

Sept. 7, 1948.

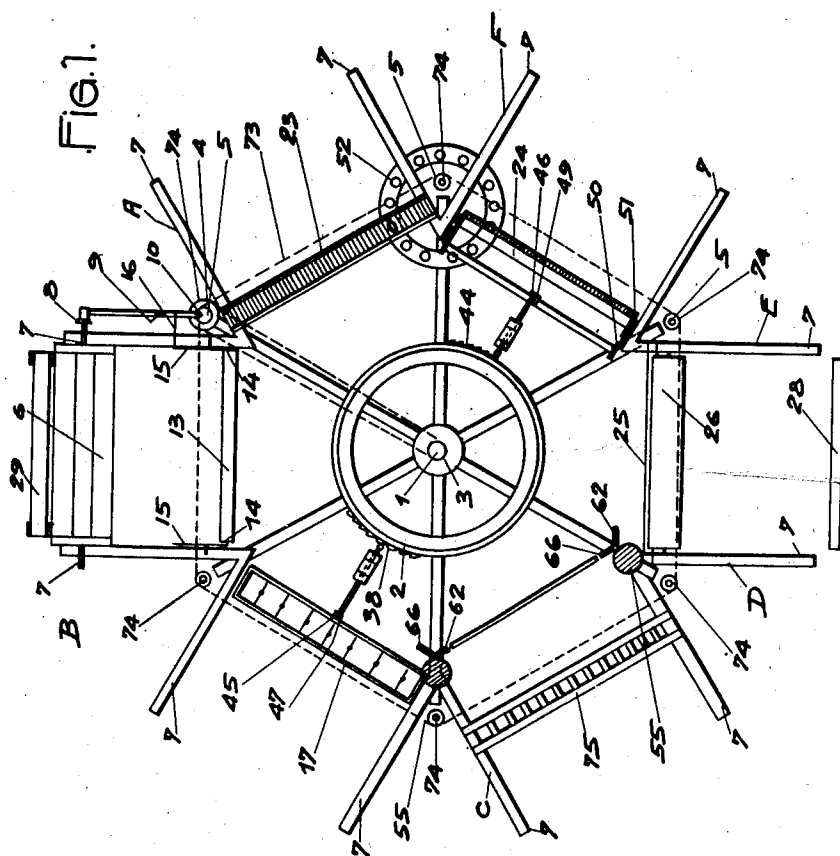
P. G. E. A. VANLAER

2,448,935

SECTIONAL WEAVING LOOM

Filed Dec. 13, 1946

6 Sheets-Sheet 1



Inventor
Pierre G. E. A. Vanlaer
by Wilkinson & Mawhinney
Attorneys

Sept. 7, 1948.

