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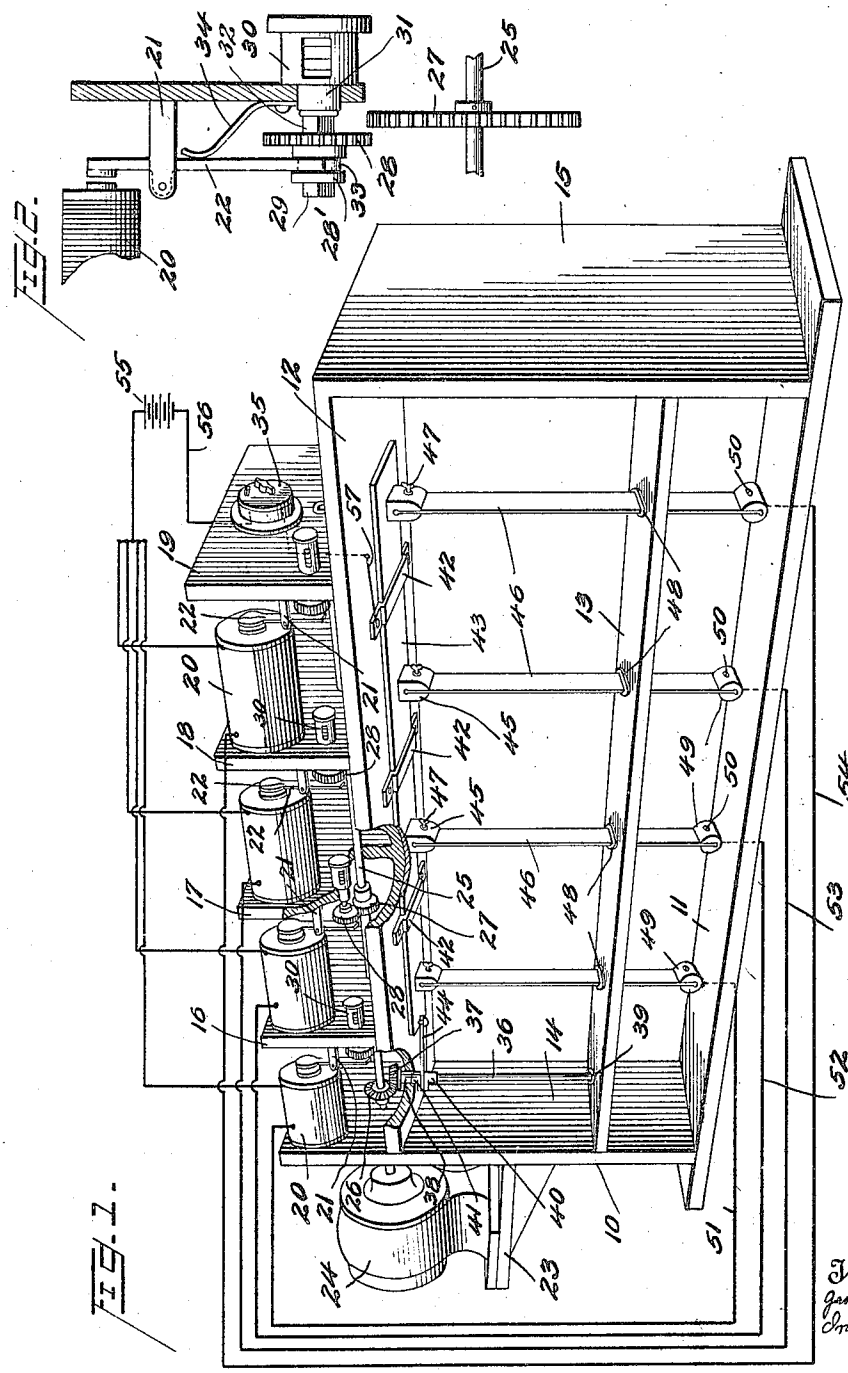


FIG. 2.

FIG. 1.

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MACHINE FOR TESTING SHEET METAL FOR VIBRATION.

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To all whom it may concern:

Be it known that we, GEORGE DE BOTHEZAT and IVAN I. EREMEEFF, citizens of Russia, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Machines for Testing Sheet Metal for Vibration, of which the following is a specification.

This invention relates to a machine for testing the resistance to vibration of sheet metal.

