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GRINDING MACHINE

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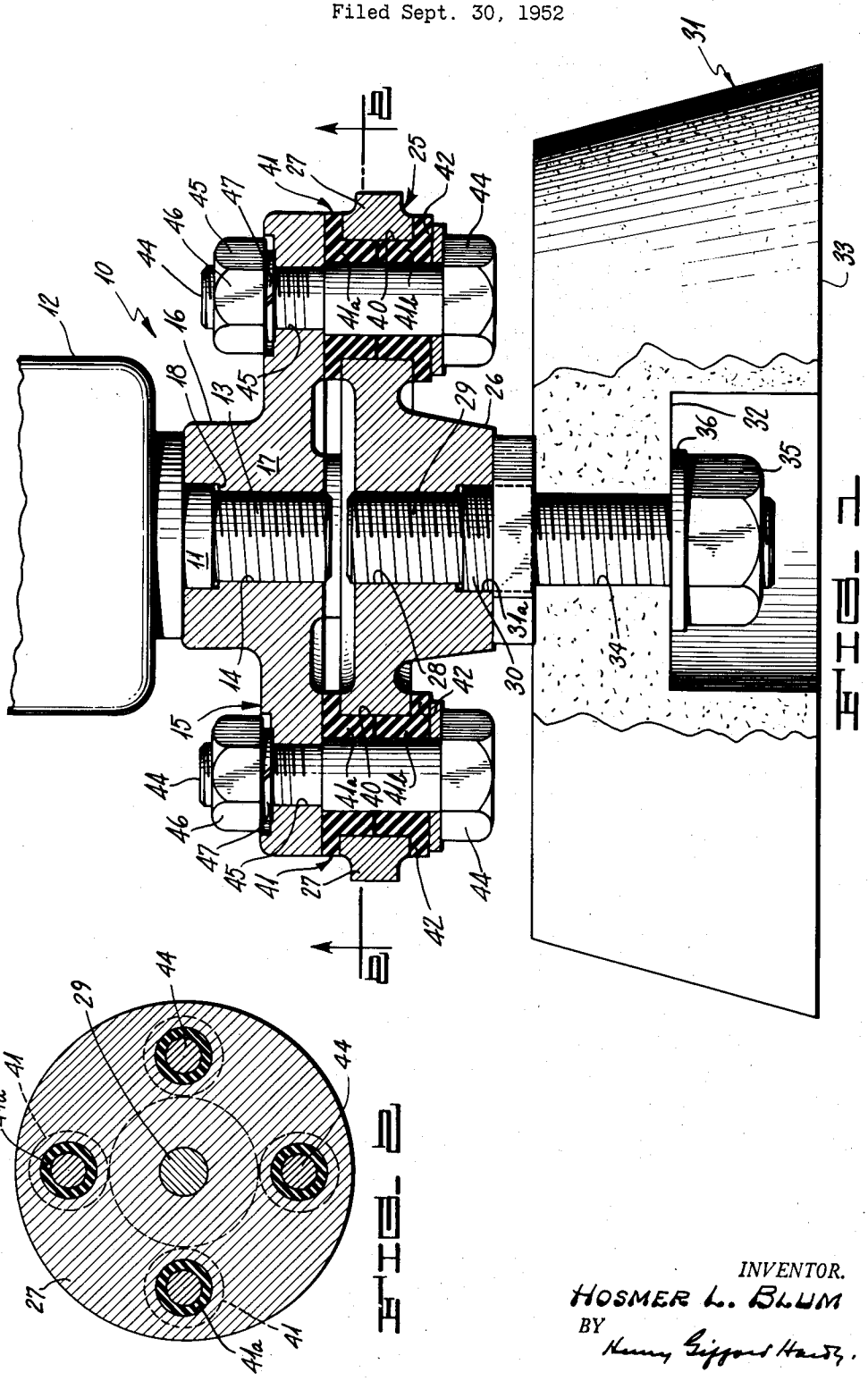


FIG. 1

FIG. 2

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GRINDING MACHINE

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This invention relates to a grinding machine. More particularly, it relates to a rotating mounting for grinding and polishing members especially adapted for delicate and accurate finishing operations.

In grinding and finishing operations of the character referred to above, it is desirable to achieve a flat grinding action and to avoid the tendency of a grinding wheel operating at high speed, to walk or dig into the surface which is being finished. It is also desirable to achieve this object without the necessity of an operator or a machine exerting a great deal of pressure on the grinding member when applied to the work, merely to maintain the position of the device in relation to the work.

