May 26, 1953 J. BAMERT 2,639,733

LENO-WEAVE LOOM

Filed March 20, 1951 5 Sheets-Sheet 1

FIG. 1

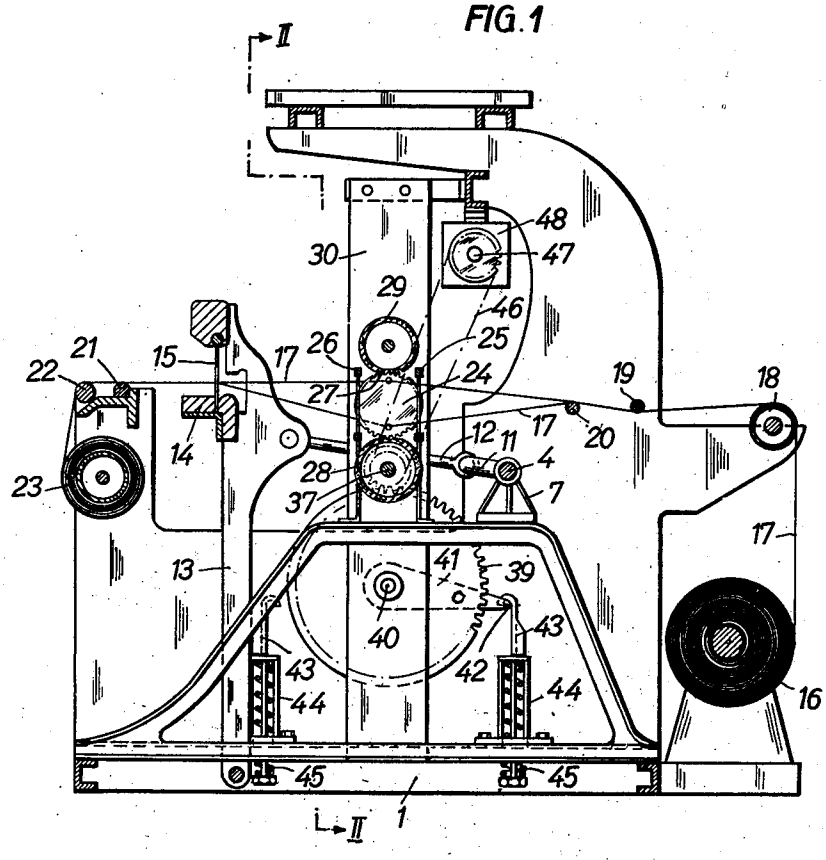
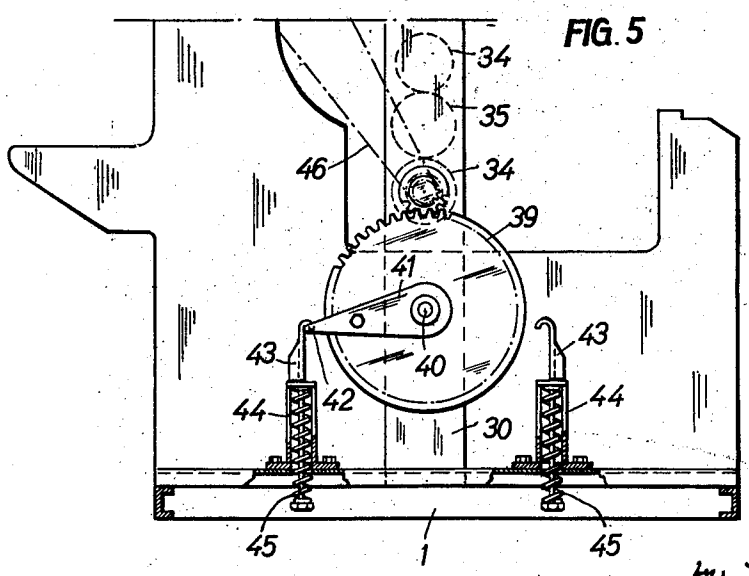


FIG. 5



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May 26, 1953 J. BAMERT 2,639,733

