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ELECTROMAGNETIC DEVICE WITH RESILIENTLY MOUNTED POLE UNIT

Filed June 26, 1962

Fig-1

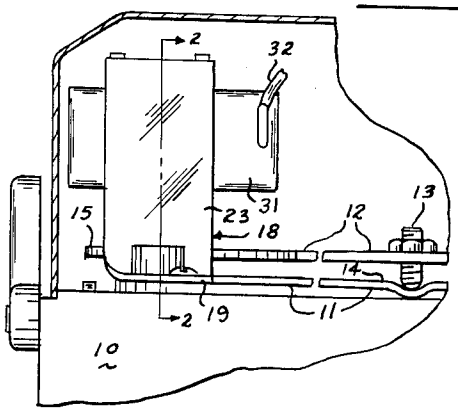
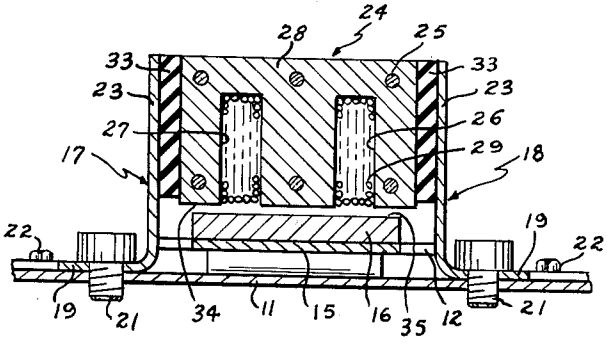
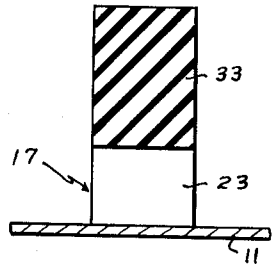


Fig-2





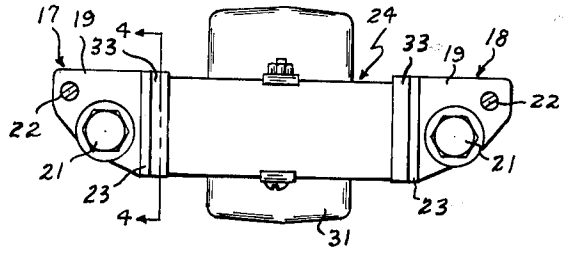


Fig-3

Fig-4

INVENTORS
JAY N. VOGELSONG
CHARLES E STRAIN
BY Tom Walker
ATTORNEY

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ELECTROMAGNETIC DEVICE WITH RESILIENTLY MOUNTED POLE UNIT

Jay N. Vogelsong, Columbus, Ind., and Charles E. Strain, Union, Ohio, assignors to The Reliance Electric and Engineering Company, Cleveland, Ohio, a corporation of Ohio

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This invention relates to electromagnetic devices. Although not so limited, the invention has special references to motor brakes and the like wherein the brake actuating force is delivered by continuously acting spring means and released electromagnetically, as for example in conjunction with the starting of the motor.

The object of the invention is to simplify the construction as well as the means and mode of operation of electromagnetic devices for disc brakes and the like whereby such brakes may not only be economically manufactured, but will be more efficient and satisfactory in use, adaptable to a wide variety of application and be unlikely to get out of order.

A further object of the invention is to reduce noise in devices of the kind described, particularly as manifested by hum and shock impulses transmitted to supporting parts.

Another object of the invention is to reduce breakage as well as noise caused by slap of an armature against the magnet face of a pole unit.

A further object of the invention is to provide for independent self-adjusting movements of the pole unit of a electromagnetic device to achieve a flush mating contact between the magnet face thereof and a cooperating armature.

A further object of the invention is to provide an electromagnetic device for brake possessing the advantageous structural features, the inherent meritorious characteristics and the mode of operation herein mentioned.

With the above and other incidental objects in view as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation as hereinafter described or illustrated in the accompanying drawings, or their equivalents.

Referring to the accompanying drawing wherein is shown one but obviously not necessarily the only form of embodiment of the invention,

FIG. 1 is a fragmentary view of a brake mechanism incorporating electromagnetic means in accordance with the illustrated embodiment of the invention, a portion of an end housing and cover member being broken away to show the electromagnetic means;

FIG. 2 is a view in cross-section taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is a detail top plan view of the electromagnetic device shown in FIG. 2; and

FIG. 4 is a detail view in longitudinal section taken substantially along the line 4—4 of FIG. 3.

Like parts are indicated by similar characters of reference throughout the several views.

Referring to the drawing, the invention is illustratively disclosed as used in connection with a disc brake (not shown) comprising in part a housing section **10**. Seated on the housing section **10** is brake actuating means having a unitary character by reason of its common mounting upon a plate **11**. An armature plate **12** is disposed in overlying generally parallel relation to the mounting plate **11** and carries a stud **13** achieving a ball-like pivot in a recess **14** in the mounting plate **11**. The armature plate **12** is thus positioned on mounting plate **11** for relative

rocking motion, this motion being utilized in a convenient manner to apply and to release an actuating pressure to the disc brake mechanism contained in housing section **10**.

The stud means **13** is located at or near one end of the armature plate **12**. The other end thereof is formed as a projecting tongue **15**. Secured to the tongue **15** in transversely disposed relation thereto is an iron or like bar **16** constituting the armature of electromagnetic means. Such means further comprises upstanding spaced apart brackets **17** and **18** which are in flanking or side by side relation to the tongue **15** and armature **16** thereon. Each bracket **17** and **18** comprises a turned over foot portion **19** secured to the mounting plate **11** by means including bolts **21** and **22**. Projecting from each foot **19** is an upstanding leg **23**, the pair of legs **23** being in opposing spaced relation to one another.