It is an object of the present invention to provide an improved mounting for grinding and polishing devices of the character and for the purposes described.

It is a further object of the invention to provide a device of the character described which is operable for flat grinding without the necessity of an operator or a machine exerting a great amount of pressure on the work, either to maintain maximum operation effectiveness or to maintain the proper position of the device on the work.

It is a further object of the invention to provide an oscillating type of grinding apparatus in which the grinding member is caused to oscillate over the entire usable area and to accomplish flat, lap grinding with the whole available surface of the grinding member.

Further objects are to provide a construction of maximum simplicity, economy, and ease of manufacture, also such further objects, advantages and capabilities as will fully appear and as are inherently possessed by the advice and the invention described herein.

Invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings, and while there is shown therein a preferred embodiment thereof, it is to be understood that the same is merely illustrative of the invention and that the invention is capable of modification and change, and comprehends other details of construction without departing from the spirit thereof or the scope of the appended claims.

Referring to the drawings:

Figure 1 is a vertical sectional view taken through the device of the present invention, with a grinding stone shown partly in elevation.

Figure 2 is the horizontal section taken along the lines 2—2 of Figure 1, looking in the direction of the arrows.

Referring now to the drawings, the grinding device is generally designated as **10** and it is shown as being coupled to a spindle **11** which may be driven by a motor **12**. The spindle is threaded at **13** for reception in the threaded central bore **14** of a rotating or driving head **15**. The head **15** is formed with a central boss **16**, which is intended to abut the spindle **11**, and with an annular flange or body portion **17**. The threaded bore **14** is recessed at **18** to provide a snug fit with the spindle as illustrated.

The driving head **15** is intended to drive an oscillating

or driven head **25** and it is operatively connected thereto by means which will be described hereinafter. The driven head **25** is generally similar in construction to the driving head **15**. Thus, it comprises a centrally located boss **26** and an annular flange or body portion **27**, and the boss **26** is bored and threaded at **28** to receive the threaded end **29** of a spindle **30**. Also, the boss **26** is recessed at **31***a* to abut the spindle **30**, as illustrated. The lower end of the spindle **30** is adapted for attachment to a grinding wheel **31**, of conventional construction or any other conventional grinding or polishing element. As illustrated, the grinding stone **31** is recessed at **32** and formed with a central hole **34** to receive the lower end of the spindle **30**. It is secured to the spindle for rotating movement in any suitable manner, as by means of a nut **35** and a washer **36**. The entire surface of face **33** becomes the operating grinding area, and not merely a portion thereof as is required by present practice.

The oscillating or driven head **25** is formed about its periphery with four holes **40** which are spaced 90° apart. A rubber grommet or bushing **41** is provided for each of the holes **40**. Preferably, each grommet is split and comprises an upper section **41***a* and a lower section **41***b*, which are identical in construction but are oppositely arranged. As will be seen, each of the grommets **41***a* or **41***b* is of tubular construction and is formed with an annular flange **42**. These grommets fit snugly within the holes **40**. A cap screw **44** is provided for each of the holes **40** and it extends through its tubular grommet and also, through a hole **45** formed in the driving head **15**. Nuts **46** and washers **47** are provided for clamping the driving and driven heads **15** and **25** together.

In operation, as the motor **12** and the spindle **11** rotate, the driven head **25** and the grinding wheel **31** also rotate but are driven through the resilient grommets **41***a* and **41***b*, so that there is no fixed or solid connection between the driving head **15** and the driven head **25**. Due, however, to the plurality of resilient connections between the driving and driven heads and the placement of these connections symmetrically about the center of rotation, an oscillating torque effect is imparted to the rotation of the grinding wheel **31**, or to such other tool as may be attached thereto. That is to say, the usual concentric line or pattern of rotation is broken, especially when the grinding face is applied to the work even with a slight pressure. Since the oscillating torque movement breaks up the concentric pattern of rotation, no scoring is possible and a buffing or rubbing action results which makes lap grinding practical for large machines of this type. Since the entire face of the grinding surface is used, more work area may be covered in a short period of time, with uniform grinding depth and without digging. Such results have not been possible heretofore. It has long been observed that in attempting concentric grinding or polishing, such rotation tends to accumulate the material within the area of rotation and does not permit the removal of the unwanted dust which causes scoring and continuous fouling of the grinding surface. With the oscillatory torque of the present invention, the material removed by grinding or sanding is thrown to one side, with the result that it does not foul the surface which is being worked upon nor clog up and foul the grinding face.

