETS—SHEET 1.

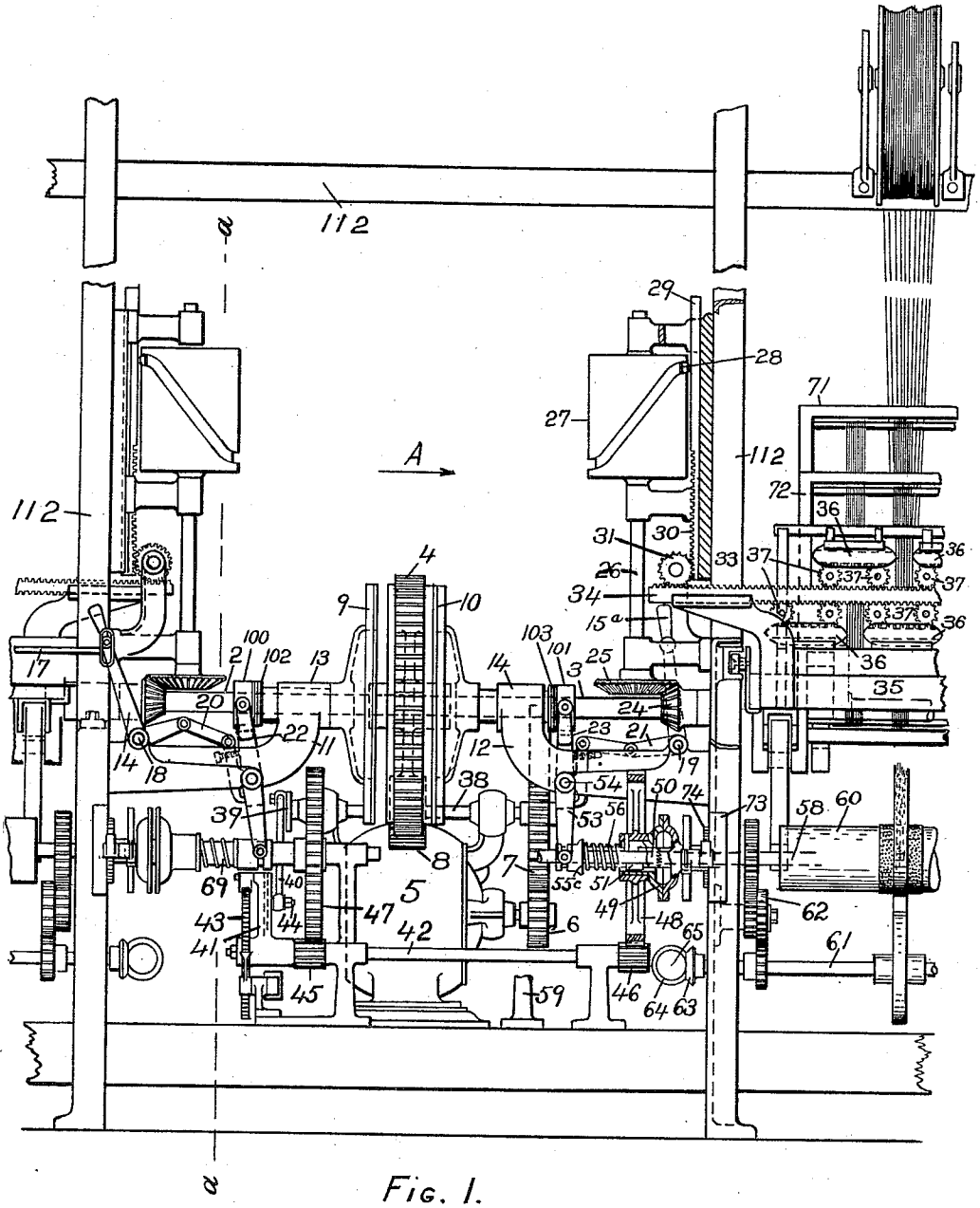

Fig. 1.