The primary objects of the invention are to subject the test specimens to oscillations and to provide mechanism for automatically indicating the number of such oscillations before rupture of the metal takes place.

Other features of the invention whereby a plurality of specimens may be tested simultaneously and a compact mechanism capable of producing accurate results is obtained, will become apparent as the description proceeds.

Our invention is described in connection with the accompanying drawing, in which:

Figure 1 is a perspective view of the testing apparatus; and

Figure 2 is a detail view of the releasable gear connection between the driving shaft and counting mechanism.

The numeral 10 designates a box-like frame having the base plate 11, top plate 12, intermediate apertured plate 13, and end plates 14 and 15. The end plate 14 is extended above the top plate and a number of partitions 16, 17, 18 and an end panel 19 are arranged in spaced relation thereto so as to create a series of compartments on the top plate 12. In each of these compartments is located an electro-magnet 20 having one end secured to one of the partitions or the extension of end plate 14 respectively. An arm 21 projects inwardly from each of the partitions 16, 17 and 18 and the end panel 19 so that one end thereof is located slightly below the exposed pole of one of the electro-magnets. An armature 22 intermediately pivoted on each arm 21, has its upper end disposed in operative relation with a pole of the corresponding electro-magnet and its lower end is bifurcated for a purpose which will hereinafter appear.

A shelf 23 is secured to the outer side of end plate 14 and this shelf supports a motor, preferably an electric motor 24. In this end plate, partitions 16, 17 and 18 and end panel 19 is journalled a driving shaft 25 which is connected to and driven by the motor 24. A bevel pinion 26 is fastened to the driving shaft near the inner side of end plate 14, and spur gears 27 are secured to said shaft near the partitions 16, 17, 18 and end panel 19, so as to mesh at the proper times with pinions 28 located in the compartments. Each pinion 28 is slidably mounted on the shaft 29 of a counting device 30. This counting device has a casing provided with a sleeve extension 31 which is pressed within an opening in each partition and the end panel. The shaft 29 extends through the sleeve 31 and is provided with a square portion 32. A pinion 28 and its hub 28′ are formed with a square opening whereby the pinion is mounted for rotation with the shaft and capable of sliding independently thereof. The hub 28′ is formed with an annular groove 33 in which the bifurcated end of the corresponding armature 22 engages. A leaf spring 34 is fixed at one end to a partition or end panel and bears at the other end against the armature 22 at a point below the pivot of the latter in order that a pinion 28 may be normally held out of engagement with the corresponding gear 27, through the instrumentality of said leaf spring yieldingly acting on the armature. However, when an electro-magnet is energized it attracts the corresponding armature, overcomes the tension of spring 34 and throws pinion 28 into mesh with gear 27. A suitable electric switch 35 is mounted on the end panel 19 and the electric connections thereto are hereinafter described.

A vertical crankshaft 36 is mounted in bearings provided in the top plate 12 and intermediate plate 13. A bevel pinion 37 fixed to the shaft at the upper end thereof meshes with the bevel pinion 26. Suitable flanged bushings 38 are inserted through the bearing openings in plates 12 and 13, and the hub of the pinion 37 bearing on the flange of the upper bushing in conjunction with a collar 39 fixed to the shaft and bearing on the flange of the lower bushing maintain said shaft from downward vertical displacement. The crank 40 of the crank shaft is disposed immediately below the top plate 12 and the upper hub 41 of the crank is larger in diameter than the shaft and is adapted to bear against said plate in order to prevent upward displace-

ment of the shaft. U-shaped guides 42 are attached to the lower surface of the top plate and a flat bar 43 is slidably mounted for longitudinal reciprocation in said guides. A connecting rod 44 is journalled at one end on the cross pin of the crank 40 and is pivotally connected at its other end to the bar 43, whereby rotation of the crankshaft will reciprocate said bar. Clamps 45 are secured to the lower face of the flat bar 43. Each of these clamps is formed with jaws having a slot between them adapted to receive the upper end of a sheet metal test specimen 46. One of the jaws of each clamp is provided with an aperture the inner wall of which is threaded for the purpose of engaging a thumb screw 47, by means of which the upper end of the strip is tightly gripped within the clamp.

