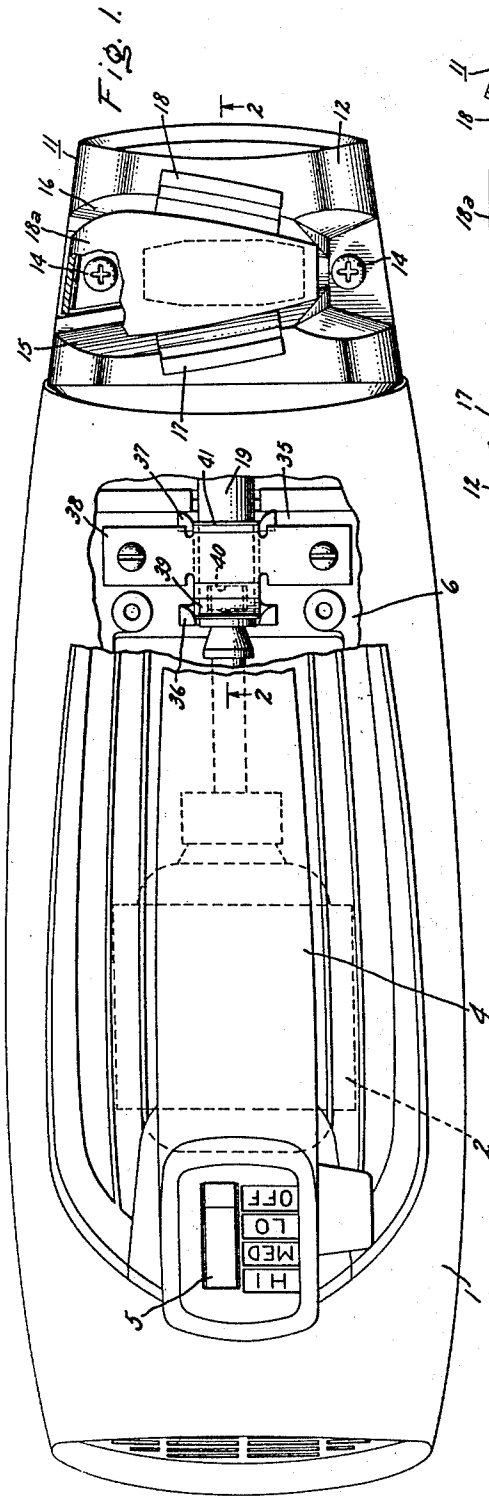
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KNIFE SHARPENER

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Fig. 1.



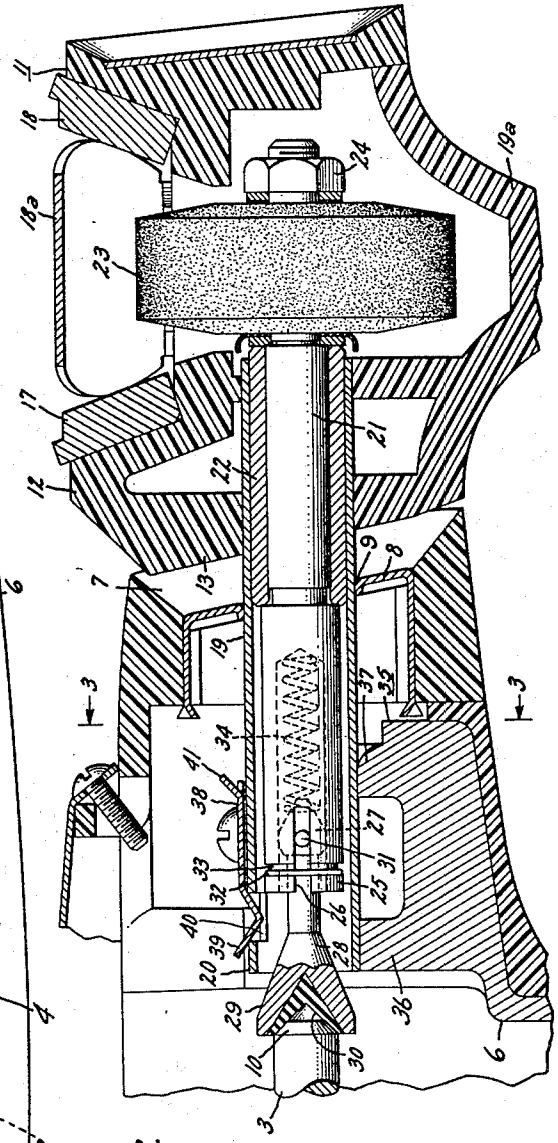


Fig. 2.