P. G. E. A. VANLAER

2,448,935

SECTIONAL WEAVING LOOM

Filed Dec. 13, 1946

6 Sheets-Sheet 2

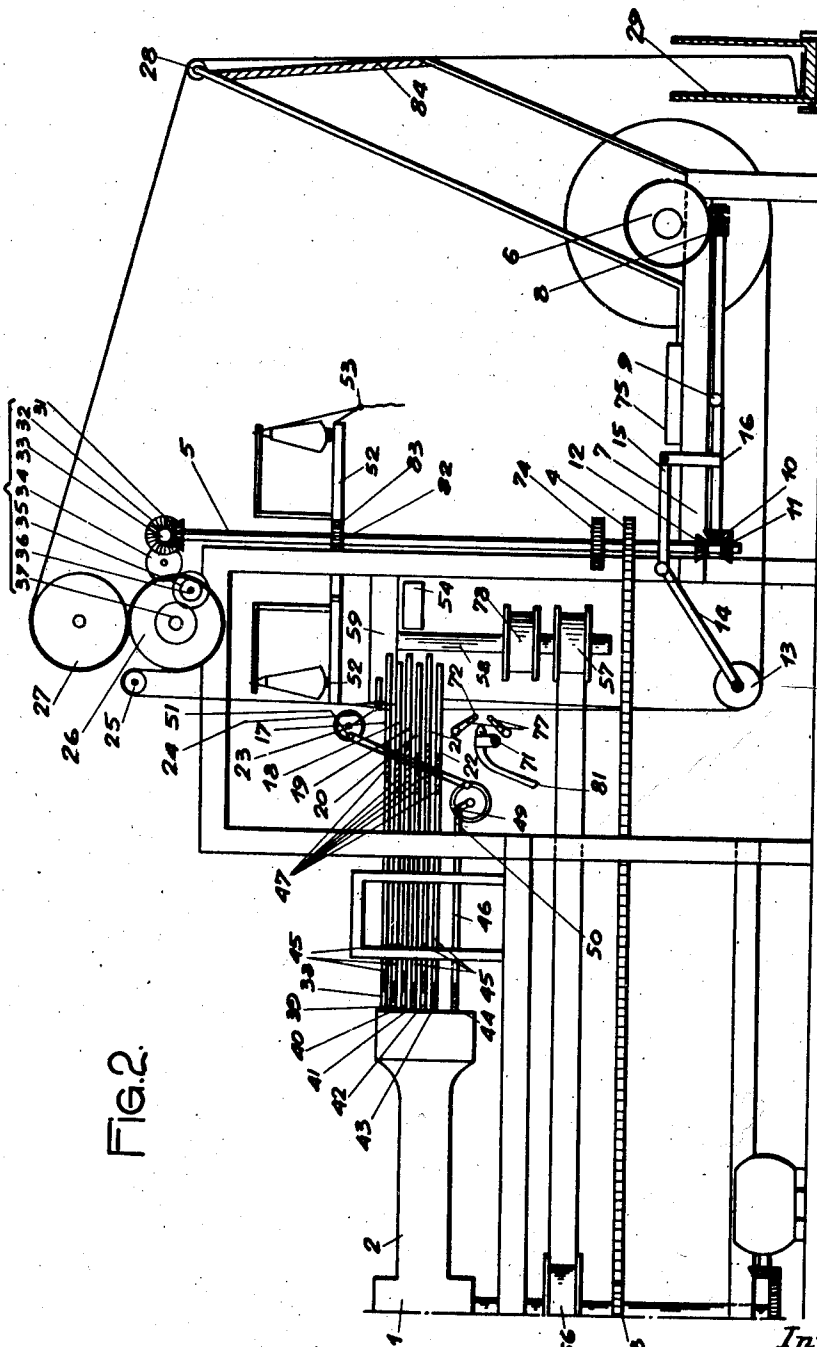


FIG. 2.

Inventor
Pierre G. E. A. Vanlaer
by Wilkinson & Mawhinney
Attorneys

Sept. 7, 1948.

P. G. E. A. VANLAER
SECTIONAL WEAVING LOOM

2,448,935

Filed Dec. 13, 1946

6 Sheets-Sheet 3

FIG. 3.

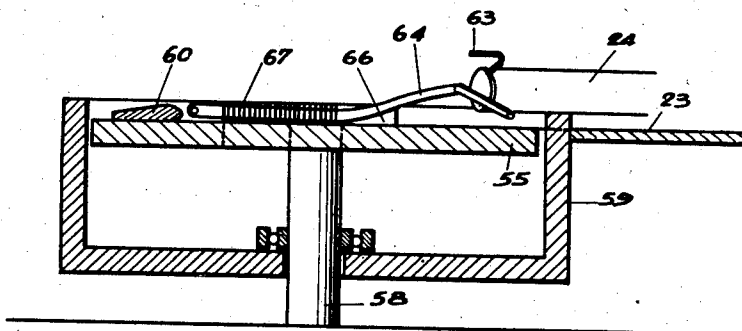
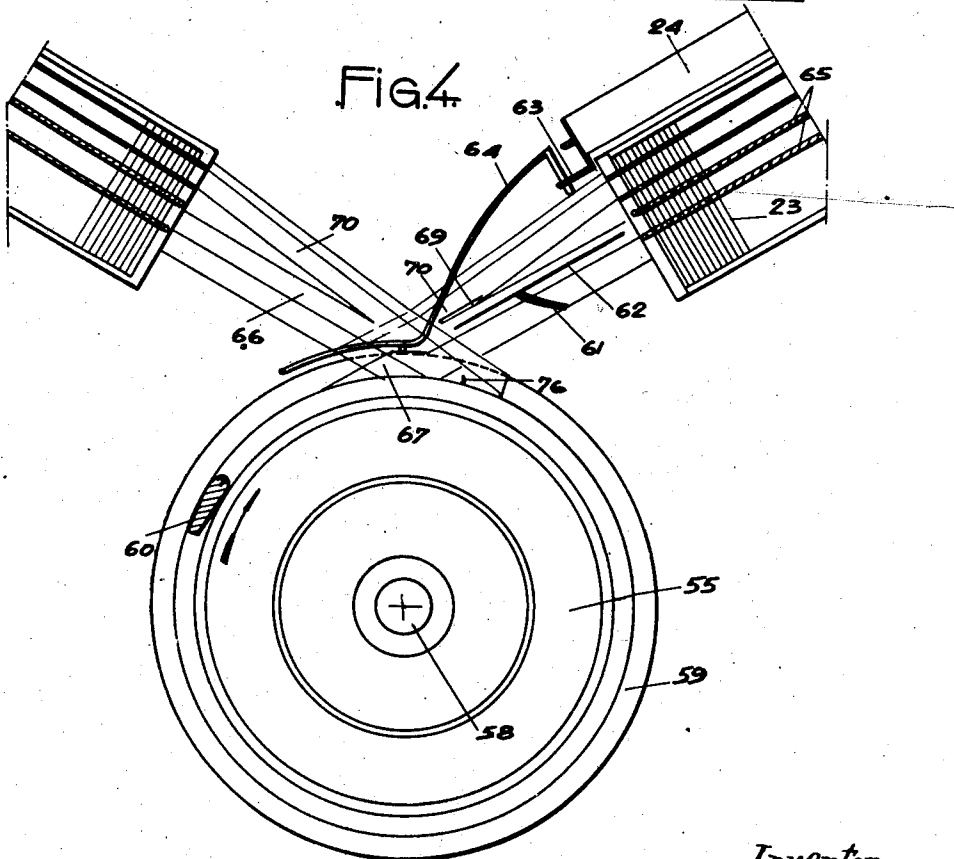


FIG. 4.



