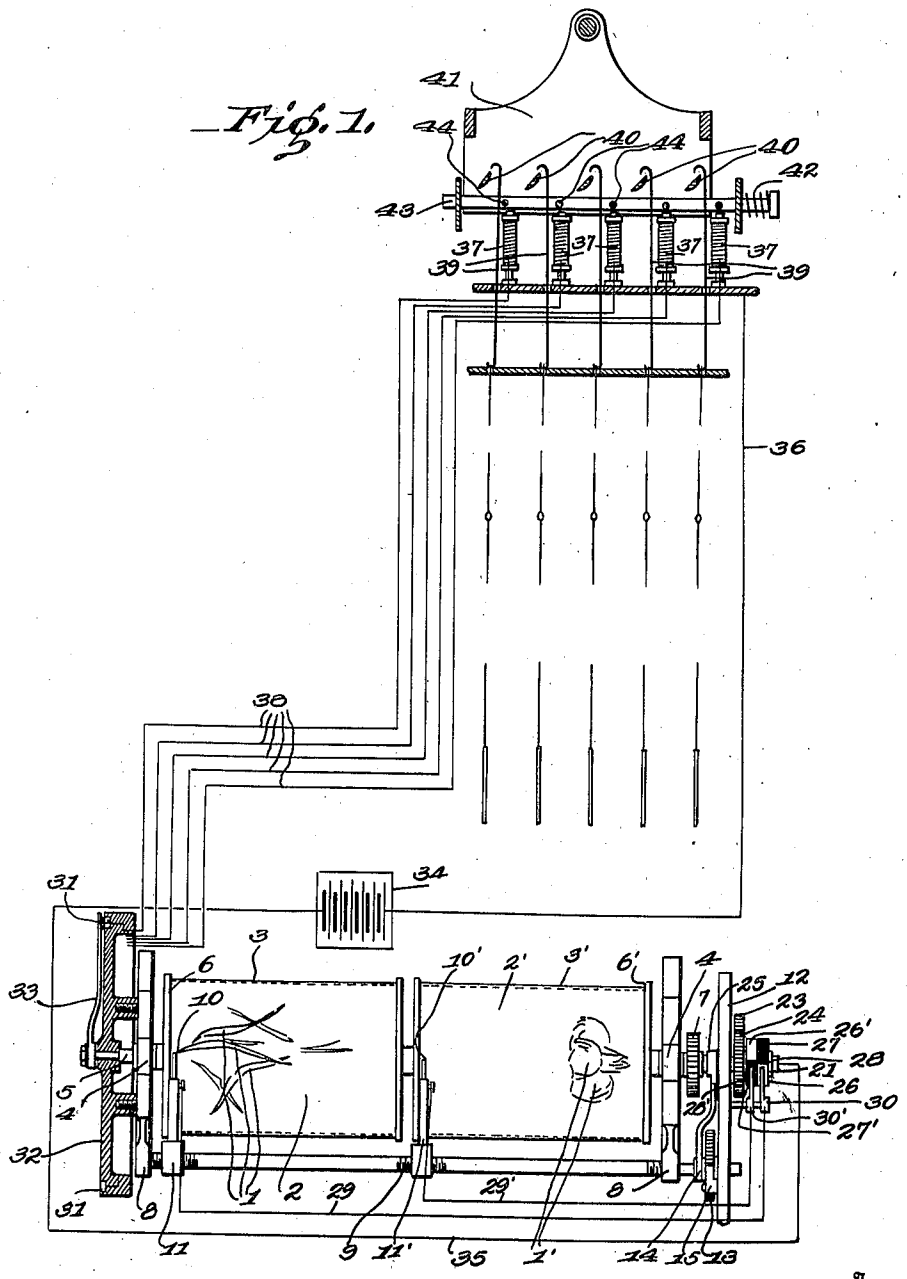
July 23, 1929. K. NAKANISHI 1,721,787

ELECTRICALLY CONTROLLED DEVICE FOR USE IN SHEDDING MOTION IN LOOMS FOR WEAVING FIGURED FABRICS AND FOR USE IN FIGURED CARD CUTTING MACHINES

Filed Nov. 5, 1926 2 Sheets-Sheet 1

Fig. 1.