LENO-WEAVE LOOM

Filed March 20, 1951 5 Sheets-Sheet 2

FIG. 2

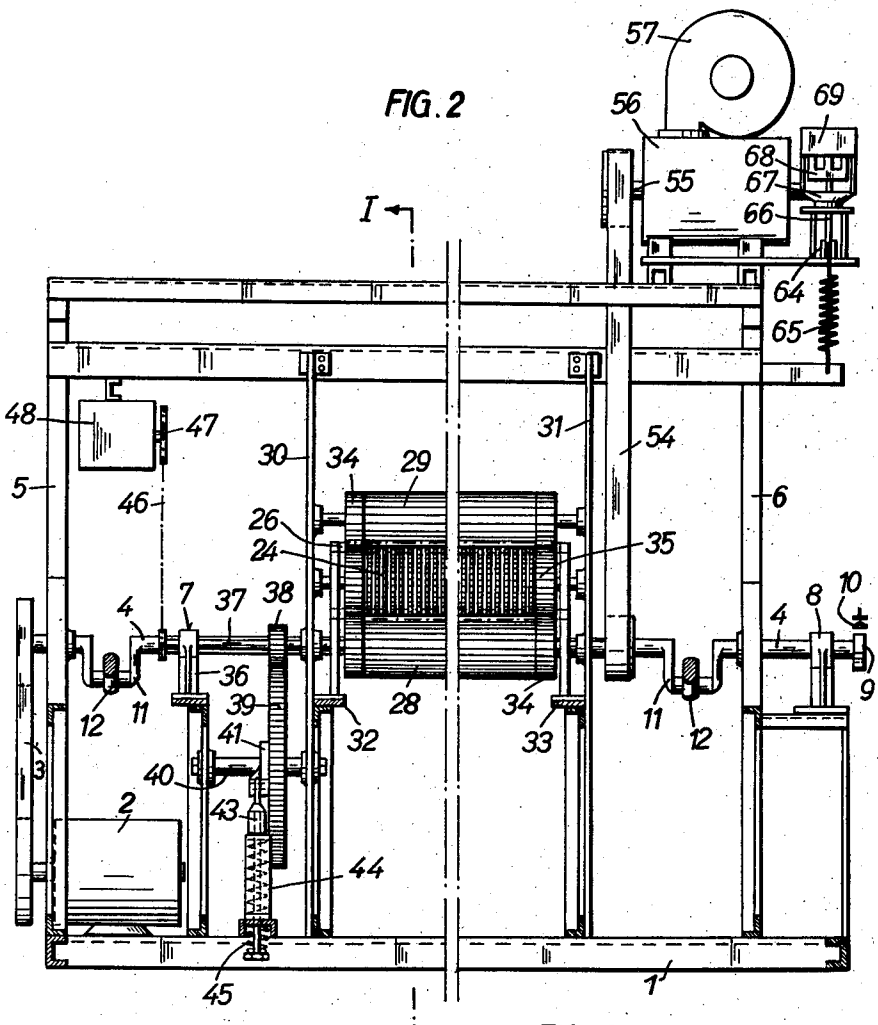
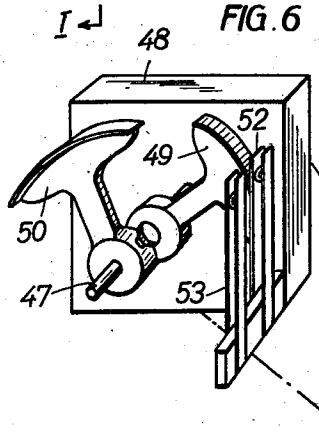