Inventor
Pierre G. E. A. Vanlaer
by Wilkinson & Mawhinney
Attorneys

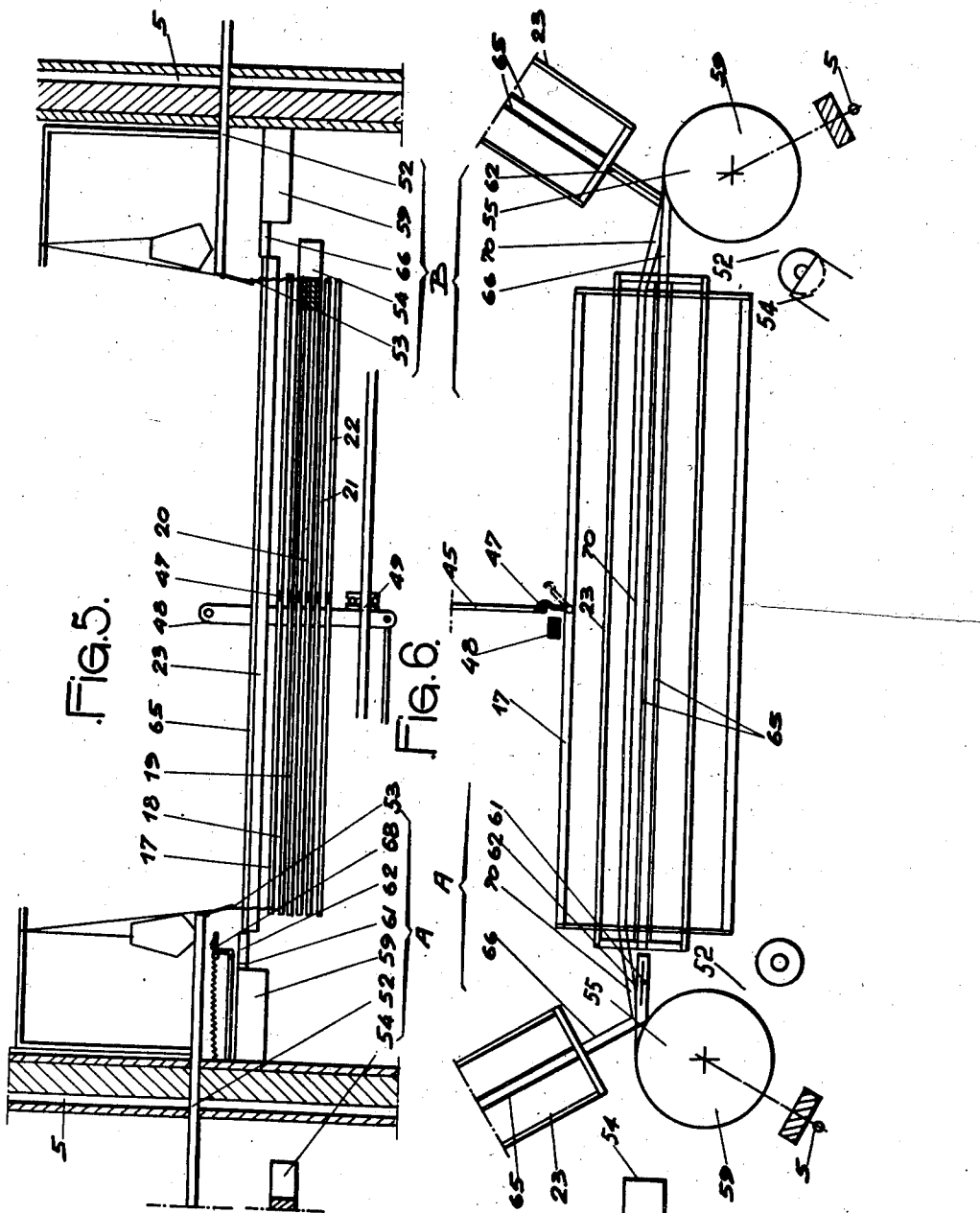
Sept. 7, 1948.

P. G. E. A. VANLAER
SECTIONAL WEAVING LOOM

2,448,935

Filed Dec. 13, 1946

6 Sheets-Sheet 4



Inventor
Pierre G. E. A. Vanlaer
by Wilkinson & Mawhinney
Attorneys

Sept. 7, 1948.