Disposed between the legs **23** in endwise or longitudinally extending relation is a pole unit **24** which may conventionally be comprised of multiple, stacked, steel laminations held together by rivets **25**. The unit **24** is E-shaped, being formed with recesses **26** and **27** defining a central leg portion **28**. An electrically energizable coil **29** is received in the recesses **26** and **27** and wound on central portion **28**. A casing **31** contains coil **29** and from it emerges electrical conductor means **32** by which the coil **29** is connected in a electrical circuit and selectively energized and deenergized.

The pole unit **24** presents end surfaces to the legs **23**. Interposed between each such end surface and a respective leg **23** is insulating means in the form of a pad **33** made of a resilient deformable material, for example rubber or a rubber-like material. The pads **33** are each solid slabs of material having a rectangular shape corresponding approximately to the outline of the end surface of pole unit **24**. By a vulcanizing or like process the pads **33** are made fast both to the end surfaces of unit **24** and to respective legs **23**. The assembly comprising parts **24** and **33** together with brackets **17** and **18**, has thus a unitary character and is so installed on plate **11**. The unit **24** is in this manner held by the brackets **17** and **18** in a predetermined suspended position over and spaced from the plate **11**. The downwardly facing surface of the pole unit, through which recesses **26** and **27** open, becomes a magnet face **34**.

The tongue **15** of armature plate **12**, and armature **16** thereon, project between the legs **17** and **18** beneath the unit **24** and locates the upper or magnet face **35** of the armature in a position approximately aligned with pole face **34**. The armature plate **12** tends normally to occupy a rocked position as shown, as by being biased thereto under spring pressure, in a manner tending normally to separate the magnet faces **34** and **35**. Upon energizing of the coil **29**, however, armature **16** is attracted to the pole unit **24** and the faces **34** and **35** are brought into contact with one another, the armature plate **12** rocking on mounting plate **11** to permit such movement. The parts remain so positioned as long as the coil **29** continues to be energized and will return to the normal separated position illustrated upon deenergizing of the coil.

The armature plate is quick acting in operation and when coil **29** is energized armature **16** strikes pole unit **24** with impact force. This, together with natural vibrations, tends to produce slapping and humming sounds contributing to the noise of motor and brake operation. In accordance with the instant invention, however, the pads **33** are resilient and deformable. The pads **33** absorb part of the energy imparted to the pole unit by the striking armature and tend similarly to absorb vibrational movements of the pole unit. The transmission of this energy to the brackets **17** and **18** and other parts of the

brake and motor accordingly is subject to a dampening influence having the result of substantially reducing noise. Further, the reduction or dampening of the energy transmission inhibits breakage of secured parts such as the brackets 17 and 18.

Further, the pole unit 24 is, by virtue of its resilient mounting, capable of limited independent motion whereby it may be self-adjusting in use. Thus, if the face of the armature 16 is not properly aligned with the face of the pole unit, the armature may in the absence of the resiliently mounted pole unit vibrate against the pole with consequent noise. In accordance with the instant invention, however, if such a misalignment exists, a force is set up tending to twist the pole unit to achieve the correct alignment, the pads 33 yielding to allow the pole unit such limited twisting motion.

The cooperative relationship here shown between the mounting plate 11, an armature plate 12 and electromagnetic means is disclosed and claimed in a copending application by Robert L. Wolfe, Serial No. 205,435, filed June 26, 1962, for Brake.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute, the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise but one of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described our invention, we claim:

1. In a disc brake or the like, electromagnetic actuating means therefor, including a mounting plate, bracket means secured to said mounting plate in upstanding relation, said bracket means including a pair of opposed legs, a pole unit longitudinally disposed between said legs to present end surfaces in spaced relation to respective legs and to present a magnet face in spaced relation to said mounting plate, a pad of resilient deformable material contained between and secured to each leg and a respective end surface of said pole unit, said legs having feet secured to said mounting plate, said unit being positioned between said legs to effect a spacing of said magnet face from said mounting plate, and an armature between said pole unit and said mounting plate adapted to move to and from a position of engagement with said magnet face, said pads having the form of solid material substantially coextensive with said end surfaces and having a thickness substantially to space said pole unit from said legs and capable of yielding to absorb vibration and to allow said pole unit bodily movements of adjustment for flush mating contact of said magnet face with said armature, said solid material tending also to adsorb impact forces caused by the striking of said magnet face by said armature.

2. Electro-magnetic means in a brake or the like, including a unitary electro magnet comprising bracket means presenting generally parallel spaced apart legs, a pole unit longitudinally disposed between said legs to present respective end surfaces thereto, and a flat sided pad of resilient deformable material contained between each leg and a respective end surface of said pole unit, one side of said pad over its entire surface being in intimate contacting relation to the leg and the other side similarly contacting the end surface of said pole unit, said pads being bonded to said legs and to said pole unit to define a connected unitary assembly of said bracket means and said pole unit.

3. Electro-magnetic means according to claim 2, characterized in that said pads have a thickness spacing said pole unit a substantial distance from said legs and providing for relative twisting motions of said pole unit for self adjustment purposes.

4. Electro-magnetic means according to claim 2, characterized in that said pads have a width to be approximately coextensive with the end surfaces of said pole unit and with a lateral dimension of said legs.

5. Electro-magnetic means according to claim 2, characterized in that said pads are made of a rubber-like material vulcanized to said pole unit and to said legs.

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ARTHUR L. LA POINT, *Primary Examiner.*

DUANE A. REGER, *Examiner.*