FIG. 6



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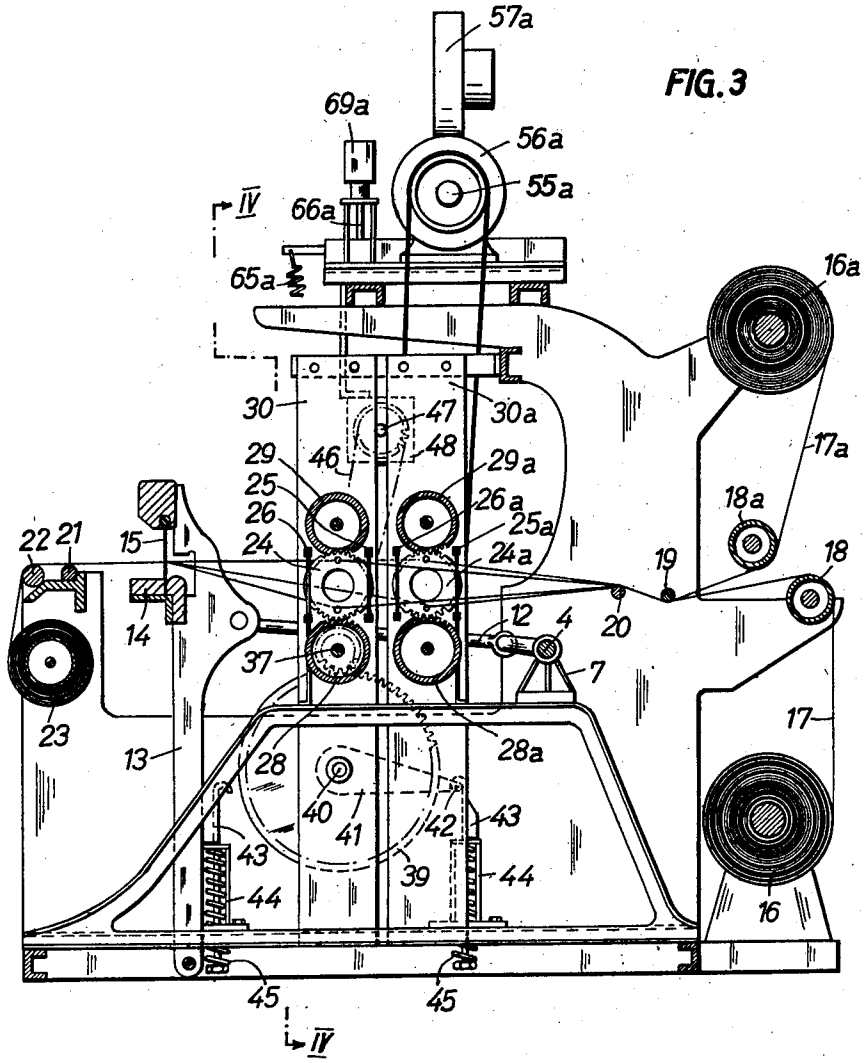
LENO-WEAVE LOOM

Filed March 20, 1951 5 Sheets-Sheet 3

FIG. 3



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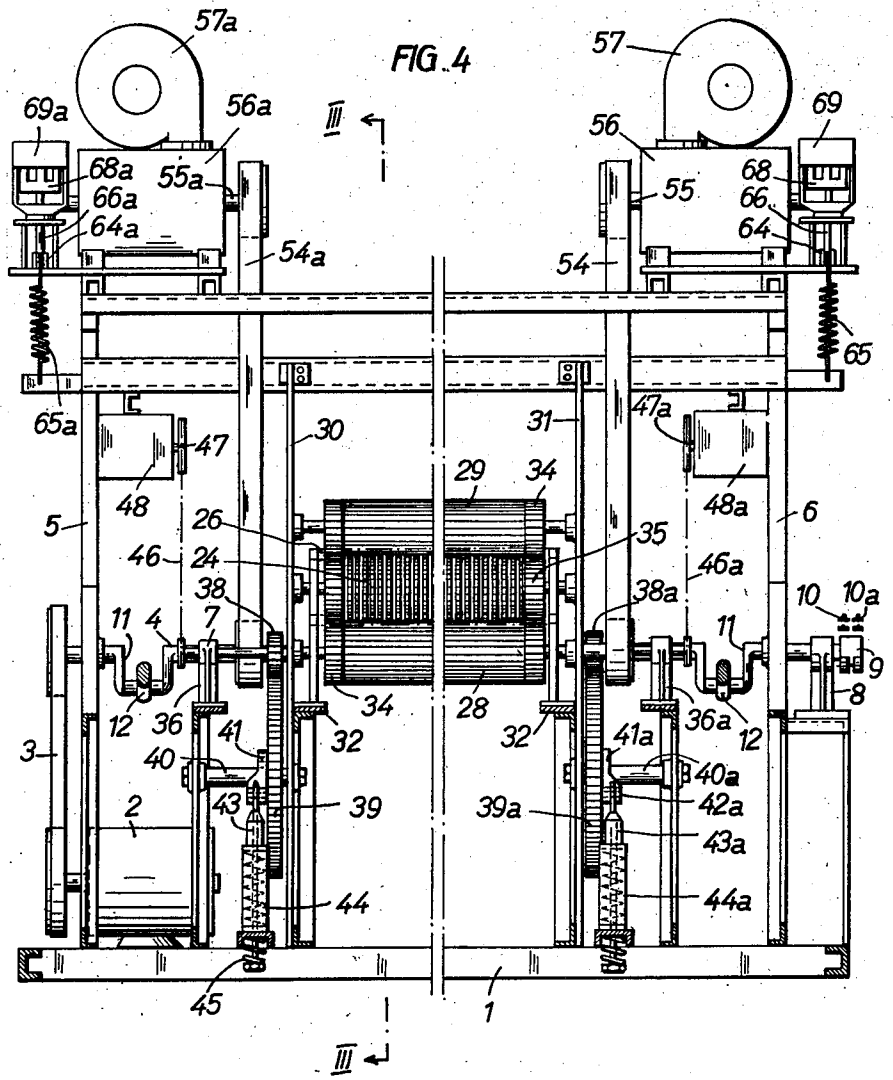
May 26, 1953 J. BAMERT 2,639,733