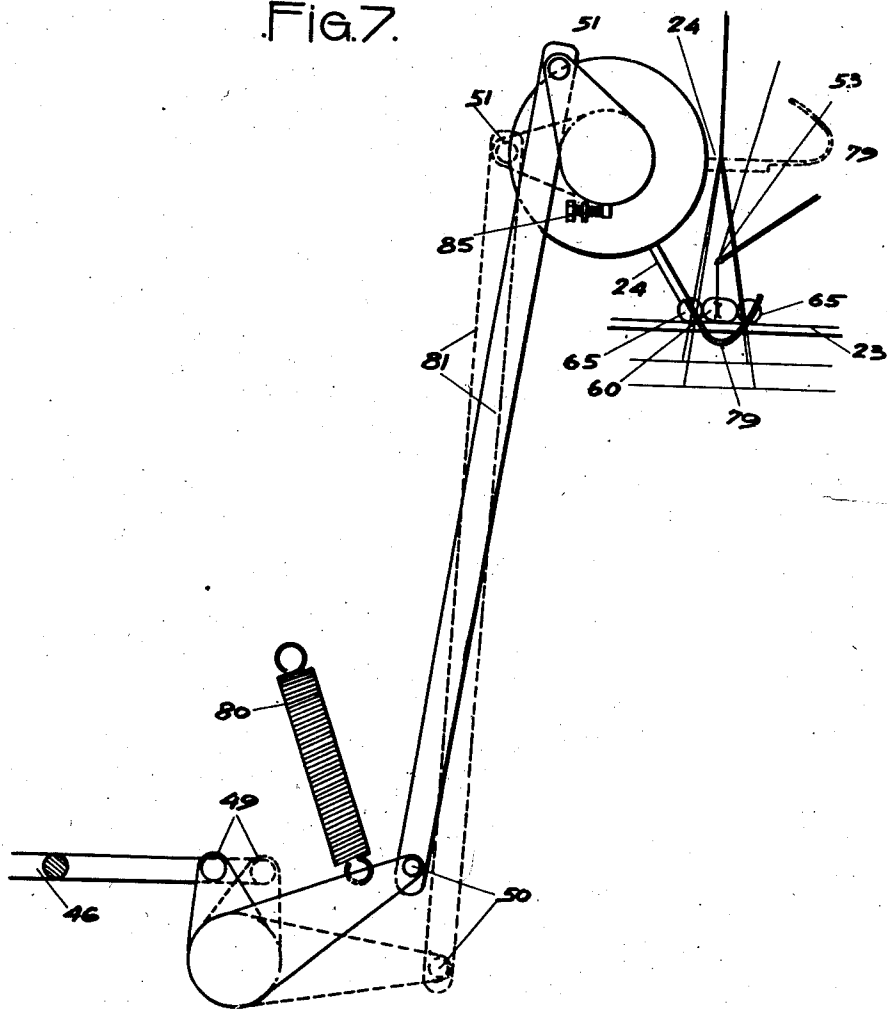
P. G. E. A. VANLAER
SECTIONAL WEAVING LOOM

2,448,935

Filed Dec. 13, 1946

6 Sheets-Sheet 5

Fig. 7.



Inventor
Pierre G. E. A. Vanlaer
by Wilkinson & Mawhinney
Attorneys

Sept. 7, 1948.

P. G. E. A. VANLAER
SECTIONAL WEAVING LOOM

2,448,935

Filed Dec. 13, 1946

6 Sheets-Sheet 6

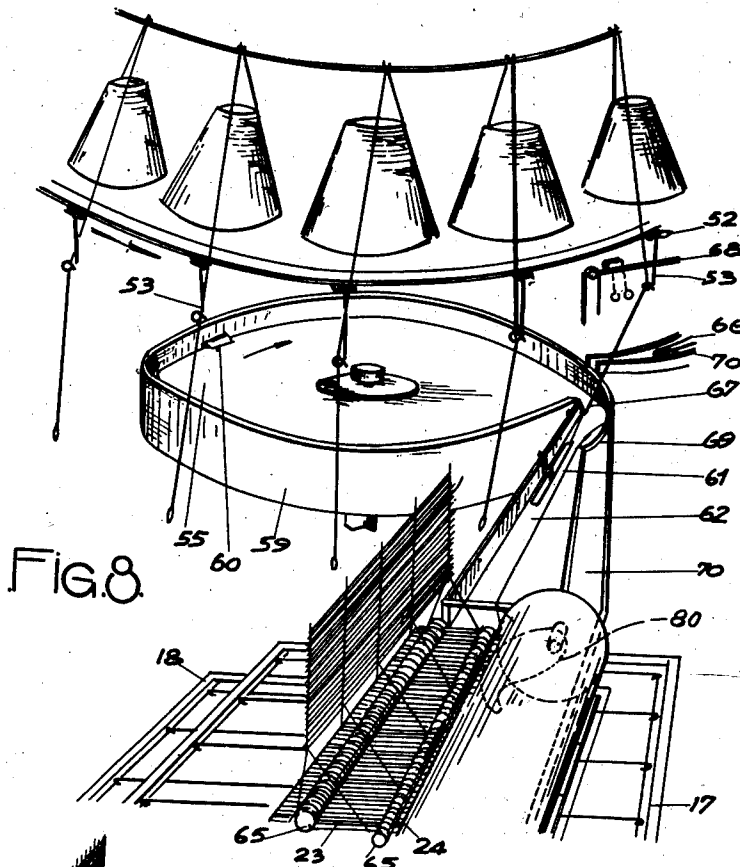


FIG. 8.

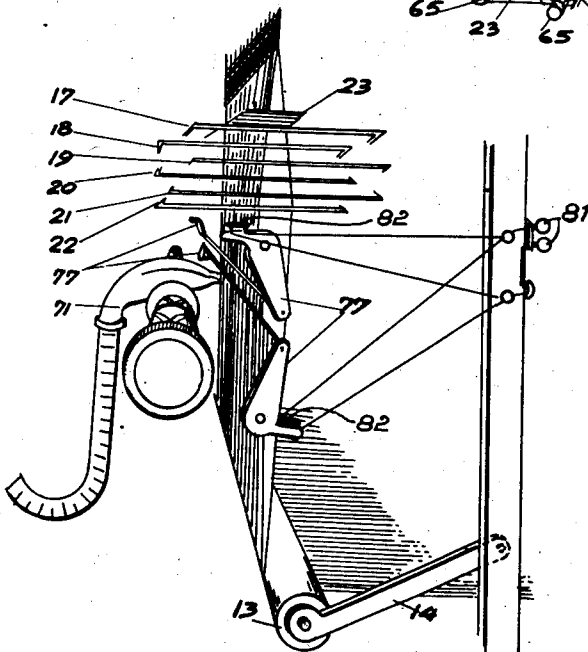


FIG. 9.