In addition to the oscillating torque, the multiple resilient mounting provides for and permits displacement of the axis of rotation of the grinding wheel **31**, for example, relative to the motor shaft or spindle **11**. In the prior devices it has been essential to maintain axial alignment between the rotation of the grinding member and the axis of the motor shaft. If any deflection were permitted not only was there undue wear on the motor but the bearings and gears were subjected to excessive wear

and strain. The resilient mounting of the present invention will compensate for and make adjustments for misalignment of the axis of rotation between the grinding or surfacing tool and the motor shaft without requiring any reduction in speed and without any strain on either the motor, the bearings, or the gears.

It is apparent that while reference is made throughout this description to a grinding wheel or stone **31**, that other members or tools such as wire brushes, sanding or other forms of abrasive discs and polishing members may be used in place of the grinding stone **31** and attached to the device by means of a suitable threaded nut adapted to be received in the threaded bore **28**.

I claim:

1. A unitary device of the character described, comprising a driving disc adapted to be coupled to a motor shaft or the like, a driven disc adapted to be coupled to a grinding wheel or the like, said driven disc having a plurality of diametrically spaced perforations adjacent its perimeter, a plurality of rubber connecting members disposed between said discs and filling said perforations and resiliently spacing said discs, and means passing through said rubber members for securing said discs and said rubber members in resilient and nonmetallic engagement as a unit ready for attachment.

2. A device of the character described, comprising driving and driven discs adapted to be coupled, respectively, to a motor and to a grinding wheel or the like, said discs being arranged in concentric, axially spaced relationship, said driven disc being formed with a plurality of holes extending therethrough and arranged symmetrically about the center thereof, means connecting said discs comprising a tubular rubber grommet for each said hole having a body portion and an external flange, said body portion being received within its hole and said flange being disposed between and contacting opposing faces of said discs, and means for clamping said grommets to said discs.

3. A grinding device of the character described, comprising a motor having a shaft, a driving disc fixed to said shaft, a driven disc arranged in concentric, axially spaced relation to said driving disc, a grinding wheel fixed to said driven disc, said driven disc being formed with at least three holes formed therein and extending therethrough, said holes being disposed symmetrically about the center of said disc and about the periphery thereof, and means connecting said discs comprising a pair of tubular rubber grommets for each said hole, each said grommet having a body portion or shank fitted within said hole and an external flange bearing against a face of the driven disc, and means for clamping said grommets to said discs.

4. In a grinding or abrading machine of the character described comprising a rigid driving member and a rigid driven member to be driven thereby, to operate at high rotational speeds and to be subjected during operation to torque and distorting force, the improvement which comprises a plurality of oppositely disposed perforations adjacent the perimeter of said driven member, a plurality of separate and individual elastic members adapted to fill said perforations disposed between said driving member and driven member, and bolts passing through said elastic members for securing said driving and driven members and said elastic members as a unit in resilient nonmetallic engagement.

5. A coupling device of the character described, comprising concentrically arranged driving and driven members, one of said members having a plurality of diametrically spaced perforations adjacent the perimeter thereof, means producing a nonmetallic yielding connection between said members comprising a plurality of individual, nonconnecting resilient members passing through said perforations arranged symmetrically about the common center of said driving and driven members, and separate means associated with each of said resilient members for securing the yielding nonmetallic connection therebetween.

6. A unitary device of the character described comprising a driving member adapted to be coupled to a motor shaft or the like, a driven member adapted to be coupled to a grinding wheel or the like, said driven member having a plurality of peripheral spaced perforations arranged diametrically, means connecting said driving and driven members comprising a plurality of individual noncommunicating elastic members passing through and supported by said perforations, and separate means for securing said driving, driven and elastic members in resilient and nonmetallic engagement as a complete unit ready for coupling.

7. In a rotating device of the character described comprising axially spaced, concentrically arranged nonresilient driving and driven members, said driven member being intended to operate at high rotational speeds and to be subjected during operation to torque tending to distort its axis of rotation from the common axis of said members, the improvement which comprises a plurality of spaced perforations adjacent the perimeter of one of said driving or driven members and arranged diametrically, a plurality of separate elastic members passing through said perforations and separating said driving and driven members, and means for securing said driving, driven and elastic members together to form a unitary device with nonmetallic resilient engagement of its several members.

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