March 1, 1949. C. S. WEYANDT 2,463,448

ELECTROMAGNETIC VIBRATOR

Filed Aug. 7, 1945 2 Sheets-Sheet 1

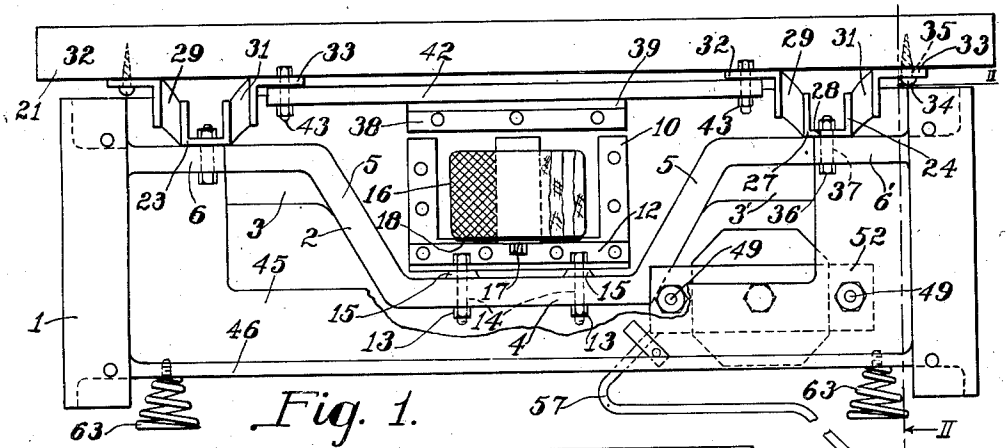


Fig. 1.

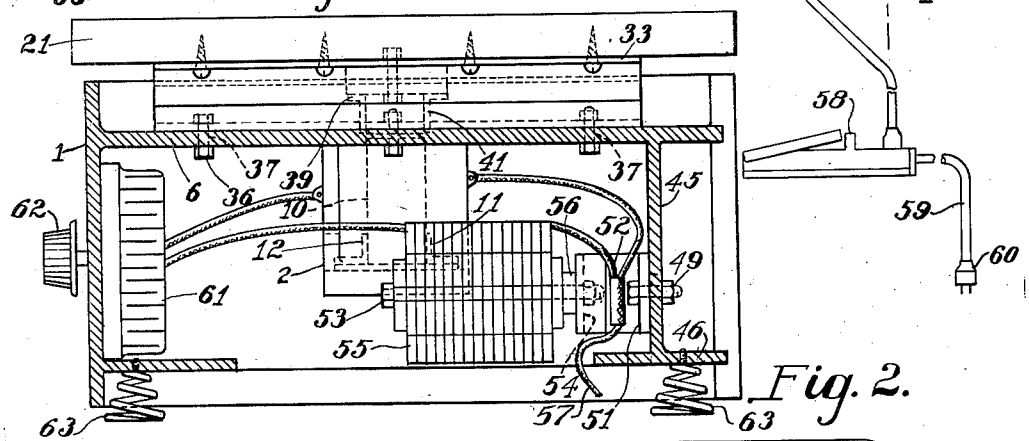


Fig. 2.

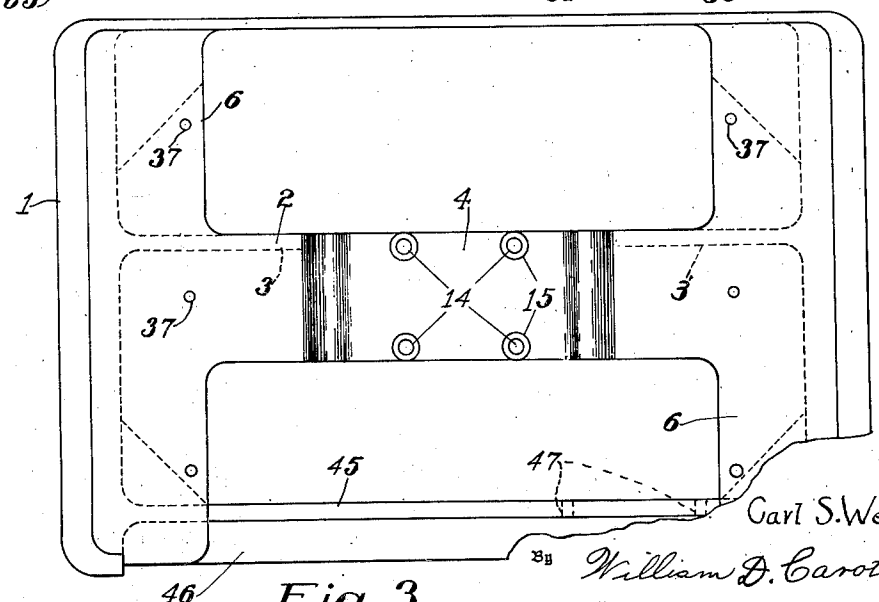


Fig. 3.

