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GRINDING MACHINE

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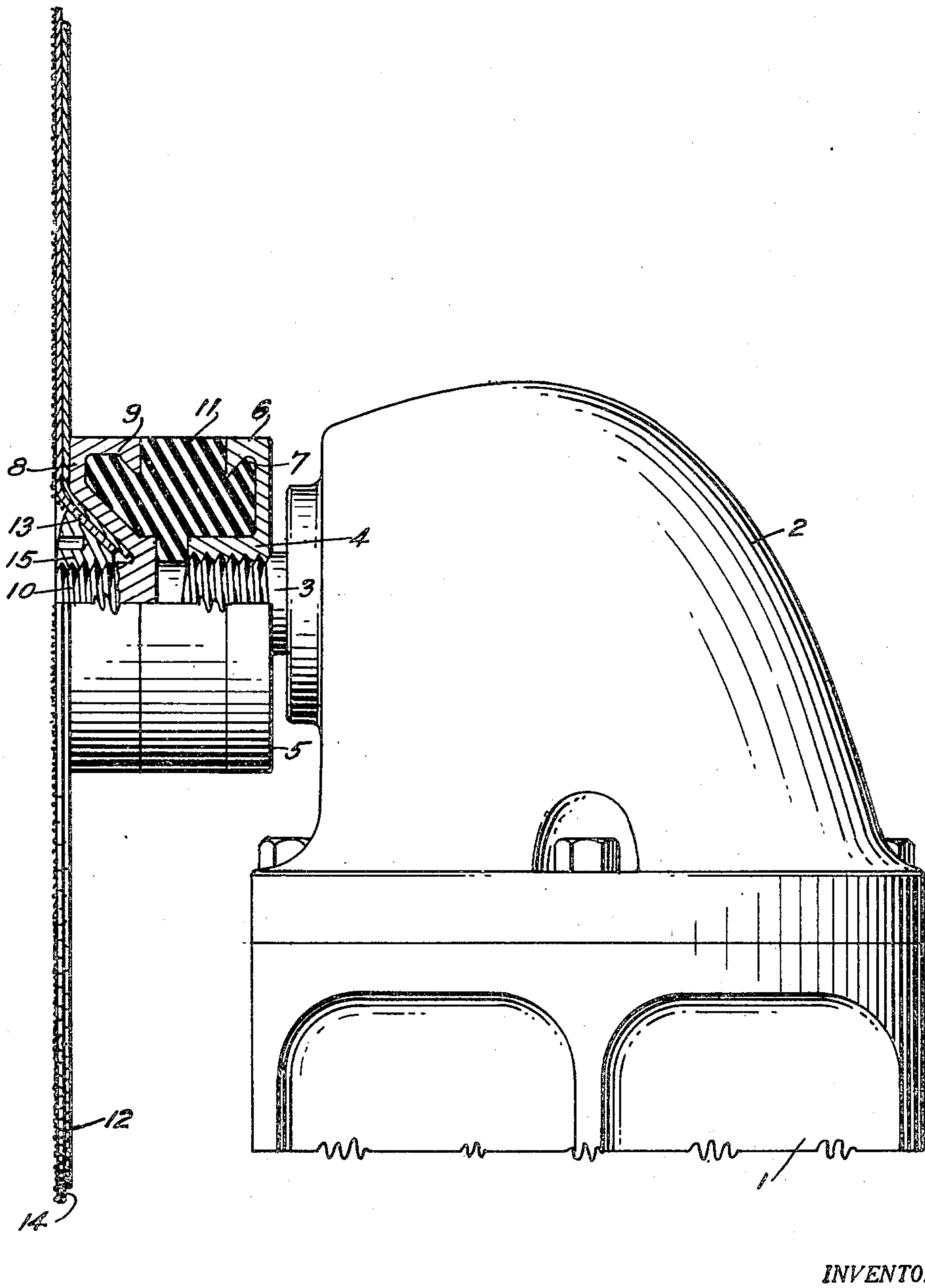

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GRINDING MACHINE

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2 Claims. (Cl. 51—197)

1

This invention relates to grinding machines and more particularly to resilient couplings for manually operated motorized grinders.

Among the objects of the invention is the provision of means for introducing an oscillating or gyrating torque in grinding, leveling and polishing surfaces and the elimination of concentric and other deep scoring effects common in the use of flat abrasive discs.

Another object is the reduction of skill and delicacy in the application of such discs and to increase speed in reducing planar inequalities in metal and other surfaces.

Another object is the provision of a simple integral unit in the form of an accessory, adaptable for use in combination with existing portable or other grinders for the above purpose.

The present disclosure relates to adaption of this invention for use with flexible abrasive discs in this art, as practiced in automobile body finishing on flat and curved surfaces, and similar uses.

In renewing a dented automobile fender for instance, it is the practice to hammer the dent against a hand block until the general curvature or plane of the fender is roughly restored to normal. However, hammer marks still remain and have to be roughed off by the use of a hand file, so far as the gauge of the metal will permit. The deeper indentations are filled with a fluxing metal such as solder or Babbitt before filing. The surface is then reduced to a common plane by the application of the flat face of a grinding disc with appropriate pressure applied, causing the yielding disc to conform to the surface being treated.