INVENTOR
PIERRE G. E. A. VANLAER
BY *Wilkinson & Maurer*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,448,935

SECTIONAL WEAVING LOOM

Pierre Georges Emile Auguste Vanlaer, Le Cannet-Rocheville, Alpes-Maritimes, France

Application December 13, 1946, Serial No. 716,053
In France October 15, 1946

9 Claims. (Cl. 139—18)

1

This invention relates to a weaving loom for the simultaneous and independent weaving of several vertical warps disposed tangentially to a central rotor driven by a vertical shaft, the shifting of the warp yarns being operated by means of rows of cams set on the rotor, the weft yarns being conveyed, pick by pick, between the warp yarns by travellers shot through the shed by the centrifugal effect of horizontal impeller plates revolving at high speed.

Some circular looms are known to weave one or several warps disposed concentrically to a central driving shaft. These looms require weft carriers large enough to contain a sufficient amount of weft yarn to ensure a fairly long non-stop operation of the loom, the size of these carriers involving a wide opening of the shed through which they are driven by complicated controls. The number of weft carriers to be run simultaneously and consequently the number of differently coloured weft yarns available for a given pattern is limited by the size of the loom, the same pattern being repeated all the way around the loom. The changing of the empty carriers or their refilling, besides being a cause of wastage, as it is practically impossible that all the weft yarns end simultaneously, compels the operator to stop the loom while the weft yarns are being replaced.

Some straight weaving looms are known to convey the weft yarns through a horizontally disposed warp, by means of missiles shot through the shed by compressed gas. Besides the difficulty of synchronizing the shooting of the missiles with the mechanical operation of the other parts of the loom, a protecting device is needed to avoid contact between the missile and the warp yarns, thus hampering the accessibility of the latter by the operator. Another device is required to bring the spent missiles back to their starting point.

On some looms, two reeds or combs are set side by side, viz: a fixed reed to keep the warp yarns in place and separated from one another, and an oscillating reed having a semi-circular motion, beating the weft thread into the fell of the cloth. In this case, transfer fingers are necessary to carry the weft thread from the lay to the angle of the shed.

The sectional loom with centrifugal weft drive to which this invention relates only requires a narrow opening of the shed, produced by a slight lateral shifting of the warp yarns, sufficient to give a clear passage to the small traveller of narrow beam. Each traveller conveying one weft

2

thread, the number of weft threads that can be conveyed in succession and pick by pick through the shed, is only limited by the carrying capacity of a cone-tray feeding the weft to each section of the loom, thus enabling the weaving of a different pattern on each of the warps to be effected, each pattern depending on the number of cones available and on their array on the cone-tray.

Changing of exhausted cones on the cone-tray is done without stopping the loom and the whole tray may be easily removed and replaced by a full one owing to its detachable parts.

The traveller's impeller plates being driven by the central shaft, synchronization between the centrifugal shooting of the traveller and the motion of the other parts of the loom, driven by the same shaft, is easily attained.

The warp yarns are protected from any contact with the traveller, although remaining easily accessible to the operator, by two parallel tension guide springs into the open coils of which they penetrate when laterally shifted to open the shed.

The travellers crossing all the sections of the loom in succession have a continuous course and consequently do not have to be brought back to their starting point by any special device.

The oscillating reed or beater is placed above the fixed reed instead of side by side therewith and lifts the weft thread to the fell of the cloth by means of flexible rods which it carries (as further explained) thus obviating the need of transfer fingers.

The vertical position of the warp yarns allows their tension to be constantly regulated by a simple device which also controls the let-off motion by positive driving of the warp beam and its reverse motion to take up any slack in the warp yarns (in the case of unpicking for instance).

The take-in motion drums, instead of rolling up the cloth, deliver it to movable containers, disposed around the loom, over a luminous inspection board.

This is a time-saving idea as the loom section does not have to be stopped for unrolling the cloth from the drum and the cloth can be inspected as it is delivered and any faulty part marked out.

Each loom section operates the weaving of each separate tangential warp and can be independently unclutched for any reason, such as a break of a warp or weft yarn, without interfering with the operation of the other loom sections, thus, if necessary, enabling the simultaneous weaving

3

of pieces of cloth of different lengths to be carried out.

The sectional loom with centrifugal weft drive is operated by a small number of parts most of which have continuous motions; the few parts with reciprocating motion are driven by small and progressive cams, thus avoiding excessive vibration and noise. The working of the loom is consequently smooth and its framework is simpler, lighter and cheaper than that of the usual looms. It can be made of fabricated steel instead of castings, thus saving metal and reducing expenses of transport.