Inventor
Carl S. Weyandt
By William D. Carothers
Attorney

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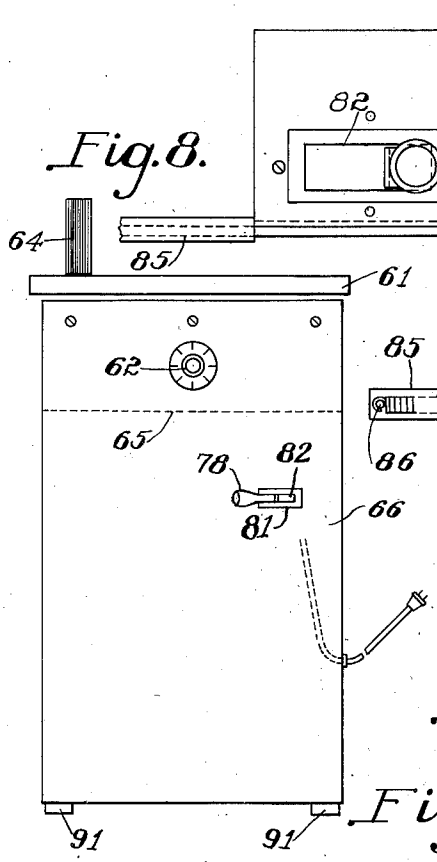


Fig. 8.

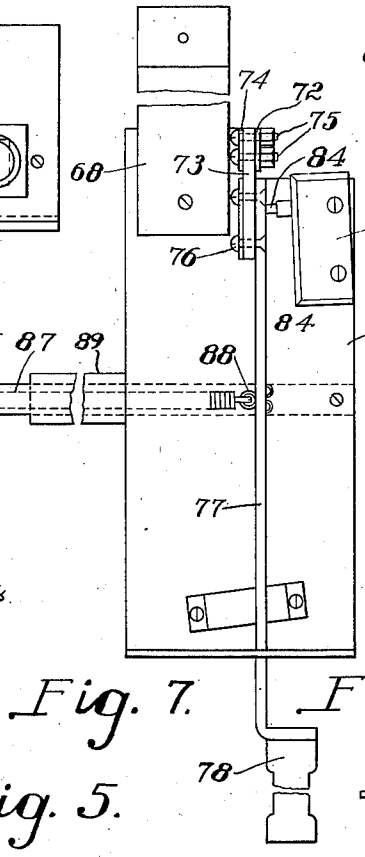


Fig. 7.

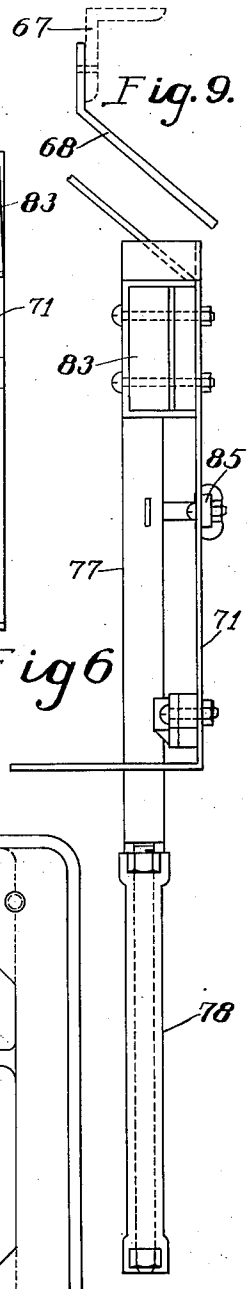


Fig. 9.

Fig 6

Fig. 5.