The intermediate plate 13, as above intimated, is formed with a number of spaced apertures in vertical alignment with the clamps 45 when the latter are in normal position. Flanged bushings 48 are inserted in these apertures and as shown in Figure 1, the metallic test specimens pass through these bushings. It is contemplated by our invention that these bushings may be made in sets, each set having openings of different sizes for use in connection with test specimens of different thickness. The openings in the bushings should be of such size as to fit the metal strips snugly so that oscillations of the upper part of the test specimens will take place about lines practically coincident with the upper edges of the bushings. The rupture of the metal will therefore usually take place at about the top of the bushings. In order to keep the metallic test specimen under a slight tension a weight 49 is detachably secured to the lower end thereof. These weights are attached to the respective specimens by screws 50 which are also adapted to act as binding screws for conductors 51, 52, 53 and 54 which lead respectively from the weights 49 to the winding of an electro-magnet 20. These windings are then connected in parallel to one terminal of a battery 55. The other terminal of the battery is connected by a conductor 56 to a contact of switch 35. The movable arm of the switch 35, which is of the single throw type, is electrically connected by a conductor 57 to the reciprocating bar 43. It will be noted that the metallic test specimens are included in each of the parallel circuits and when a rupture of a test specimen occurs the corresponding electro-magnet is deenergized owing to the breaking of the particular circuit.

In operation, the switch 35 is closed and the motor 24 is started. Rotation of the driving shaft 25 is imparted to the crank shaft by means of the bevel gears 26 and 38. The energization of the electro-magnets 20, following the closing of the switch, results in the attraction of armatures 22 and the throwing of pinions 28 into mesh with spur gears 27, thus driving the counting devices 30. The crank shaft through the medium of connecting rod 44, reciprocates the flat bar 43 which, through the clamps 45, imparts oscillatory movements to the test specimens. When one of the latter breaks during the test, an electric circuit through the corresponding electro-magnet is broken thereby releasing an armature 22 which, under the pressure of spring 34, moves pinion 28 out of mesh with gear 27. The driving mechanism to the corresponding counting device is thereby broken and the latter will indicate the number of oscillations which the test specimen withstood before the breaking took place. When it is desired to discontinue the test, the switch 35 is opened and the motor stopped. It seems clear that the number of oscillations of a metallic strip before rupture will be an index to the ability of such material to resist vibration.

The supporting frame is preferably of wood or bakelite and the bushings 48 are preferably of fibre but any other suitable material could be used. Furthermore, a clutch could be used to connect the motor to the driving shaft if desired or shiftable clutches could be used to connect pinions 28 to the shaft of the indicating device without departing from the scope of the invention. The form of the invention shown and described has been selected for illustrative purposes merely, and it is not our intention to limit the invention by this disclosure, except as may be required by the appended claims.

We claim:

1. In a testing machine of the character described, the combination with a supporting frame, of a bar mounted on said frame for reciprocatory movement, means for reciprocating said bar, an intermediate plate in said frame having an aperture therein, and adapted to permit a sheet metal test specimen to extend through said aperture, a clamp carried by said bar for gripping said specimen, means tending to exert a slight tensile stress on said specimen, and means for indicating the number of oscillations imparted to said specimen before rupture thereof.

2. In a testing machine of the character described, the combination of means for vibrating a sheet metal specimen including a driving shaft, a counting device associated with said shaft, and means for connecting said device to the shaft at the beginning of the test and disconnecting the device from said shaft upon rupture of the specimen.

3. In a testing machine of the character described, the combination of means for vibrating a sheet metal specimen including a

driving shaft, a counting device associated with said shaft, and electro-magnetic means for connecting said device to the shaft at the beginning of the test, said electro-magnetic means being deenergized upon rupture of the specimen.

4. In a testing machine of the character described, the combination of means for vibrating a sheet metal specimen including a driving shaft, a gear fixed to said shaft, a counting device having a shaft, a pinion slidably mounted on the shaft of said counting device for rotation therewith, an electro-magnet, and a spring pressed armature associated with said magnet adapted to move said pinion into and out of mesh with said gear.

5. In a testing machine of the character described, the combination of means for vibrating a sheet metal specimen including a driving shaft, a counting device associated with said shaft, and electro-magnetic means for connecting said device to the shaft at the beginning of the test, said electro-magnetic means being energized by an electrical circuit of which the sheet metal specimen forms a part, whereby upon rupture of the specimen the electro-magnetic means is deenergized.

In testimony whereof we affix our signatures.

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