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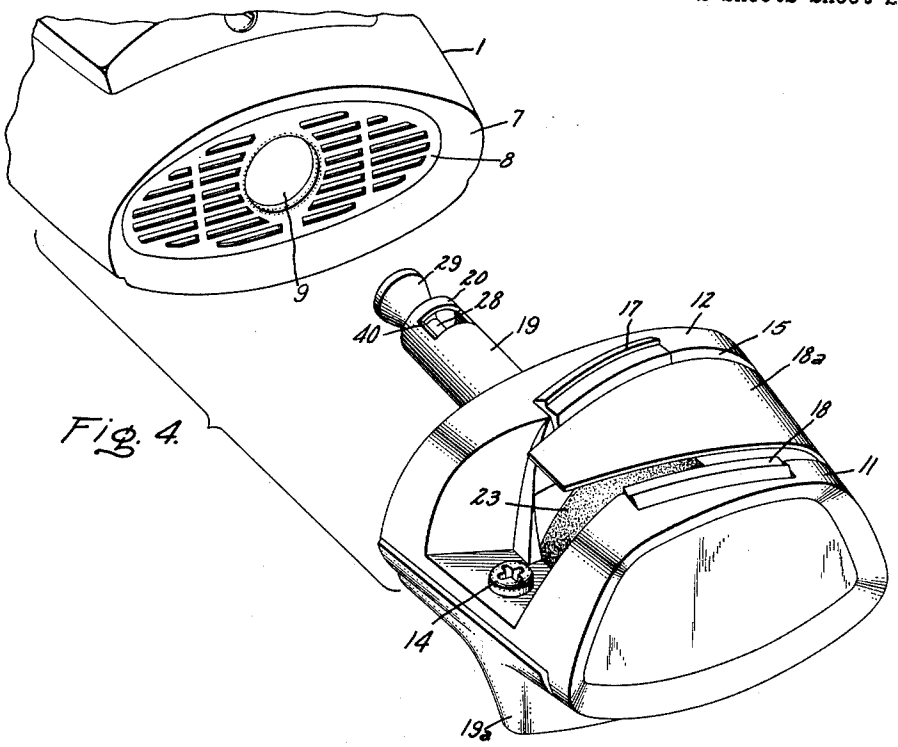
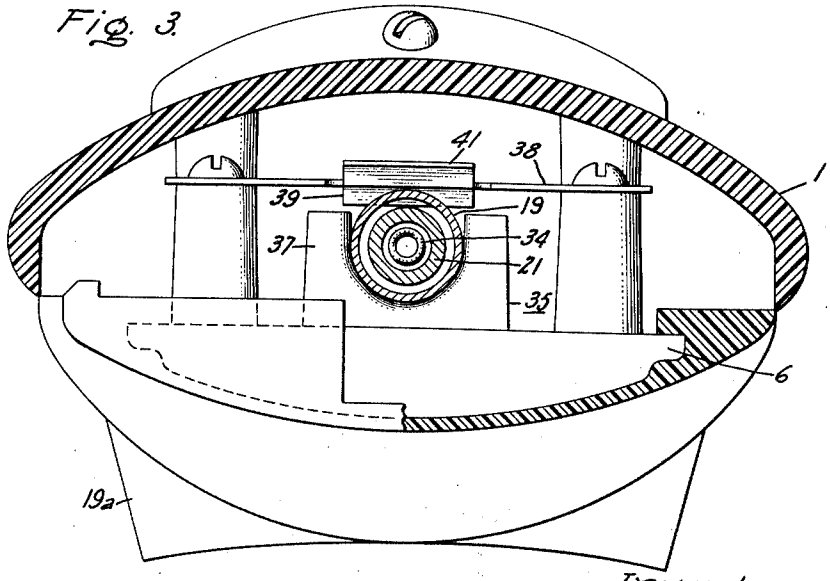


Fig. 4.

Fig. 3.



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KNIFE SHARPENER

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7 Claims. (Cl. 51—128)

This invention relates to motor driven knife sharpeners intended for use in the home, and more particularly to devices of this character adapted to be connected to and driven by a separate power unit such as a portable mixer.

The general object of the invention is to provide an improved knife sharpener attachment of the rotary grinding wheel type which may be releasably connected to a portable mixer or the like in such a way that close tolerances in the connecting mechanism are unnecessary, and the grinding wheel is frictionally driven so that it will stall under excessive sharpening pressure.

Further objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims appended to and forming a part of this specification.