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Fig. 3.

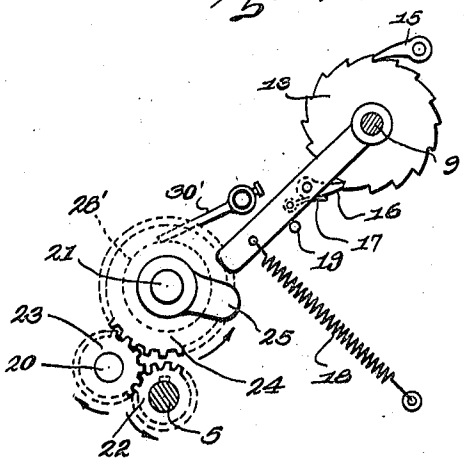


Fig. 2.

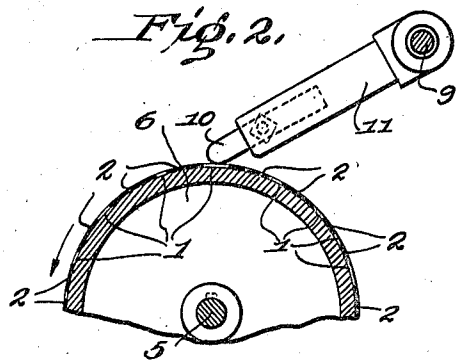
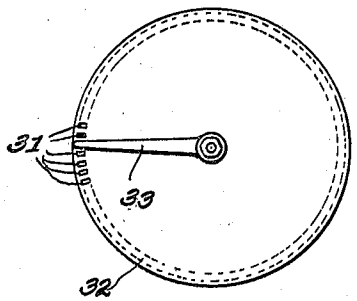


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ELECTRICALLY-CONTROLLED DEVICE FOR USE IN SHEDDING MOTION IN LOOMS FOR WEAVING FIGURED FABRICS AND FOR USE IN FIGURED-CARD-CUTTING MACHINES.

Application filed November 5, 1926. Serial No. 146,484.

My invention relates to an electrically controlled device for shedding motion in looms for weaving figured fabrics, and is also applicable to machines for cutting figured cards used in jacquard and dobby machines. The invention comprises a pattern sheet or sheets having the conducting and insulating portions and rotated step-by-step, a contact brush or brushes in contact with said pattern and adapted to be moved step-by-step in the direction of the axis of rotation of said pattern, a stationary insulating disc having a plurality of annularly arranged contacts, a contact arm rotated in unison with the pattern and adapted to engage successively with one of said contacts, and a plurality of circuits each including an electro-magnet and one of said contacts on the insulating disc and connected in parallel with the source of current. The object of my invention is to provide an electrically controlled system for looms, which may be operated effectively in an economical manner.

The accompanying drawings illustrate my invention, in which:—

Figure 1 is a diagrammatic view of the apparatus according to my invention applied to the loom for weaving figured fabrics, including the electrical connection,

Figure 2 is a cross section of the pattern cylinder and the contact brush cooperating therewith, a part being broken away,

Figure 3 is a detail showing the mechanism for moving the contact brush in the direction of the axis of the pattern cylinder,

Figure 4 is a detail elevation of the circuit closer comprising the fixed disc and the revoluble contact arm.

My invention is applicable to the shedding apparatus in looms for weaving figured fabrics and to the machines for cutting cards used for jacquard and dobby machines. In the folowing description, my invention will be described as applied to the apparatus for governing the shedding motion in the looms for weaving figured fabrics.