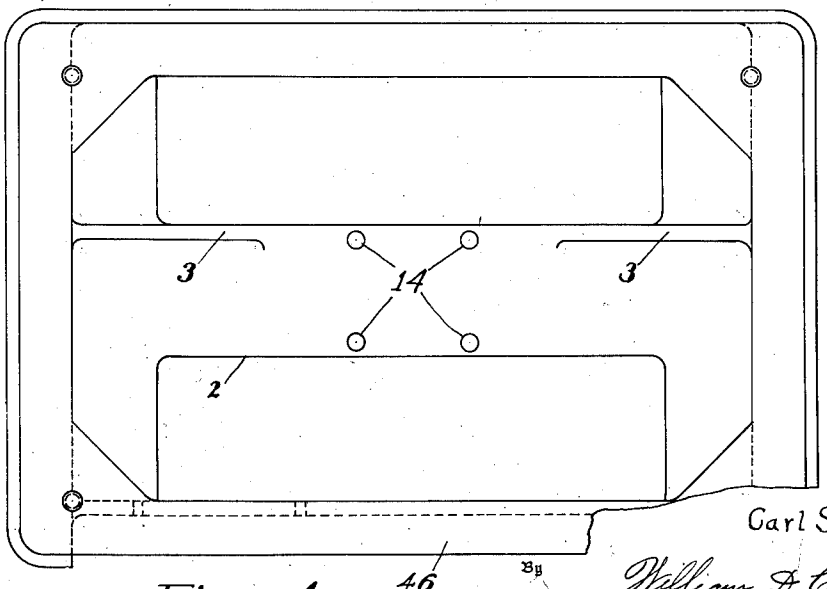


Fig. 4.

Inventor
Carl S. Weyandt
By William D. Carothers
Attorney

Patented Mar. 1, 1949

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UNITED STATES PATENT OFFICE

2,463,448

ELECTROMAGNETIC VIBRATOR

Carl S. Weyandt, Homer City, Pa.

Application August 7, 1945, Serial No. 609,416

9 Claims. (Cl. 271—89)

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This invention relates to a vibrator particularly suitable for producing stacks of laminae, such as paper or cards, with the edges in alignment.

It is an object of the invention to provide a vibratory apparatus adapted to receive a stack of laminae for rapidly vibrating the stack to cause the edges to become aligned.

Another object is the provision of a vibrating apparatus which is relatively noiseless, compact and readily controlled by the operator.

These and other objects of the invention will be apparent from a consideration of the following specification taken in connection with the annexed drawings showing a preferred embodiment of the invention by way of example, and wherein:

Figure 1 is a rear view of a preferred embodiment,

Figure 2 is a section view taken on line II—II of Figure 1,

Figure 3 is a top view of the housing of Figure 1 with the table and vibrating mechanism removed,

Figure 4 is a bottom view similar to Figure 3,

Figure 5 is a front view of a modification set within a cabinet,

Figure 6 is a side view of the knee switch mechanism,

Figure 7 is a top view of the knee switch mechanism,

Figure 8 is a front view of the switch mechanism on an enlarged scale, and

Figure 9 is a side view of a detail.

Referring to the drawing, Figure 1, there is shown a casing which preferably is in the form of an integral heavy casting 1 having a middle bracket 2 with reenforcing ribs 3, 3', and a bottom bar 4 and connecting sloped side portions 5 merging with a flange or shelf 6, 6' extending internally along the ends of the casting. An E-shaped electromagnet 10 made up of laminations riveted together has angle plates 11 and 12 riveted thereto on opposite sides, and bolts 13 pass through holes 14, surrounded by finished elevated bosses 15, and the angle plates to hold the electromagnet in position. The middle leg of the electromagnet is surrounded by a coil 16 of wire, suitably held thereon by a clip 17 and resting on an insulating and cushioning pad 18.

The table 21 preferably is constructed of hard wood, such as maple, but may be of metal, pressed fibrous composition, or other suitable material. A pair of vibration members 23 and 24 on opposite sides of table 21 serve as spring supports

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therefor. As these supports are alike in construction, only one of them will be described in detail. The supporting member 24 comprises a channel-shaped metal strip 27 with holes 28 formed medially therethrough at intervals along the strip, the rubber pads 29 and 31 have one of their respective faces secured to each side of the channel strip 27 by vulcanization or in any other suitable manner. The pads are right and left hand, and the faces thereof are substantially parallel. The ends of the pads preferably are formed as a fillet to reduce tension on the joint between the metal rubber at its ends. Angle strips 32 and 33 are vulcanized to the opposite faces of the pads 29 and 31 and on one side screws 34 pass through holes 35 in the angle strip to secure the vibratory member to the table 21. Bolts 36 passing through holes 28 in the vibration members 23 and 24 and through holes 37 in the flanges 6, 6' secure the vibration members to the casing. An armature 38 in the form of a laminated bar has angle strips 39 and 41 riveted to the sides thereof, and is welded or otherwise secured to a bar 42 which in turn is secured to the table 21 preferably by bolts 43.