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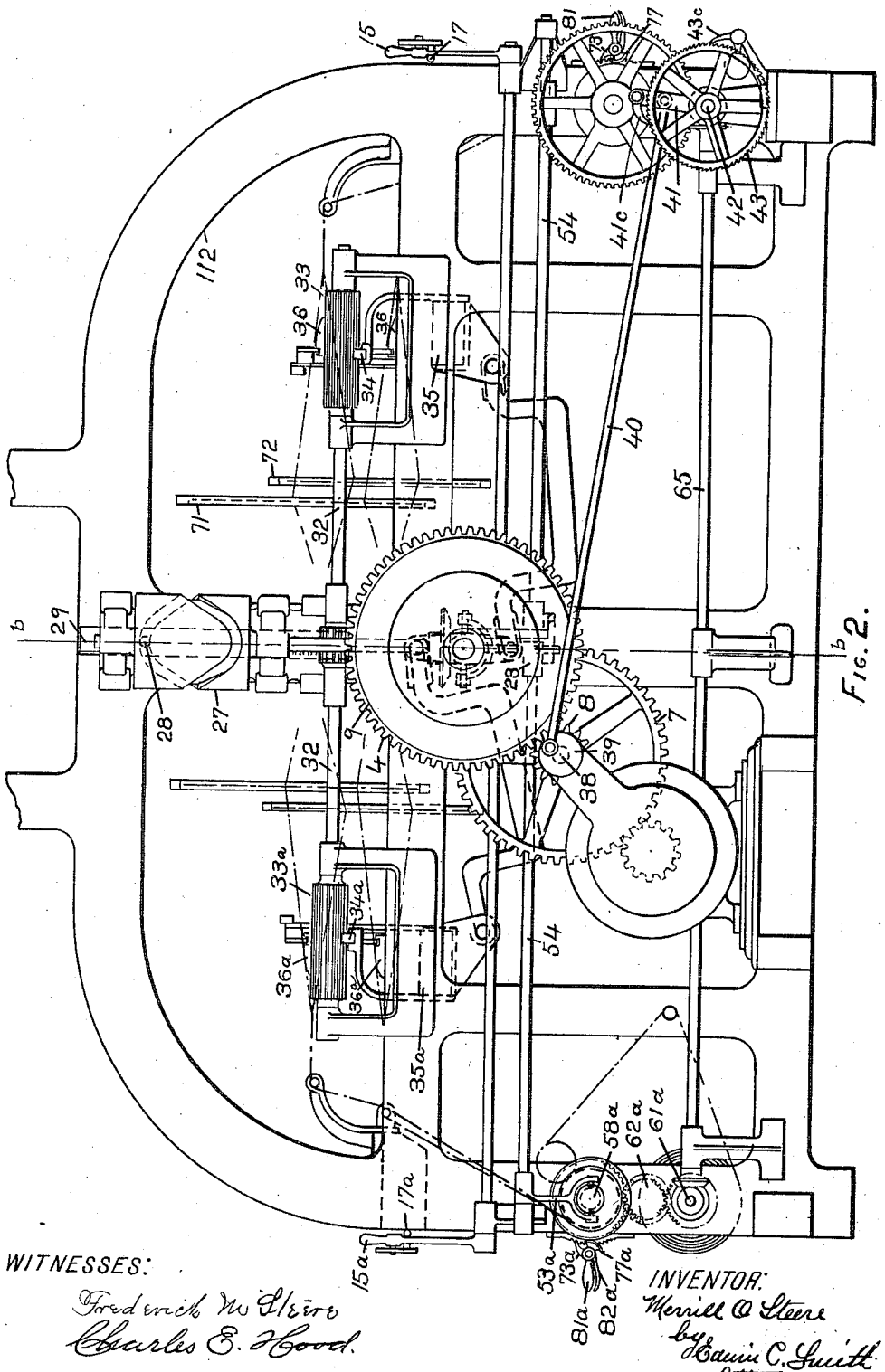

FIG. 2.

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3 SHEETS—SHEET 3.