The pattern or design sheet 3 comprises an electrically conducting portion 1 and an insulating portion 2, and it is formed into a cylindrical shape or an endless band. One, two or more of such pattern sheets are employed, and same is rotated step-by-step by means of a suitable mechanism. In the example shown, two cylindrically formed pattern sheets are shown. Journalled in the bearings 4 is the main shaft 5 on which is mounted cylinders 6 and 6′ carrying the pattern sheets 3 and 3′ respectively. On one end of the main shaft 5 is mounted a gear 7 which is connected to a suitable mechanism and is rotated step-by-step thereby. The operation of said mechanism is such that the gear 7 is stopped for a predetermined period during every rotation. Extending from one side of each bearing 4 are arms 8 which support a screw spindle 9. Contact brushes 10 and 10′ are normally held in contact with the patterns 3 and 3′ respectively, and are carried by the holders 11 and 11′ respectively. Said holders 11 and 11′ are made of insulating material and are screwed on said screw spindle 9 to be traversed along the spindle upon the rotating movement of the latter. At one end the screw spindle 9 is journalled in the frame 12, and near that end a ratchet wheel 13 is securely mounted and an arm 14 is loosely mounted to the screw spindle 9. (Fig. 3.) Mounted on the inner side of the frame 12 is a check pawl 15 engaging with the teeth of the ratchet wheel 13. A pawl 16 for feeding the ratchet wheel 13 is mounted on the arm 14, and it is urged by a spring 17 also secured to the arm 14. A spiral spring 18 is connected to the arm 14, and the latter is normally pulled by the spring 18 against the stop 19.

The main shaft 5 is also journalled at one end in the frame 12, and two studs 20 and 21 (Fig. 3) are arranged adjacent that end of the main shaft. On the main shaft 5 and the studs 20 and 21 are mounted gears 22, 23, and 24 respectively, transmitting the rotation from the main shaft to the stud 21. On the inner end is secured a tappet 25 adapted to engage with and lift the arm 14 on every rotation of the stud. On the outer end are secured slip rings 28 and 28′, the ring 28 having the conducting half 26 and the insulating half 27, and the ring 28′ having the conducting half 26′ and the insulating half 27′. As shown in Figure 1, said conducting and insulating halves of the slip rings 28 and 28′ are oppositely arranged to each other. Contact brushes 30 and 30′ are held in contact with the slip rings 28 and 28′, respectively, and they are connected by means of conductors 29 and 29′ to the contact brushes 10 and 10′ respectively.

On the left-hand-side bearing 4 is secured an insulating disc 32 having a plurality of contacts 31 annularly arranged near the periphery of the disc. The main shaft 5 loosely pass through the disc 32 and, at the end, carries a contact arm 33 securely mounted thereon, which contact arm 33 cooperates with the annularly arranged contacts 31.

The battery, generator, or other suitable source of current 34 is connected, on one hand, with the slip rings 28 and 28′ by means of the conductor 35 and, on the other hand, with the windings of the magnets 37 by means of the conductor 38 with one of the contacts 31 on the insulating disc 32. Thus, it will be seen that when the contact brush 10 engages with the conducting portion 1 of the pattern sheet, the magnet 37 which is at the time connected with the contact 31 which is engaging at the time with the contact arm 33 will be energized, and then said magnet will pull the hook 39 pertaining thereto to bring the upper bent of the latter out of the path of the knife 40, thereby preventing the engagement of the knife 40 with the hook 39. On the other hand, when the contact brush 10 comes on the insulating portion 2 of the pattern, the magnet 37 connected with that contact 31 which is at the time cooperating with the contact arm 33 will be deenergized, and it does not act upon the hook 39 pertaining thereto, and consequently the hook will maintain its position adapted to be engaged by the knife 40 upon the rising movement of the latter, thereby making a shed of the figuring warp pertaining thereto. The knives 40 are carried by the carrier box 41. A horizontal bar 43 carries a plurality of pushing projections 44, and is adapted to be moved endwise against the action of the spring 42, by the action of a suitable device not shown, when the carrier box 41 descends, thus all the hooks 39 are pushed by the projections 44 into the paths of the knives 40. When the box 41 ascends, the horizontal bar 42 will return to the normal position by the action of the spring 42, releasing the hooks 39. In the drawing, the left hand one of the hooks 39 is shown as seized by the magnet 37.