LENO-WEAVE LOOM

Filed March 20, 1951 5 Sheets-Sheet 4

FIG. 4



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May 26, 1953 J. BAMERT 2,639,733

LENO-WEAVE LOOM

Filed March 20, 1951 5 Sheets-Sheet 5

FIG. 7

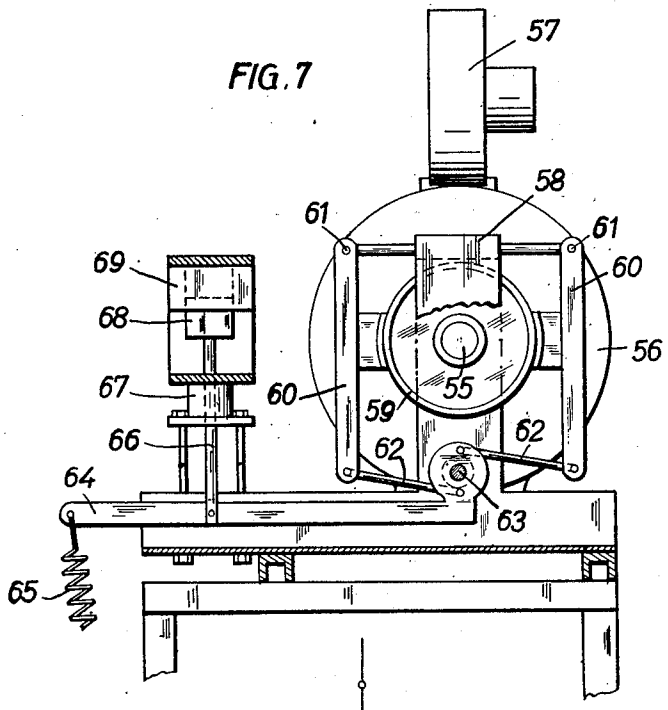
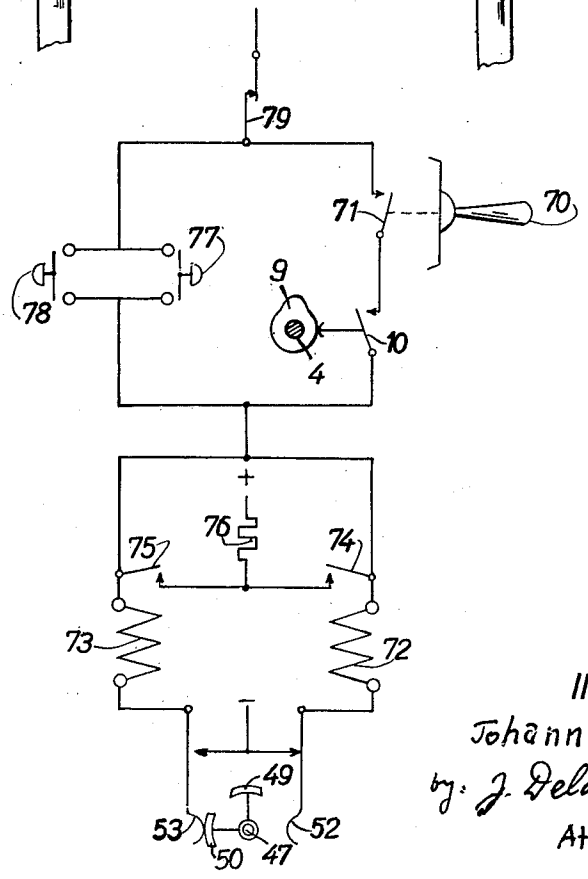