Briefly stated, in accordance with one aspect of our invention there is provided a knife sharpener attachment including a grinding wheel mounted on a rotary shaft carried by a casing arranged to be detachably connected to a portable mixer, with the grinding wheel shaft and the mixer motor shaft in axial alignment. When so positioned the two shafts are frictionally connected by a clutch-like coupler secured by universal joint structure to the grinding wheel shaft.

For a better understanding of the invention, reference may be made to the following description and the accompanying drawings in which:

FIG. 1 is a top plan view of a knife sharpener attachment connected to the rear end of a portable mixer, some of the parts being broken away to show details of construction.

FIG. 2 is an enlarged fragmentary cross-sectional view taken along the line 2—2 in FIG. 1.

FIG. 3 is a cross-sectional view taken along the line 3—3 in FIG. 2.

FIG. 4 is a fragmentary exploded perspective view showing the knife sharpener attachment in position to be coupled to the mixer.

Referring to the drawings, the numeral 1 designates the housing of a portable mixer having an electric motor 2 including a rotary shaft 3 mounted within the housing. The mixer is provided with a handle 4 vertically spaced from housing 1, a speed control switch 5 and a pair of beater spindles extending through the bottom wall of the housing and connected by suitable gearing (not shown) to motor shaft 3. Motor 2 is mounted by suitable fastening means on motor frame 6, which may be made of die-cast metal and which is in turn suitably fastened within housing 1. Housing 1 and handle 4 may be conveniently formed in integral fashion from a molded plastic material. It will be understood that the mixer as thus far described is of a type which is well known in the art.

The rear wall of housing 1 includes a frame portion 7 and a central rear wall 8 having an opening 9 in the center thereof. Shaft 3 is arranged in axial alignment with opening 9 in the rear wall and is provided with a frusto-conical surface 10 which is spaced from the opening so as to permit the mounting of the knife sharpener attachment to be described hereafter.

The knife sharpener attachment is generally designated

by the numeral 11 and comprises a grinding wheel casing 12 having an end wall 13 similar in configuration to the rear wall of housing 1. Preferably, casing 12 is made of plastic material molded in two parts, an upper section and a lower section, secured together by a pair of screws 14. Casing 12 is provided with a top opening defined in part by inclined walls 15 and 16 which carry magnetic knife guides 17 and 18, respectively. A protective shield 18*a* is secured to casing 12 so as to overlie the top opening without interfering with placement of knives to be sharpened against the guides 17 and 18 in sharpening position.

Grinding wheel casing 11 also includes a tubular member 19 extending in generally perpendicular relation from wall 13, and a foot portion 19*a* integral with the lower section of the casing. Tubular member 19 is of somewhat lesser diameter than the diameter of opening 9 and is of such length that when inserted in the opening to the extent permitted by engagement of end wall 13 with rear wall portions 7 and 8 of the mixer housing its end portion 20 is in close proximity to the end of shaft 3.

A shaft 21 is carried by casing 11 for rotation within tubular member 19, being supported therein by sleeve bearing 22. One end of shaft 21 extends within the central portion of casing 11 and is threaded so that a grinding wheel 23 may be mounted thereon by means of nut 24. It will be understood that grinding wheel 23 is secured in fixed relation to shaft 21 so that it may be driven thereby when the shaft is coupled to the motor shaft 3 of the mixer. As shown in FIG. 2, the side faces of grinding wheel 23 are suitably inclined so that when a knife is inserted through the top opening of the casing in contact with the face of either guide 17 or guide 18, the edge of the knife contacts the grinding wheel at the proper grinding angle.

End portion 25 of shaft 21 is formed with a central bore so as to be of tubular configuration and is provided with a longitudinal slot 26 extending entirely across the diameter of the shaft. Telescopically mounted within end portion 25 of shaft 21 is the conical end portion 27 of a frictional clutch type coupler 28. Coupler 28 includes a cup-shaped end portion 29 having a clutch surface 30 arranged to mate with and engage frusto-conical surface 10 on the end of shaft 3.

In order to obviate the necessity of assuring perfect alignment of shaft 21 with respect to shaft 3, coupler 28 is connected to end portion 19 of the shaft by a universal joint arrangement which includes a cross-pin 31 secured to the end portion 27 of the coupler so as to rest in sliding engagement with slot 26. A retaining ring 32 positioned in a peripheral slot 33 adjacent the end of shaft 21 limits movement of cross-pin 31 and prevents coupler 28 from being completely removed from the shaft. The clutch surface 29 of the coupler must be held in engagement with the end of shaft 3 and this is accomplished by a spring 34 positioned within tubular end portion 19 of the shaft which engages end portion 27 of the coupler and biases it axially toward shaft 3, as shown in FIG. 2.