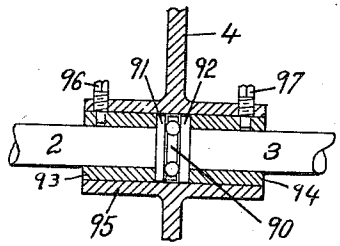

FIG. 3

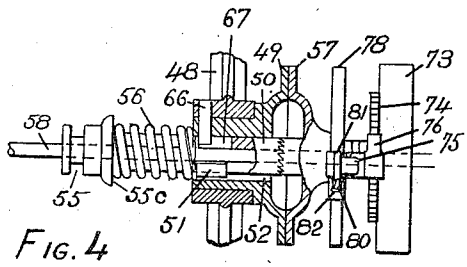

FIG. 4

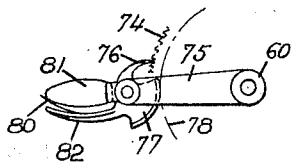

FIG. 6

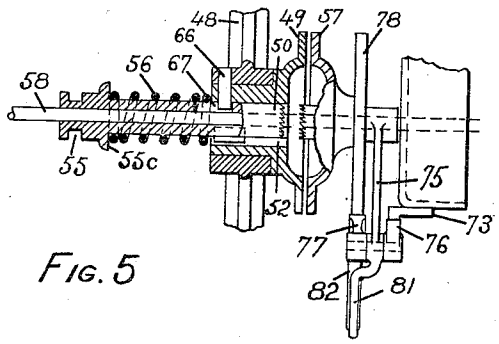

FIG. 5

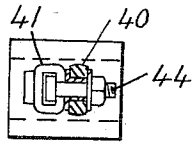

FIG. 7.

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NARROW-WARE LOOM.

998,808. Specification of Letters Patent. Patented July 25, 1911.

Application filed April 19, 1909. Serial No. 490,671.

To all whom it may concern:

Be it known that I, MERRILL O. STEERE, a citizen of the United States, residing at Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Narrow-Ware Looms, of which the following is a specification.

My invention is an improvement in narrow ware looms and its purpose is to facilitate the operation of the loom and augment its efficiency.

The nature and operation of my invention are fully disclosed in the following specification and the accompanying drawings which illustrate respectively: Figure 1, a front elevation of the portion of a loom embodying my invention, partly in section; Fig. 2, a view sectional on the line *a*—*a* of Fig. 1, looking in the direction of the arrow A, and with parts pertaining to the left hand section omitted; Fig. 3 is a sectional view of the main clutch gear showing the thrust bearing in the line *b*—*b*, of Fig. 2; Figs. 4 and 5, enlarged views of the take-up clutch, partly in section; Fig. 6, enlarged view of the take-up dog; Fig. 7, a detail of the take-up pawl arm.

The loom of my invention has two weaving sections, each subject to independent control and one take-up device common to both weaving sections but disconnectible from either section when that section is stopped. By two weaving sections, I mean two subdivisions of the loom, each capable, in conjunction with the driving section to be described, of weaving independently of the other, and each susceptible of being stopped without affecting the other section. My loom is further of the type in which weaving is accomplished at both front and back, the warps being suspended overhead. There are two crank shafts 2 and 3 to operate the lays or battens, of which there are two to each crank shaft, and one crank shaft for each weaving section. On these shafts, at their juncture, and freely rotatable thereon is a driving wheel 4 which may be of any suitable form and driven in a usual manner. I shall employ, to designate the motive means, the term motor, irrespective of whether it is a belt, rope or prime mover of some description, but prefer however to employ a gear wheel and drive it from an electric motor 5 through a suitable train of gears 6—7 and 8. Mounted on the shafts 2 and 3 are clutch members 9 and 10 respectively, each secured to its shaft to rotate it, but slidable on the shaft to engage or disengage the gear 4. To support the weight of the clutches and of their gear 4, brackets 11 and 12 extend from the frame 112 of the loom with bearings 13 and 14 for the clutches. The clutches are operated by the starting handles 14, 15 and 15ª, see Figs. 1 and 2. As indicated in Fig. 2 these handles are at front and back of each weaving section of the loom, 15 being on the front of the right hand section and 15ª for the back. In Fig. 1, the front starting handle 14 of the left hand section alone shows because the handle for the rear is directly behind it, and only the rear handle 15ª for the right section shows because the front handle 15 is omitted for clearness. From each handle rods 16 and 17 extend along the weaving section so the section may be started or stopped by the operator from any point—Fig. 2, and left hand section of Fig. 1.