At the bottom at one side the casing has a vertical wall 45 with a reenforcing portion 46 extending at right angles thereto and at the top merging with shelves 6 and 6'. This wall is bored at 47 to receive bolts 49 which pass through the exterior angle plates 51 of a vibratory member 52 similar to members 23 and 24 to hold the member 52 in position on wall 45. A bolt 53 passes through the middle channel of strip 54 of vibratory member 52 and secures a plurality of rectifier disks 55 thereto, an insulation washer 56 being interposed. These rectifier disks preferably are of the copper oxide type, although any other suitable form of rectifier may be employed. A conduit 57 contains conductors connected to the rectifier disks and at its opposite end is connected to a treadle type switch 58 which may be connected by conductors 59 and male plug 60 to any suitable source of alternating current of the desired frequency. A rheostat 61 of suitable construction which may be controlled by a calibrated knob 62, is connected between coil 16 and rectifier 55, or in any other part of the circuit in known manner to control the actuating current for the electromagnet. The bottom of case 1 has coil springs 63 or other suitable vibratory members on which the casing rests, to eliminate or reduce transmission of vibration from the housing 1 to its support.

In operation, current is supplied from any suit-

able source of alternating current, through conductor 59, switch 58 and conductor 57 to the rheostat 61 and to the rectifier 55, which passes successive current impulses of like polarity spaced by zero current intervals. This intermittent pulsating current which is controlled by rheostat 61, is transmitted to coil 16 on the electromagnet 10 and causes armature 38 to be intermittently attracted so as to vibrate and cause vibration of table 21 to which it is connected, the amplitude of vibration being regulated by the rheostat 61. For example, if plug 60 is connected to a sixty cycle source of alternating current, this being most commonly employed in commercial wiring, the armature and table will be vibrated at the rate of 3600 times per minute. If a current source of 25 cycles is used the table vibrates 1500 times per minute. The specific type of vibration members 23 and 24 shown is preferred because of the elimination of noise and its long life, the rubber pads being vibrated in a state of shear or tension, and they are selected to have, with the table, a natural frequency of vibration close to the recurrence periodicity of the current impulses. For example, the vibrating mass may be one fifth or less of the weight of the non-vibrating base.

In stacking paper or cards, the stack of paper 64 (Figure 5) is placed endwise on the table and is supported against toppling by the hands of the operator or by any other support, and the operator now steps on treadle switch 58 to actuate the electromagnet and cause table 21 to vibrate substantially vertically at a rate of 1500 times per minute or more. The vibration of the table is transmitted to the paper stack and appears to free the individual sheets of paper so that they may fall until the ends of all of them rest on the table to form a smooth edge stack. The stack then may be turned at right angles to align the other edges of the paper, and to prevent the papers from getting out of alignment they may be supported edgewise against a surface at right angles to table 21.

In the modification shown in Figures 5 to 9, wherein like parts are correspondingly numbered, the casing 1 is supported by the springs 63 on the internal shelf of a cabinet 66 which contains an operating or initiating switch. Inside cabinet 66 on a shelf 65 is secured an angle strip 68 to which is secured a plate 71 carrying the switch mechanism. A portion of plate 71 is turned up at 72 and a plate 73 of rubber or other suitable flexible or resilient material is secured thereto between plate 74 and turned up portion 72 by bolts 75. To the other end of plate 73 is suitably secured as by rivets 76, a switch operating arm 77 so that the rubber plate 73 forms a flexible hinge which does not transmit any substantial vibration to arm 77. A rubber covered handle 78 extends through the opening 81 in the cabinet, and a sponge rubber cushion 82 held in the opening 81 of the cabinet in any suitable manner is employed to further dampen vibration of the handle. A switch case 83 secured on plate 71 may contain a snap acting switch of any suitable type, for example, like that disclosed in Patent No. 2,172,673, issued on August 12, 1939, to Malcolm W. Eaton, and has an actuating button or rod 84 extending therefrom adapted to be contacted by switch arm 77. An extension 85 of plate 71 has a pin 86 extending therefrom to which is fastened one end of helical spring 87, the other end being fastened to an eye 88 in switch arm 77. Spring 87 preferably is covered by a tubing 89 of rubber or other vibration damping material. Spring 87 biases arm 77 to the left as seen in Figure 7 and when the switch arm 77 is moved to the right it pushes rod or button 84 and closes the snap action switch in case 83 to actuate the electromagnet. The preferred construction is such that arm 77 can overtravel a considerable distance in actuating the switch.