FIG. 8



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Patented May 26, 1953

2,639,733

UNITED STATES PATENT OFFICE

2,639,733

LENO-WEAVE LOOM

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Application March 20, 1951, Serial No. 216,490
In Switzerland June 3, 1950

11 Claims. (Cl. 139—50)

1

My invention relates to a loom for weaving leno cloth with the aid of thread guiding elements which comprise openings for the passage of warp threads which have to be intercrossed, which elements are oscillatable through a gear drive to produce the leno weave, the weft threads being picked when the said elements are in their terminal positions.

In accordance with my present invention, a reversible motor imparts an oscillatory movement to the gear drive of the said elements and is controlled from the loom mechanism. The said motor is adapted to be subjected to the action of a self-acting brake, when at the same time at least one stop means associated with said drive enters into action.

The device, object of my invention, makes it possible to control within accurate limits the oscillations of the thread guiding elements, thus affording an accurate crossing operation on one hand and a high drive speed and a high loom output on the other hand. No difficulties are involved in providing means for varying the angle of swing of the said elements for the purpose of changing the crossing operation.

The thread guiding elements are preferably constituted by toothed discs which mesh with toothed rollers. Such discs require comparatively little space and may be guided laterally. A plurality of parallel rows of such discs with individual drives may be arranged on the loom thus increasing the range of possible patterns.

Two forms of the loom according to my present invention are shown in the accompanying drawing, in which one comprises one row, and the other comprises two parallel rows of thread guiding discs.

Fig. 1 shows a side elevation of a loom comprising a single row of thread guiding discs, in section on the line I—I in Fig. 2,

Fig. 2 shows a front elevation in section on the line II—II of Fig. 1,

Fig. 3 shows a loom comprising two rows of thread guiding discs in side elevation and in section on the line III—III of Fig. 4,

Fig. 4 shows a front elevation in section on the line IV—IV of Fig. 3,

Fig. 5 shows the stop means in side elevation and part section and in the other terminal position of a pivotable stop arm than in Figs. 1 and 3,

Fig. 6 is a perspective view, in a larger scale, of the operating parts of a terminal switch,

Fig. 7 is an end view, in part section and larger scale of an electromagnetic brake mounted on the reversible motor, and

2

Fig. 8 depicts a wiring diagram.

In the first example (Figs. 1, 2) a motor 2 is mounted on the foot 1 of the loom frame and drives the loom crankshaft 4 via a belt drive 3 and a clutch (not shown). The crankshaft 4 is mounted in the two frame side-shields 5, 6 and also in two bearing blocks 7 and 8. In Fig. 2, the right-hand end of crankshaft 4 carries a cam 9 for biasing the contact arm 10 to produce a current pulse. The slay 13 with shuttle track 14 and reed 15 is reciprocated, in known manner, from the two cranks 11 of shaft 4 via the links 12. The warp threads 17 pass from the warp beam 16 via a guide roller 18 and two guide rods 19, 20 to the reed 15. The cloth passes to the cloth beam 23 via a guide rod 21 and a guide roller 22.