The starting handles are mounted on the rock shafts 18 and 19 and connected through the toggles 20 and 21 with the clutch arms 22 and 23. The effect of this connection is shown in Fig. 1 where at the left the starting handle is shown in its nonoperating position with the clutch member 9 withdrawn from the gear 4. On the right the starting handle is shown in operating position with the clutch member 10 engaged with the gear 4. In this latter position, the toggle 21 is thrown down below the dead center, so that the effect is to lock the clutch in position and prevent its spontaneous displacement induced by the jar of the loom in operation or other causes.

Each weaving section has its own shuttle mechanism, and as that for each section is like the other, only one will be described. On the shaft 3 is a bevel gear 24 which meshes with one of twice the diameter 25 mounted on a shaft 26. On the shaft 26 is a cam 27 which actuates the shuttles, this cam being so proportioned as to cause one complete reciprocation of its follower roll 28 and its slide 29 in one complete rotation. The slide 29 has rack teeth 30 which mesh with the pinion 31 on the shaft 32. On the same shaft is a long pinion or gear 33 with which the shuttle bar 34 engages constantly, the pinion being of sufficient length to engage the shuttle bar at any position of the latter in its movement with the lay or batten

35 on which it is mounted. This construction is duplicated for the rear side of this section by the long pinion 33ª, which is on the same shaft 32 and which drives through the shuttle bar 34ª the shuttles 36ª. It follows, because of the ratio of the bevel gear 24 to the bevel gear 25 (1 to 2) that the cam 27 makes only a half rotation with each complete rotation of the crank shaft 3 and as each such crank shaft rotation means one "beat-up" or "pick" of the loom the movement of the shuttle bar 34 is of alternate direction with each succeeding pick, as is desired.

The operation of the shuttles 36 is well known, they being driven by gears 37 which in turn are driven by the shuttle bar as is clearly shown in Fig. 1, some of the coverings being omitted so as to show the active mechanism unobstructed.

The take-up mechanism or actuating device is not directly driven from the weaving mechanism as is usual, but from the main drive of the loom which in this case is the electric motor 5. On the shaft 38 which carries the gears 7 and 8 is a crank 39 which by a rod 40 connects with a rockable pawl arm 41, on the shaft 42 which also carries the ratchet or take-up gear 43. The pawl arm 41 has a T slot in which is the T-headed stud 44 which receives the end of the connecting rod 40, and by which said rod may be adjusted in position on the pawl arm 41—Fig. 7. By this means the throw of the pawl arm 41 may be varied and the pawl 41ᶜ be caused to take up whatever numbers of teeth on the take-up gear is necessary. A detent pawl 43ᶜ restrains the ratchet 43 after movement of the pawl 41ᶜ.

The take-up actuating device is connected with the various take-up rolls, as follows: The shaft 42 carries two pinions 45 and 46 which mesh with gears 47 and 48 respectively. The gear 48 is secured to the friction clutch member 49 which is in turn carried on the positive clutch member 50, on which the friction clutch member has longitudinal movement, but with which it rotates positively—Figs. 4 and 5. The positive clutch member 50 is in the form of a long sleeve in which is set a key 51 to engage the internal splineway 52 of the friction clutch member 50 to permit the aforesaid longitudinal movement of the latter. At the opposite end of the positive clutch member 50 is a groove 55 which is engaged by the yoke arm 53—Fig. 1, whereby the clutch members are moved. The yoke arm 53 is secured to the same rock shaft 54 on which the clutch arm 23 is mounted. Therefore, operation of the main driving clutch member 10 is concurrent with that of the take-up clutch. A spring 56 is interposed between the shoulder 55ᶜ and the friction clutch member 49. When the arm 53 is shifted to operate its clutch, the friction clutch member 49 is forced by the spring 56 to engage its corresponding member 57 which is secured to the shaft 58 on which is the take-up roll. Further movement of the yoke arm 53 engages the teeth of the positive clutch member 50 with the toothed hub of the member 57. The pin 66 secures the gear 48 to the member 49 and projects into an elongated opening 67 in the member 50. This permits movement of the member 50 independent of the member 49, and provides for movement of the member 49 by the member 50 to withdraw the friction clutch members apart.