Other interesting features of the sectional weaving loom with centrifugal drive will appear in the course of its detailed description hereafter. The accompanying drawings illustrate the invention:

Fig. 1 is a plan view of a sectional weaving loom with centrifugal weft drive consisting of six weaving sections. In order that the drawing may be clearly understood, only a few parts common to all sections have been shown in each section.

Fig. 2 is a sectional view of half of the same loom between the central shaft and the outer movable container.

Fig. 3 is a sectional view of an impeller casing.

Fig. 4 is a plan view of an impeller casing and of its runways.

Fig. 5 is a sectional diagram of a weaving section between frames A and B.

Fig. 6 is a plan view of the same weaving section.

Fig. 7 is a diagram showing the operating parts of the beater reed.

Figure 8 is a perspective view of the impeller casing.

Figure 9 is a perspective view of the electro-pneumatic warp-stop motion device.

The sectional weaving loom with centrifugal weft drive shown in Fig. 1 is made of six triangular frames A, B, C, D, E, F, the interval between each two frames constituting a weaving section.

The loom may have as many frames and sections as required, depending on the number and the width of the separate pieces of cloth that are to be simultaneously woven.

The frames are radially assembled by cross bars which carry at their intersecting point the bearings of a vertical shaft 1 driving a rotor 2.

A cog wheel 3 on shaft 1 drives through a chain the cog wheel 4 on the vertical shaft 5 of frame A which, by means of a circular chain 73 and of cog wheels 74 drives the various shafts 5 corresponding to each of them (Figs. 1 and 2).

All loom sections being alike the operation of section AB between frames A and B alone shall be described.

The warp beam 6 is carried on extensions 7 of frames A and B. It is driven by a worm 8 and a ball-jointed shaft 9 carrying a conical gear 10 which may, through a slight vertical shifting of shaft 9 allowed by the ball-joint, mesh either with a conical gear 11 or a conical gear 12 set opposite one another on the vertical shaft 5 (Fig. 2).

The warp yarns coming from warp beam 6 are stretched under the tension roll 13 carried by swinging arms 14 counterbalanced by lever arms 15 adjustable by means of sliding weights.

Excessive tension of the warp yarns lifts the roll 13 and depresses the lever arm 15 which, through the cross piece 16, lowers the ball-jointed shaft 9, thus causing gears 10 and 11 to mesh

4

and operating, through the shaft 9 and the worm 8, the let off motion of the warp beam.

Slack in the warp yarns is taken up in the reverse way, the weight of the roll 13 bringing it down and the arm 15 up, lifting the ball-jointed shaft 9, causing gears 10 and 12 to mesh and operating the take in motion of the warp beam.

A removable foot bridge 75 crosses the warp yarns and enables the operator to reach any of them as well as any point of the loom section (Figs. 1 and 2).

After the tension roll 13, the warp yarns move upwards through the eyelets of heddles carried by heddle frames of horizontally sliding harnesses 17, 18, 19, 20, 21 and 22 (Fig. 2).

Only six of these appear on Fig. 2 but their number depends on the pattern of the cloth to be woven. It may differ from one section to the other.

The warp yarns then enter the dents of the fixed reed 23 and the flexible rods 79 of the beater reed 24, which is set above the fixed reed and is shown in its lower position in Fig. 7.

The cloth woven by the interlacing of the warp yarns with the weft thread carried by the traveller 60 (Fig. 7) is pulled upwards by the take up roll 26 over the tension roll 25, under the pressure roll 27 and is carried by its own weight towards the movable container 29 over the guard roll 28 which prevents it from folding down into the warp beam and over the luminous inspection board 84 (Fig. 2).

The take up roll 26 is driven by vertical shaft 5 through gears 31, 32, 33, 34, 35 and 36 belonging to drive head 30, the adjustable combination of these gears giving the required number of picks per inch by regulating the motion of the take up roll in relation with the rotation speed of the rotor (Fig. 2).

The cam rows 38, 39, 40, 41, 42 and 43 set on collar bands around the rotor 2 opposite the harnesses 17, 18, 19, 20, 21 and 22 operate the lateral motion of these harnesses and the consequent shifting of the warp yarns thus producing the opening of the shed, by means of sliding rods 45 equipped with friction rollers and catches which are caught by spring hooks 47 of the harnesses. Contact between the rotor cams and the friction rollers on the sliding rods is ensured by coil springs (Figs. 1, 2, 5 and 6).

The forward motion of a clutch arm 48 un-hooks the harness spring hooks 47 from the catches on the sliding rods, thus releasing the harnesses and enabling their operation to be effected by hand when necessary as in the case of unpicking. When the clutch arm is released, the springs on the harness hooks push them back into contact with the catches on the sliding rods (Figs. 1, 2, 5 and 6).

The motion of beater reed 24 is operated through a row of cams 44 on rotor 2 driving the sliding rod 46 by means of a friction roller kept in contact with the cams by a coil spring on the rod. A semi-circular reciprocating motion is thus conveyed to the beater reed through crank-shafts 49, 50 and 51, the two latter being linked by the connecting rod 81. The beater reed is brought back to its lower position by a spring 80, an adjustable stop 85 regulating this position (Figs. 1, 2 and 7).

The crank-shaft 49 may be slid out of reach from the connecting rod 46 by the lower part of clutch arm 48 thus stopping the beater's motion (Figs. 2 and 7).