The warp threads 17 intermediate of rod 20 and reed 15, pass through rotary guide discs 24 of which each comprises two diametrically opposite circular holes for receiving a warp thread 17 each, as shown in Figs. 1 and 2. Two diamerticallly opposite zones of each thread guiding disc 24, are disposed in the gap between two reeds 25 and 26, which form left-hand and right-hand guide stops for the discs 24. Each of the two warp threads 17 of the individual discs 24 within range of the reeds 25, 26 passes through a gap between the latter. The discs 24—which in operation are oscillated for the purpose of forming the desired leno wave—are shown in their inoperative position in Fig. 1, in which their two cross-holes are vertically superposed and spaced from each other in accordance with the desired width of the shed formed by the threads 17. When the discs 24 perform one complete revolution, starting from the terminal position shown, their two warp threads 17 are inter-crossed so as to produce a so-called "half cross gauze." After picking the weft thread, the discs 24 are turned back, thus abolishing the warp linkage on the free stretch of the warp threads. The operation described then is repeated as required. When the guide discs 24 perform 1½ revolutions, so-called "full cross gauzes" are produced.

The discs 24 through a rim gear 27 mesh with two toothed rollers 28, 29 which are disposed in two frame portions 30, 31 in parallel superjacent relation. The reeds 25, 26 also are mounted on the frame portions 30, 31. The rollers 28, 29 at both ends carry a driving gear wheel 34 which is engaged by an intermediate wheel 35, whereby the two rollers 28, 29 are positively coupled for rotation.

As shown in Fig. 2, the shaft 37 of the bottom

roller 28 is extended to the left beyond a bearing block 36 disposed at 7, and has a pinion 38 affixed to it, which pinion meshes with a gear wheel 39 of which the shaft 40 is mounted on the loom frame. The shaft 40 carries an arm 41 which by means of a screw is affixed to the gear wheel 39. The arm 41 at its free end has as shown in Figs. 1, 2, 3 and 5 a lateral stop 42 for alternating co-action with two opposite counterstops 43 of which each is guided vertically movable in a framelike bearing 44. Each counterstop 43 is engaged by a tension spring 45 which tends to hold the stop in its inoperative position, in which it is seated through a thickened portion on the yoke of its bearing 44. The two bearings 44 are detachably secured in any known way, such as by toggle screws, to the foot 1 of the loom frame. The parts 39 and 41–45 together form a mechanical stop means for the rollers 28 and 29 by alternate coaction of stop 42 of stop-arm 41 with the hook of each of the counter-stops 43 against the tension of springs 45, as a result of the oscillation of gear wheel 39, depending upon the direction of rotation of roller shaft 37, as explained hereafter.

In Fig. 2 the left-hand of the roller shaft 37 through a chain drive 46 is positively connected for rotation to the shaft 47 of a terminal switch disposed in a box 48. On the driving shaft 47 are mounted two switch arms 49 and 50 (Figs. 6 and 8) each of which may be adjusted by means of set screws or otherwise, in any well-known manner, in an angular position on shaft 47. The two switch arms 49, 50 are capable of biasing a contact arm 52 and 53 respectively.

In Fig. 2 the right-hand end-portion of roller shaft 37 through a belt drive 54 is operatively connected to the shaft 55 of a reversible motor 56 which is mounted on the loom frame and provided with a fan 57. The latter serves for blowing cooling air through the motor housing when the loom is in operation. The spent cooling air is conducted to an electromagnetically actuated brake 58 (Fig. 7) associated with motor 56. The brake 58 comprises a brake disc 59 affixed to motor shaft 55. Two brake rods 60 pivoted on pins 61 coact with said disc 59, and each of said rods through a link 62 is coupled to an arm 64 which is mounted on an axle pin 63 and biased by a tension spring 65. A rod 66 is pivoted to the arm 64 and passes through a stationary guide means 67 and carries the core 68 which is associated with a solenoid indicated at 69.