Fig. 4 shows the take-up clutch completely engaged to operate the take-up, and in Fig. 5 the take-up clutch is completely disengaged. Note in Fig. 5, that whereas the friction member 49 has moved but slightly, relatively to the member 57, the positive member has moved substantially. The shaft 58 which carries the take-up clutch is mounted in suitable bearings, of which the outboard or supporting bearing is not shown in behalf of clearness, but only a portion of its foot 59. On the shaft 58 is the take-up roll 60 and beneath the latter is the spool shaft 61 connected by suitable gearing 62 with the shaft 58. On the spool shaft is a bevel gear 63, meshing with which is another gear 64 on the shaft 65 which extends across the loom and through similar gearing drives the spool shaft 61ª and through the gearing 62ª the take-up roll 58ª. The take-up connections for the other weaving section are of like character, except that the positive clutch member 69 is longer than the positive clutch member 50 and the gear 47 is secured directly to it. The friction clutch member acts with the positive clutch member just the same as the friction clutch 49 with the positive clutch member 50.

Connected with each take-up roll is a take-up dog and handle, one of which will be now described. Secured to the frame 112—Fig. 1, is a bracket 73 having ratchet teeth 74 concentric with the take-up roll shaft 58. On the shaft 58 is a handle lever 75 carrying a pawl 76 to engage the ratchet teeth 74 and a friction dog 77 which engages the wheel 78 connected with the take-up roll shaft—see Fig. 6, in which the ratchet teeth of the bracket 73 and periphery only of the wheel 78 are represented. When either half of the loom is stopped, the take-up actuating device has been disconnected and therefore, without the provision described the disconnected take-up rolls and spools would be free to "let back" under the tension of the fabric which would spoil the fabric when the weaving is again started, because uniform tension of fabric is essential to proper weaving, with uniform number of picks per inch. Furthermore, if the fabric is slack the shed will also be slack and there

would be likelihood of a smash, for unless the shed is taut, the shuttle will encounter and break the warp threads instead of properly entering and passing through them. The dog 77 prevents this by engagement with the wheel 78 which as stated is connected with the take-up roll shaft, preferably by being secured to the clutch member 57. Concurrent engagement of the pawl 76 with the teeth 74 locks the wheel from turning back and therefore prevents the take-up roll from "letting back" to slack off the fabric. Should the handle lever 75 yield with the taking-up of the fabric, it will always maintain the pawl 76 in position to engage the ratchet teeth 74 because it can only descend until the hub of the pawl 76 encounters the bracket 73. This device serves another function, for it is sometimes necessary to slack off the take-up roll. On restarting the weaving the handle lever 75 is raised, with the pawl 76 engaging one of the upper ratchet teeth and by means of the wheel 78, the take-up roll is turned to take up the fabric as tightly as may be by this means. Then by depressing the handle lever 75 the tension on the fabric can be further increased, the dog 77 biting on the wheel 78 and carrying it with the handle lever. The dog 77 is maintained in biting engagement with the wheel 78 by the spring 80 interposed between the handle 81 of the lever 75 and the handle portion 82 of the dog—Fig. 6. By means of the handle portion 82 the dog can be released at will. This device forms an independent means whereby the take-up rolls for a section may be controlled independently of the take-up actuating device driven by the motor.

To prevent the gear 4 following which ever clutch member is withdrawn, under pressure of the other, a novel arrangement of thrust bearing is employed. Between the ends of the crank shafts 2 and 3 is interposed a ball thrust 90. The thrust plates 91 and 92 are sufficiently larger in diameter than the shafts to abut the sleeves 93 and 94 which are secured within the hub 95 of the gear 4 by any usual fastening device such, for example, as the screws 96 and 97.