The weft yarn wound in cones is carried by

a cone-tray 52 the circular motion of which is operated by shaft 5 and gears 82 and 83 which enable the adjustment of its speed of rotation to be effected according to the number of cones available on the tray. This tray is built in two detachable parts so that it may be easily removed from the frame (Figs. 1, 2, 5 and 6).

The eyelet 53, carried by the cone-tray on a spring arm, holds the loose end of a weft thread, fed from one of the cones on cone-tray 52, opposite the exit of the impeller casing 59 where it is caught in the slot 61 of the exit runway 62 (Fig. 4). The loose end of the weft thread has been previously dipped in a trough 54 containing melted wax of any other suitable thermoplastic or soluble quick-coagulating material (Figs. 2, 5 and 6).

The traveller 60 on the impeller plate 55 driven by shaft 1 through pulleys 56 and 57 and the shaft 58, gathers speed in the impeller casing 59 until the arm 63 of the beater reed 24, on its way down, lowers the trap door 67 in the impeller casing by means of a trigger 64 (Figs. 2, 3 and 4).

The pulley 78 on shaft 58 drives the impeller plates of the other sections through a circular belt.

The centrifugal effect produced by the high speed of rotation of the impeller plate drives the liberated traveller on to the exist runway 62 and over slot 61 where the weft thread caught in the slot slips into a notch on the traveller's nose where it is held fast by the coagulated material which it has previously gathered. This notch is gauged according to the diameter of the weft yarn used (Figs. 4 and 7). From then on, the traveller pulls along the weft thread which unwinds from the cone, the spring arm of the eyelet 53 being jerked upwards and compensating for part of the strain applied to the thread.

The traveller coming out of exit runway 62 reaches the surface of the fixed reed 23 across which two parallel coil tension springs 65 are stretched for the purpose of guiding the course of the traveller through the loom section (Figs. 4, 6 and 7).

The vertical warp yarns have been divided by the lateral motion of the harnesses and have penetrated the open coils of the tension guide springs on each side of the track of the traveller and are thus protected from any contact with it.

The flexible rods 79 of the lowered beater reed are concealed between and slightly below the dents of the fixed reed and laterally between the coils of the tension guide springs, thus ensuring a clear run to the traveller until it reaches the entrance runway 66 of the following impeller casing 59 which takes it to the impeller plate 55 (Figs. 5, 6 and 7).

The weft thread which has been laid by the traveller on the surface of the fixed reed 23 between the parted warp yarns, is picked up by flexible rods 79 of the beater reed 24 on their way up. When the nonflexible dents of the beater reed penetrate into the shed, the weft thread lifted up by the flexible rods and laterally held by the closing warp yarns, slides on to the non flexible dents of the beater which press it into the top angle of the shed and the fell of the cloth (Fig. 7).

Upward motion of the beater reed releases trigger 64 from arm 63 and a spring lifts and closes the trap door 67 of the impeller casing.

A knife 80 (Fig. 8) carried on both ends of the beater reed severs both trailing ends of the inserted pick.

The loose end of the weft yarn which has just been severed floating down from eyelet 23 is conveyed by the circular motion of the cone-tray 52 over the dipping trough 54 where it gathers a small amount of pasty material which coagulates before it is brought again into slot 61.

In the meantime, the rotation of the cone-tray has brought another weft yarn, fed by the next cone through the next eyelet, into slot 61.

This yarn is ready to be caught by the notch in the nose of the next traveller which, coming from the preceding impeller plate 55 through loom section FA and entrance runway 66 of said section is gathering speed on the impeller plate 55 pending the opening of the trap door 67 which will enable the insertion of the next pick to be effected as described hereabove.

The flexible prong 76 in the middle of entrance runway 66 cleans the traveller notch of remnants of coagulated material and thread (Figs. 4, 5 and 6).

Should the weft thread break or the traveller fail to catch it, no upward jerk would be applied to the spring arm supporting the eyelet 53 which would consequently remain in position, the rotation of the cone-tray bringing it into contact with the rocker arm 88 carrying a mercury level electric switch which, by rocking, would switch on an electro-magnet.

This magnet, through appropriate controls, swings the latch 89 locking the exit runway 62 and opening the subsidiary runway 70 enabling the traveller to reach the next impeller plate 55 across section AB but without going through the shed (Figs. 4, 5 and 6).

The same device unclutches, through appropriate controls, the take up roll 26 and the cone-tray 52 by compelling their driving gears to slide on their shafts and it can also be made to operate the clutch arm 48 thus throwing the harnesses and beater out of action.

Weaving on loom section AB is consequently stopped but the other loom sections may keep on working, being provided with travellers using the subsidiary track 70 across loom section AB (Fig. 6).

A break in any warp yarn achieves the same result through an electro-pneumatic warp stop motion which may either stop the weaving on the loom section within which a break has occurred or warn the operator by lighting an alarm bulb 81.

This automatic warp stop motion consists of a suction head 71 sliding to and fro on a double thread shaft across the width of the warp yarns below the harnesses and between two wires stretched on rocker arms 77 carrying mercury level switches 82.