In the circuit diagram (Fig. 8) 70 denotes the starting handle by means of which a switch 71 is actuated in order to engage and disengage the clutch (not shown) disposed between the belt drive 3 and the crank-shaft 4 in order to start and stop the loom. When the switch 71 is closed, the control of the reversible motor 56 is prepared. The contact arm 10 is periodically actuated through the cam 9 disposed on crankshaft 4, i. e. at each revolution of the shaft. The two relays 72, 73 thus respond alternatingly, being energized through the rotating switch arms 49, 50 and the contact arms 52, 53 respectively, of the terminal switch. Thereby holding contacts 74 and 75 respectively are closed, whereupon the respective relay after eliminating the current impulse produced via the contact arm 10, is held in its position via the holding resistance 76 until the holding circuit is deenergized via the terminal switch (48) and so on. Owing to such alternating actuation of the two relays, the reversible motor 56 is periodically switched over as required. By virtue of the corresponding periodical excitation of the solenoid 69 which is connected (in a manner not shown) to the electric lead system, the core 68 is attracted or raised, whereby the arm 64 (against the action of its tension spring 65) is rocked and the two brake rods 60 are rendered inoperative via the links 62 so that the shaft 55 of the reversible motor 56 is tripped for rotation. The brake rods 60 normally are disengaged only when the motor is operating. In order that the reversing cylinder (not shown) may be manually rotated, the brake rods 60 are manually tripped and locked by self-acting means, a safety contact 79 being opened in order to prevent a control of the realys 72 and 73.

Two push buttons 77, 78 disposed at different points on the loom, permit to energize the two relays 72, 73 when the loom is out of operation.

The lower roller 28 is driven from motor 56 via the belt drive 54 which admits slippage, whereby the said roller is oscillated, and such oscillating movement is positively transmitted via the intermediary wheels 35 onto the upper roller 29. The guide discs 24 disposed between the two rollers 28, 29 thus are oscillated (in a suitable gear ratio) about their axis for the purpose of producing the leno weave. The gear wheel 39 thus is coercively oscillated from the shaft 37 of the lower roller 28 via the pinion 38. In the final phases of the oscillations of gear wheel 39, the abutment 42 of the arm 41 which follows such oscillations, alternatingly hits the spring-loaded counterstops 43 so as to elastically dampen the oscillations of wheel 39 and of the two rollers 28, 29. Accordingly, the braking action of the two rods 60 on the brake disc 59 of motor 56 is aided, thus uniformly maintaining the angle of swing of the guide discs 24.

The warp threads may be drawn into the guide discs 24, since the cylinder of the reversible motor 56 is manually rotatable. By actuating the push buttons 77 and 78, the rollers 28, 29 may be turned back from the motor 56 to permit of working backwards, or opening the leno weave for the purpose of locating the point of thread failure.

When the said angle of swing has to be changed, the gear wheel 39 which carries along the abutment arm 41, has to be exchanged for a gear wheel having another diameter, if required also the pinion 38. For such purpose, the axle pin 40 of the wheel 39 is detachably disposed in vertical slots of the two frame portions (Fig. 2) which carry the axle 40. Furthermore, the counterstops 43 and their bearings have to be replaced by suitable counterstops having corresponding bearings, and the switch arms 49 and 50 of the terminal switch have to be reset with respect to their angular position on their shaft 47.

The stop arm 41 of the stop means may be made adjustable on its drive wheel 39 with respect to its angular position on the wheel axle 40. If desired, the stop 42 may be connected directly to the drive wheel 39 by such known means as a bolt and nut assembly, the bolt being housed in a boring through wheel 39, and arm 41 being eliminated; the stop 42 may then be adjustable with respect to the angle of rotation of wheel 39 by providing on said wheel a plurality of borings or a slot. In place of two stop means, only one such means could be provided for the rollers 28, 29 and the row of guide discs.

The second form of invention shown in Figs. 3 and 4 differs from the first form in that two rows of guide discs **24**, **24***a* are provided, a separate pair of rollers **28***a*, **29***a* and all accessories being provided for operating the second row of discs, just as for the pair of rollers **28**, **29**. The accessory parts are designated by the same numerals as in the first form of invention, but supplemented by the suffix *a*.