The clutch arms 22 and 23 engage collars 100 and 101 and between these collars and the hubs of the clutch members 9 and 10 are ball thrust bearings 102 and 103, which, being of usual construction are not here detailed.

Not only are the lays arranged to beat in opposition, but the rack bars for the shuttles are similarly arranged so that reciprocating motion is opposed to, and therefore neutralized in its vibratory effect, by the opposed movement of kindred parts, both as regards longitudinal and transverse vibrations.

The loom may in general be said to comprise two weaving sections and one driving section to control the two, and it should be noted that inasmuch as the shuttle actuating mechanism for each weaving section is disposed within the driving section, the shuttle space in the weaving sections is not encroached upon.

A distinct advantage accrues from the foregoing arrangement, which in effect, is the transposition of the drive from the end of the loom to a point intermediate the ends, preferably midway thereof. The loom is subdivided, so that in case stopping is required for piecing or the like, only one half the production of the loom is stopped, the other half being unaffected.

In looms of this character, where weaving is performed on both sides, it is necessary at times to disconnect one group of weaving from another entirely. For example, when the warps for one group of weaving are drawn in and in readiness for operation, it is desirable to commence weaving. The opposite lay and its coöperating parts are usually disconnected by disconnecting the crank pitmen, uncoupling the harness mechanism that acts with that lay and disconnecting from the main drive any other allied parts. In the case of a hundred shuttle loom with fifty shuttles on the side and driven from the end such disconnection would leave fifty shuttles operative and fifty nonoperative. In the case of my improved loom, the disconnection for drawing-in and kindred purposes affects only one quarter of the shuttles because there are four lays, each susceptible of disconnection. The take-up rolls for each section are connected to each other and to their common take-up actuating devices, so that they may be independently operated, in any suitable manner. This connection may be accomplished by suitable clutches between the gearing 62 and 62^a and the shafts 58, 61, and 58^a, 61^a respectively. Stopping to piece affects only one-half of the weaving, whereas, with the usual construction all the shuttles would be stopped for such purpose. Distinct advantage is derived from weaving on opposite sides of the loom, but in my improved loom this is greatly augmented by the capacity for subdivision as indicated, in that the curtailment of productive capacity is much diminished and the efficiency of the loom is conserved. Due to the drive being within the loom, there is no obstruction to passing around the loom end and the danger of an operative being caught in the driving mechanism is lessened.

A distinct advantage lies in the novel take-up arrangement, there being only one take-up actuating device for all the weaving. It has been usual to drive the take-up from the "lay" and to provide one take-up for each "lay." This would call for four take-

ups for such a loom as has been described. To meet varying conditions of weave, the take-up ratchet or gear 43 is changed for one of coarser or finer pitch. As there is a great variety of weaves, a corresponding variety of gears is maintained and were this multiplied by four the time devoted to handling and space devoted to storing them would constitute a substantial waste of labor, and of investment both in gears and in floor space available for other purposes or not otherwise needed.

Without limiting myself to the precise form and arrangement of construction, I claim:

1. In a loom, the combination with a plurality of independently controlled weaving sections having take-up rolls, of a single take-up actuating device coöperative with the rolls of all the weaving sections, and means to independently connect and disconnect the rolls of a weaving section with said take-up actuating device.

2. In a loom, the combination with a plurality of independently controlled weaving sections having take-up rolls, and a single motor for driving the weaving sections, of a single take-up actuating device operated directly from the motor and coöperative with the rolls of all the weaving sections, and means to independently connect and disconnect the rolls of a weaving section with said take-up actuating device.

3. In a narrow ware loom, the combination with a plurality of independently controlled weaving sections, a single driving means therefor and a single take-up actuating device coöperative with all the weaving sections, of means to disconnect from the driving device and from the take-up actuating device any and all of the weaving sections.

4. In a loom, the combination with a plurality of weaving sections, each section including weaving devices and take-up rolls, of a motor, means independently connecting the motor with the weaving devices, a single take-up actuating device and means independently connecting the take-up actuating device with the take-up rolls.