In operation the operator holds a stack of papers on edge on the vibrator table 21 and with his knee pushes switch handle 78 to the right to actuate the switch 83 and start the table 21 vibrating until the edges of the paper are in alignment. When the operation is finished he releases the switch handle 78 by withdrawing his knee and the spring 87 retracts the arm 77 and allows switch 83 to open to stop operation of the table. The hinging of the switch arm 77 on a vibration absorbing pivot prevents or reduces transmission of vibrations thereto, which would be extremely disagreeable to the operator, and the sponge rubber cushion also prevents transmission of vibration from the cabinet to the handle. Preferably the cabinet is set on vibration absorbing pads 91 or springs to prevent transmission of vibration to the floor.

Various modifications may be made without departing from the spirit or scope of my invention.

What I claim as my invention and desire to secure by United States Letters Patent is:

1. In a paper jogger the combination of a base, a table, spaced rubber members for resiliently supporting the table on said base for vibration relative thereto in a vertical rectilinear path, a vibratory motor having an armature member and an electromagnetic field member, means for securing the armature member directly to the underside of the table substantially centered between the spaced rubber members, means to independently secure the field member on the base to hold said members in operative spaced relation and to provide a magnetic coupling therebetween, and means to electrically energize the field member and rapidly oscillate the armature member relative thereto to vibrate the table.

2. In a paper jogger the combination of a relatively heavy base, a table of relatively less mass, spaced spring members for resiliently supporting the table on said base for vibration relative thereto in a vertical rectilinear path, a vibratory motor having an aramature member and an electromagnetic field member, means for securing the armature member directly to the underside of the table substantially centered between the spaced supporting members, means to independently secure the field member on the base to hold said members in operative spaced relation and to provide a magnetic coupling therebetween, and means to electrically energize the field member and rapidly oscillate the armature member relative thereto to vibrate the table, the relatively greater mass of the base preventing substantial absorption of vibration from the table.

3. In a paper jogger the combination of a base, a table, spaced spring members for resiliently supporting the table on said base for vibration relative thereto in a vertical rectilinear path, a single vibratory motor having an armature member and an electromagnetic field member, means for securing the armature member directly to the underside of the table substantially centered between the spaced supporting members, means to independently secure the field member on the base to hold said members in operative spaced relation and to provide a mag-

netic coupling therebetween, means for energizing the field member with intermittent current pulsations obtained by rectifying alternating current to rapidly oscillate the armature member relative to the field member without physical contact with one another to silently vibrate the table, and means to regulate the amplitude of vibration of the table while the operation of the motor subsists.

4. In a paper jogger the combination of a base, a table, spaced rubber members for resiliently supporting the table on said base for vibration relative thereto in a vertical rectilinear path, a vibratory motor having an armature member and an electromagnetic field member, means for securing the armature member directly to the underside of the table substantially centered between the spaced rubber members, means to independently secure the field member on the base to hold said members in operative spaced relation and to provide a magnetic coupling therebetween, means to electrically energize the field member and rapidly oscillate the armature member relative thereto without physical contact between the members to silently vibrate the table, and means to regulate the amplitude of vibration of the table to adapt it to the characer of paper being jogged.

5. In a paper jogger the combination of a base, a table to support the paper to be jogged, spaced spring means to resiliently support the table on the base for vibration relative thereto in a vertical rectilinear path, a single vibratory motor having an armature member and an electromagnetic field member, means to secure the armature member directly to the underside of the table substantially centered between the spaced supporting means, means to independently secure the field member on the base to support said members in operative spaced relation and provide a magnetic coupling therebetween, and means to rectify alternating current and electrically energize the field member and rapidly oscillate the armature member secured to the table to vibrate the latter relative to the base.

6. The structure of claim 5 characterized in that said armature is straight and the electromagnetic field member is provided with a plurality of spaced poles.

7. In a paper jogger the combination of a base in the form of a vertical walled enclosure, support means carried by the base within the walls and spaced from the top of the latter, a table covering the walled enclosure, spaced rubber members resiliently supporting the table for vibration in a vertical rectilinear path on said support means to bring the table into relative close relation to the top of the walled enclosure, an armature mounted directly on the underside of the table substantially centered between the spaced rubber members, an electromagnetic field member supported within the base in operative spaced relation to the armature to provide a magnetic coupling therebetween, and means to electrically energize the field member to rapidly oscillate the armature secured to the table to vibrate the latter.

8. The structure of claim 7 characterized in that said last mentioned means includes an electrical rectifying device, and means to resiliently support said device within the base.

9. The structure of claim 7 characterized in that said last mentioned means includes an electrical rectifying device, means to resiliently support said device within the base, and means to regulate the amplitude of vibration of the table to adapt it to the character of paper being jogged.

CARL S. WEYANDT.

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