Warp threads **17***a* are supplied from an upper warp beam **16***a* to the additional row of discs **24***a* which, as shown in Fig. 3, are put in front of the discs **24**. The second row of discs **24***a* is driven from a reversible motor **56***a* via a belt drive **54***a*, to which motor is associated an electromagnetic brake **69***a* as well as a terminal switch **48***a*. The second row of discs **24***a* with accessories forms an aggregate per se to which the current impulse also is transmitted via the cam **9** (Fig. 4) provided on the crankshaft **4**. The cam **9** comprises two control arms, i. e. one for the contact arm **10** which is associated with the drive for the pair of rollers **28**, and **29**, and the other for the contact arm **10***a* pertaining to the drive for the pair of rollers **28***a*, **29***a*. The gear wheel **39***a* with stop arm **41***a* serves for limiting the angle of swing of the discs **24***a*, which arm through a lateral stop **42***a* alternatingly coacts with the two counterstops **43***a* which are loaded by tension springs **45***a*. Each row of thread-guiding discs thus is oscillated from a separate gear drive which forms a component of an aggregate provided for each row, which aggregate comprises a reversible motor, a self-acting brake and a stop means.

Each pair of rollers **28**, **29** and **28***a*, **29***a* thus operates per se. The guide discs **24**, **24***a* may have the same angle of swing or different angles of swing inter se, in accordance with the desired leno weave. Again, the pairs of rollers **28**, **29** and **28***a*, **29***a* may swing in one and the same direction or in opposite direction. The construction may be such that one pair of rollers is at standstill, whilst the other is rotated so as to give origin to an alternating rotation of the guide discs of both rows.

What I claim and desire to secure by Letters Patent is:

1. In a leno-weave loom operating by means of thread-guiding elements apertured for the passage of warp threads to be interconnected, the said elements being oscillated through a gear drive for the purpose of producing the leno weave, the weft thread being picked in the terminal positions of said elements, a reversible motor for oscillating the gear drive of said elements, means for controlling the motor from the loom mechanism, a self-acting brake associated with the motor, and at least one stop means associated with the gear drive and adapted to become effective together with the said brake.

2. A leno-weave loom as set forth in claim 1, in which said brake is electromagnetically actuated, and the reversible motor is provided with a fan for the purpose of blowing cooling-air through the casing, which air subsequently is conducted to said brake.

3. A leno-weave loom as set out in claim 1, in which the said stop means comprises a stop which is positively moved by said gear drive and is adapted to alternatingly coact with spring-loaded counterstops in the terminal phases of the oscillations of said drive.

4. A leno-weave loom, as set out in claim 3, in which said elements are peripherally toothed, and in which the reversible motor through a belt drive transmits motion to two peripherally toothed rollers which are in meshing engagement with a row of said elements, the latter being disposed between the two rollers, and the said rollers transmitting motion to the stop which coacts with said counterstops.

5. A leno-weave loom as set forth in claim 3, in which for the purpose of changing the angle of swing of the thread-guiding elements, two switch arms of a terminal switch associated with the reversible motor are adjustably mounted on their shaft with respect to their angular position, the said shaft being positively actuated by the loom mechanism, and in which at least the counterstops of the stop means are removably mounted on said loom, whereby different sets of said counterstops can be interchanged.

6. A leno-weave loom as set out in claim 5, in which said terminal switch has a contact arm which is periodically actuated by said switch arms, for the purpose of producing a current pulse, and a relay adapted to respond when closed across the terminal switch in order to energize a holding contact provided for said relay.

7. A leno-weave loom as set out in claim 5, in which the positively moved stop of said stop means is removably associated with said gear drive.

8. A leno-weave loom as claimed in claim 7, in which said stop comprises a gear-wheel meshing with said gear drive and an abutment arm connected to said gear-wheel and adapted to engage said counterstops, said gear-wheel being adapted to transmit motion from said gear-drive to said arm, and being removably mounted on its shaft, whereby different gear wheels can be interchanged.

9. A leno-weave loom as set out in claim 1, comprising two rows of thread-guiding elements, each row being oscillated through a separate gear drive which forms a component of an aggregate provided for each row, the said aggregate including a reversible motor, a self-acting brake and a stop means.

10. A leno-weave loom as claimed in claim 9, in which said elements are peripherally toothed, and in which, in each of said aggregates, the reversible motor transmits through a belt drive the driving motion for two peripherally toothed rollers, a row of said elements being disposed between and geared with said two rollers, said rollers transmitting motion to the associated stop-means which coacts with counterstops.

11. A leno-weave loom as set out in claim 10, in which the warp threads are conducted from an associated warp beam to each row of thread-guiding elements.

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