5. In a loom, the combination with a plurality of weaving sections, each section including weaving devices and take-up rolls, of a motor located substantially midway the ends of the loom and connected to the weaving devices, a single take-up actuating device driven from the motor, and means independently connecting the take-up actuating device with the take-up rolls.

6. In a narrow ware loom, the combination with two weaving sections, weaving devices for both sections and a crank shaft for each section to operate the weaving devices of each section, of a driving wheel common to both shafts, a clutch on each shaft to engage the driving wheel, a single take-up actuating device for both sections operatively connected with the driving wheel and means to concurrently connect a weaving section with and disconnect it from the driving wheel and from the take-up actuating device.

7. In a narrow ware loom, the combination with two weaving sections, each having its own crank shaft, opposed lays and shuttles driven from the crank shafts, and take-up rolls, of a driving section intermediate the weaving sections, comprising a motor, a wheel common to and freely rotatable on both shafts driven by the motor, clutches to operatively connect the wheel with either and with both shafts a single take-up actuating device directly operated by the motor and means to connect and disconnect the rolls of a weaving section with said take-up actuating device, whereby said device controls the taking up of the fabric throughout the loom.

8. In a narrow ware loom, the combination with a plurality of lays and their accompanying shuttles and take-up rolls, a motor to drive the same, a single take-up actuating device driven direct from the motor and means to disconnect any one of the take-up rolls from the take-up actuating device, of a wheel 78 rotatable with a take-up roll, a fixed ratchet 74, an arm 75, a pawl 76 on the arm, engaging the ratchet to prevent movement of the arm, and a friction dog 77 to engage the wheel 78 to prevent rotation of it and of the take-up actuating roll when disconnected from the take-up device.

9. In a loom, the combination with a plurality of weaving sections, each section including weaving devices and take-up rolls, of a motor, means independently connecting the motor with the weaving devices, a single take-up actuating device driven from the motor, means independently connecting the take-up actuating device with the take-up rolls, and a single means for connecting and disconnecting the weaving devices and take-up rolls of one section with the motor and take-up actuating device respectively.

10. In a narrow ware loom, the combination with weaving sections, each having its own lays, shuttles and crank shaft to drive the lays, and take-up rolls, of a driving section to operate and control the weaving sections comprising a motor, a take-up actuating device operated directly by the motor and means for adjusting the take-up actuating device, a shuttle actuator for each weaving section disposed within the driving section and driven from the crank shaft of its weaving section.

11. In a loom, the combination with a plurality of weaving sections each having weaving mechanism including shuttles, of a driving section located between the weaving

sections, a crank shaft for each weaving section a shuttle actuator for each weaving section located within the driving section, a motor in the driving section, and means independently connecting the shuttle actuator and the crank shaft of each section with the motor.

12. In a loom, the combination with a plurality of weaving sections, each section including weaving devices and take-up rolls, of a motor, means independently connecting the motor with the weaving devices, a single take-up actuating device, means independently connecting the take-up actuating device with the take-up rolls, and means for operating the take-up rolls for a section independently of the take-up actuating device.

13. In a loom, the combination with a plurality of weaving sections, each section including weaving devices and take-up rolls, of a motor, means independently connecting the motor with the weaving devices, a single take-up actuating device, means independently connecting the take-up actuating device with the take-up rolls, and means for operating the take-up rolls for a section independently of the take-up actuating device, said means being arranged to prevent backward movement of the take-up rolls when the take-up actuating device is disconnected therefrom.

14. In a loom, the combination with a plurality of independently controlled weaving sections having take-up rolls, of a single take-up actuating device coöperative with the rolls of all the weaving sections, means to independently connect and disconnect the rolls of a weaving section with said take-up actuating device, and means for operating the take-up rolls for a section independently of the take-up actuating device.

In testimony whereof I affix my signature in presence of two witnesses.

MERRILL O. STEERE.

Witnesses:
JOHN M. WELCH,
ARTHUR W. PUDDINGTON.