The operation of the invention briefly is as follows:—The pattern carrying cylinder 6 is rotated step-by-step, and the contact brush 10 is held in contact with the pattern sheet having the conducting portion and the insulating portion. The contact arm 33 also moves in unison with the cylinder 6 and engaging successively with a plurality of contacts 31 on the insulating disc 32. The stud 21 will be rotated for 180° during one revolution of the main shaft 5. During one half rotation of the slip ring 28′, the contact brush 30′ engages with the insulating half of the ring 28′, so that the circuit including this point will be opened, thus during that period the system will not be influenced by the pattern sheet 3′ on the cylinder 6′. During the same half rotation of the slip rings, the contact brush 30 engages with the conducting half of the slip ring 28, supplying current from the source 34 to the contact brush 10. When this brush 10 engages with the insulating portion of the pattern 3, the magnet 37 connected with at contact 31 which is cooperating at the time with the contact arm 33 will not act upon the hook. On the contrary, when said contact brush 10 engages with the conducting portion 1, the magnet 37 connected with that contact 31 which is at the time cooperating with the arm 33 will be energized and pull the hook 39 pertaining thereto, thus holding the latter in the position not to be engaged by the knife 40. From the foregoing, it will be observed that according to my invention two contact brushes 30 and 30′ alternately engages with the conducting half and the insulating half of the slip rings 28 and 28′, and that the pattern sheets 3 and 3′ alternate at the end of each half revolution of the slip rings. So, my invention is applicable to the system in which two differently colored figuring warps are used. As the stud 21 makes one revolution during two revolutions of the main shaft 5, the tappet 25 operates once during two revolutions of the pattern sheets 3 and 3′, engaging with and lifting the arm 14 and stretching the spring 18. When the tappet is disengaged, the arm 14 is returned to the normal position by the action of the spring 18, then the pawl 16 engaging with the teeth of the ratchet 13 will rotate the latter, thereby rotating the screw spindle 9. Thereupon the holders 11 and 11′ will be moved one step in the axial direction along the pattern sheets, thus the engaging positions of the contact brushes 10 and 10′ on the pattern sheets 3 and 3′ are varied.

Among many advantages, my invention possesses the advantages with the aforementioned arrangement that many numbers of magnets 37 may be effectively and accurately operated employing a source of current of a comparatively low voltage, and that the elaborated figures or designs may be readily transferred directly to the shedding system of the loom for weaving figured fabrics or to the card-cutting machines, in an economical manner.

What I claim is:—

A machine of the class described comprising a cylinder having a shaft, bearings for said shaft whereby said cylinder is mounted for rotation, a pattern sheet on the cylinder having conducting and insulating portions; a fixed disc having contacts, a circuit closing arm revoluble with the cylinder and arranged to cooperate with said contacts; a threaded shaft arranged longitudinally of and parallel with the cylinder, bearings for said threaded shaft, a ratchet wheel on said threaded shaft, a detent to hold said ratchet wheel against

reverse rotation, a swinging arm on said threaded shaft having a spring pressed pawl to engage said ratchet wheel for step by step rotation, a spring to move said arm in one direction, a revoluble element geared to the shaft of the cylinder and having a tappet arm to engage and move said swinging arm against the action of said spring and circuit closing means including an element movable with said revoluble element and a brush carried by said threaded shaft and movable thereby longitudinally of the cylinder and on the pattern sheet thereof.

In testimony whereof I affix my signature.

KINJIRO NAKANISHI.