Even with finer grit abrasive discs, score lines are left in the surface that must be masked by fluid primer applied as a paint, and hand rubbed down to a smooth surface when dry, before applying the ultimate lacquer finish. This prior method has certain objectionable results, in that the primer in the deeper score lines eventually shows through the semi-transparent finish coat.

This invention consists in interposing between the driven shaft and the revolving grinding disc, a resilient cushioning coupling which introduces a vibratory oscillating torque in the drive. This causes a buffing or rubbing action which breaks the concentric line of rotation of the grinding disc when pressure is applied.

Other objects and advantages will appear as the description proceeds. In the specification and the accompanying drawings the invention is disclosed in its preferred form. But it is to be

2

understood that it is not limited to this form, because it may be embodied in modifications within the spirit of the invention as defined in the claims following the description.

The one sheet of drawings shows a side elevation, partially in vertical section of a motorized grinder having this invention applied thereto.

In detail the structure illustrated in the drawings comprises the motor 1, having the reduction gear case 2 with the threaded driven shaft 3 projecting therefrom. The continuation of the motor, not shown, terminates in a manual grip in the form of a handle from which the electric service cable projects.

The structure of the invention comprises the internally threaded hub 4 on the flat head 5 having the concentric peripheral flange 6 under-cut as at 7. The alined head 8 has the similarly undercut flange 9 integral with the axial threaded stud 10. The head 8 is countersunk in its central portion, surrounding this stud.

The space between the heads 5, 8, is filled with a rubber compound 11 vulcanized therein and keyed under the undercut flanges at 7, 9. This compound adheres to all contacting surfaces and extends flush with the perimeters of the inturned flanges to form an integral flexible coupling to the drive shaft 3 against the shoulder of which the threaded hub 4 abuts.

The flexible metal plate 12 has a depressed center portion at 13 fitting snugly within the countersunken center of the head 8. This plate is composed of a suitable nonfatiguing metal alloy such as copper-beryllium, spring steel or a suitable plastic sheet or the like.

The abrasive disc 14 is centrally slit so that it will be depressed into the countersink beneath the nut 15 on the stud 10 rotated by the motor 1, with the nut flush with the face of the disc. These discs are composed of a heavy fabric partially impregnated with a plastic cement and coated with a granular abrasive having the desired cutting qualities, ranging from coarse to the finer grades for polishing.

The machine is manipulated by grasping the handle with one hand and laying the face of the disc 14 against the surface to be reduced, while pressure is applied by the other hand on the rounded gear case at 2. To prevent burning the surface the disc is constantly moved about over the surface. The greater the pressure applied at 2, the greater the deviating eccentricity resulting in the oscillating orbit; making it practically impossible to form concentric score lines in the surface being treated.

Practice proves that with this invention a greater area can be ground easier in a given time, with less skill and a minimum of regrinding of the oscillated surface. Lateral and circular movement of the grinding head is greatly facilitated, because of the absence of the anchoring effect of relatively deep concentric scoring of the surface, when this invention is not interposed in the drive. The oscillating effect presents less friction per unit of area and enlarges the effective area by the gyrations due to the flexible line of drive at 11.

When off center pressure is applied to the abrasive disc 14 against the surface being ground, the flexible plate 12 yields to conform to the contour of this surface. This lateral pressure is also exerted against the flexible compound 11 which also yields and distorts the axis of the drive 3, 10, and causes the oscillating and buffing action above described.

Lamb skin and fabric discs may be substituted for the abrasive disc 14, for polishing lacquer and similar finishes. And wire brush discs or stones may be used for leveling surfaces or applying scratch finishes to stone or gritty finishes on buildings and the like. The absence of concentric grinding torque prevents burning and deep scoring of any surface when this invention is interposed in the driving line.

It is to be understood that this disclosure has been confined to the present adaptation, but it is equally effective in stationary grinding and finishing machines where its mode of operation is desirable.

This invention is not to be confused with flexible couplings through which two shafts are driven at fixed axial angles to each other.

Having thus described this invention what I claim and desire to secure by Letters Patent is:

1. A flexible coupling for a disc grinder in the class described, comprising a substantial median resilient cushion increasing in longitudinal width from axis toward the periphery; a driving head on one lateral surface of said cushion attachable to a motive means and having a hub extending into and driving the mass of said cushion; a driven head attached to the other lateral surface of said cushion having a concave center portion extending into and driven by said cushion; abrasive disc attaching means on said driven head within said concave portion; and a flexible abrasive disc countersunk into said concave portion and secured thereto below the plane of said disc; the mass of said cushion being such that the axis of said driven head and driving head may be forced out of alignment and cause a selected degree of oscillating and gyrating torque in said grinding disc at the will of the operator.

2. A flexible coupling for a disc grinder in the class described, comprising a substantial median resilient cushion increasing in longitudinal width from axis toward the periphery; a driving head attached to one lateral surface of said cushion having an internally threaded hub engageable with a motive means and extending into and driving the mass of said cushion; a driven head attached to the other lateral surface of said cushion having a concave center portion extending into and driven by said cushion and having an axial stud within said concave portion; and a flexible abrasive disc countersunk into said concave portion and secured thereon; the mass of said cushion being such that the axis of said driven head and driving head may be forced out of alignment and cause a selected degree of oscillating and gyrating torque in said grinding disc at the will of the operator.

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