The loose end of any broken warp yarn is sucked in by the suction head and reacts on the wire corresponding to its position in the warp, compelling the arm to rock and switching on through the mercury level switch, either the unclutching electro-magnet or the alarm bulb, or both (Fig. 2).

The ventilator providing the suction may be driven by the loom or by a separate motor.

This automatic electro-pneumatic stop motion, although specially designed for the sectional loom described and claimed, may also be fitted to any other weaving loom.

Besides doing away with drop wires used in warp motions of conventional types, it also cleans the warp yarns of their dust and, by making them vibrate prevents them from adhering to one an-

other. By fitting the suction head with an extension, it may also be used for clearing the various parts of the loom from dust and lint.

Selvages are made by any known device such as the use of heddle reeds carried on some of the harnesses or by inserting the floating ends of the last pick back into the shed.

It is clear from the above description:

(a) That the sectional weaving loom with centrifugal drive to which this invention relates brings a solution to the problem of the automatic pick by pick weaving of fancy fabrics;

(b) That each section operates independently from the others and is a separate loom by itself;

(c) That each pick being fed from a different cone, faults in the yarn are compensated for in the cloth;

(d) That unpicking is easy, the unclutched harnesses sliding freely by hand, the take-up roll once unclutched letting off the faulty cloth and the warp beam automatically taking up any consequent slackness of the warp yarns;

(e) That only the shedding motion remains the same for all loom sections as it depends on the combination of the cam row carried by the rotor (Fig. 2). Changing the shedding motion is obtained by sliding the collar bands on which the cams are set around the rotor. Different patterns may also be obtained with the same shedding motion by using a different combination of harnesses on each section;

(f) That the described sectional loom takes up no more floor space than the number of conventional looms giving the same output.

I claim:

1. A sectional weaving loom with centrifugal weft drive comprising a central rotor, a number of vertical warps, disposed tangentially to said rotor, rows of cams adjustably mounted on said rotor and adapted to shift the warp yarns and form the shed successively in each section; a horizontal impeller plate revolving at high speed for each section, travellers shot through the shed by a centrifugal effect produced by said impeller plates, means for guiding each traveller of one impeller plate to the impeller plate of the following section through the shed and means whereby the said travellers draw the weft yarns, pick by pick, between the warp yarns.

2. A sectional weaving loom according to claim 1 in which the centrifugal weft drive consists of impeller plates revolving at high speed in casings from which protrude several runways, a weft yarn conveyor or traveller which is shot through one of the runways by the centrifugal effect of the impeller plates, means for feeding the weft thread pick by pick to the traveller from cones carried by a revolving cone-tray and for insuring that the weft thread is made fast to the nose of the traveller, means for controlling the timing of the traveller's egress from the impeller casing through a trap door and for selecting the desirable runway through which it should travel.

3. A sectional weaving loom with centrifugal weft drive according to claim 1 with means for guiding the weft conveyor or traveller between two parallel tension coil springs stretched across

the surface of a horizontal fixed reed or comb, the vertical warp yarns, when laterally shifted to produce the shed, penetrating into the open coils of the guide springs which protect them from coming into contact with the traveller.

4. A sectional weaving loom with centrifugal weft drive according to claim 1 which comprises a combination of two horizontal reeds or combs, a fixed reed and an oscillating beater reed with a semi-circular motion, the beater reed being set above the fixed reed in such a way that when it reaches its lower position, flexible rods carried by the dents of the beater reed penetrate the dents of the fixed reed, pick up the weft thread lying on the latter and lift it on their way up so that it slides back on to the beater reed dents which press it into the top angle of the shed.

5. A sectional weaving loom with centrifugal weft drive according to claim 1 in which a clutch arm which by disengaging spring hooks carried by the harnesses from catches on driving sliding rods, releases the harnesses and enables them to be operated by hand.

6. A sectional weaving loom with centrifugal weft drive according to claim 1 comprising a device for controlling the tension of the warp yarns by means of a gravity tension roll on rocker arms counterbalanced by levers, the former being vertically shifted by any tension variation of the warp yarns and accordingly moving a ball-jointed shaft carrying on its free end a conical gear which is thus made to engage either of two conical gears opposed on a vertical driving shaft, the ball jointed shaft being connected to a worm which operates the let off or the take up motion of the warp beam depending on which of the gears are engaged.

7. A sectional weaving loom with centrifugal weft drive according to claim 1 wherein a device delivers the cloth to movable containers over a luminous inspection board thus saving time for stopping, unrolling and restarting, and allowing for inspection of the cloth as it is delivered as well as for marking of faulty parts.

8. A sectional weaving loom with centrifugal weft drive according to claim 1 in which provision is made of an electropneumatic warp stop motion consisting of a suction head sliding reciprocally across the width of the warp yarns between two wires stretched on rocker arms provided with mercury level switches, the sucking in of the loose end of any broken warp yarn reacting on the wires and rocking the switches operating an electro-magnet for the lighting of an alarm bulb.

9. A sectional weaving loom with centrifugal weft drive according to claim 1 in which provision is made of an electric weft stop motion consisting of a rocker arm with a mercury level switch which is rocked by the impact of an eyelet holder carried on a rotating cone-tray when this eyelet is not jerked out of position by the pull exerted on the weft yarn running through it.

PIERRE GEORGES EMILE AUGUSTE
VANLAER.