Knife sharpener casing 11 is arranged to be detachably secured to the rear wall of mixer housing 1 with coupler 28 in frictional engagement with the end of motor shaft 3, and thus a support member 35 is disposed within housing 1 between the end of shaft 3 and opening 9 in the rear wall of the housing. Support member 35 comprises a pair of generally U-shaped support arms 36 and 37 arranged to embrace at spaced points end portion 20 of tubular member 19, and a flat spring member 38 secured to motor frame 6 so as to overlie end portion 20 of the tubular member. A resilient detent element 39 extends forwardly from spring 38 over end portion 20, which is

provided with an aperture 40 positioned so as to receive the detent element. Thus tubular element 19 may be properly positioned and releasably held in place with coupler 28 in frictional engagement with shaft 3. Spring member 38 also includes an upwardly inclined lip portion 41 which functions to guide end portion 29 of coupler 28 and end portion 20 of tubular member 19 into proper position when these parts are inserted through opening 9 in the rear wall of the mixer. It will be understood that detent 39 cooperates with aperture 40 in releasably securing tubular member 19 in its proper axial position and, to some extent, prevents rotary movement of the tubular member during knife sharpening operations. The oval configuration of rear wall portions 7 of the mixer and end wall 13 of the grinding wheel casing also cooperate to prevent rotation of the tubular member in the entire grinding wheel case inasmuch as wall 13 is arranged to nest within wall portion 7.

In operation, the mixer (with the beaters removed) is placed on a counter top or other horizontal surface and the sharpener attachment is positioned as shown in FIG. 4. Tubular member 19 may then be inserted in opening 9 in the rear of the mixer. When the parts are releasably engaged as shown in FIG. 2 foot portion 19*a* supports casing 11 on the counter top and the mixer motor shaft 3 is coupled to grinding wheel shaft 21. Since the driving force from mixer motor 2 is transmitted to the grinding wheel through the friction clutch arrangement provided by coupler 28, excessive pressure of a knife against the grinding wheel which might result in nicking or burning of the blade causes the clutch arrangement to slip and the wheel stalls before damage to the knife occurs. Upon completion of sharpening operations the knife sharpener attachment is easily removed by pulling casing 11 away from the mixer so as to disengage detent 39, such removal being facilitated if casing 11 is twisted slightly as it is withdrawn.

While we have disclosed a particular embodiment of our invention, we do not desire the invention to be limited to the specific construction disclosed, and we intend by the appended claims to cover all modifications within the true scope of our invention.

What we claim is:

1. A knife sharpener comprising: a power unit having a motor driven first shaft, a grinding wheel casing, means for detachably connecting said casing to said power unit, a second shaft carried by said casing and positioned so as to be in axial alignment with said first shaft when the casing is connected to said power unit, a grinding wheel carried by said casing, said second shaft being in driving engagement with said wheel, and frictional clutch means for coupling said second shaft to said first shaft including a coupler extending axially from said second shaft into abutting frictional engagement with an end portion of said first shaft when said casing is connected to said power unit, and universal joint means connecting said coupler to said second shaft.

2. A knife sharpener comprising: a power unit having a motor driven first shaft, a grinding wheel casing, means for detachably connecting said casing to said power unit, a second shaft carried by said casing and positioned so as to be in axial alignment with said first shaft when the casing is connected to said power unit; a grinding wheel carried by said casing, said second shaft being in driving engagement with said wheel, and frictional clutch means for coupling said second shaft to said first shaft including a coupler extending axially from said second shaft into abutting frictional engagement with an end portion of said first shaft when said casing is connected to said power unit, and universal joint means connecting said coupler to said second shaft, said universal joint means including means allowing limited axial movement of said coupler with respect to said second shaft and spring means biasing said coupler toward said first shaft.

3. A knife sharpener comprising: a power unit including a housing having an opening in one wall thereof and a motor driven first shaft located within said housing in alignment with said opening, the end of said first shaft being spaced from said opening; a grinding wheel casing having an end wall and a tubular member extending therefrom, said tubular member being of lesser diameter than said opening and of such length that when inserted in said opening to the extent permitted by engagement of said end wall with said one wall its end portion is in close proximity to the end of said first shaft; means for detachably securing said casing to said power unit with said tubular member extending through said opening into close proximity to the end of said first shaft; a second shaft carried by said casing and extending within said tubular member, a grinding wheel fixedly mounted on said second shaft; a coupler extending axially from said second shaft, said coupler having a clutch surface arranged to engage the end of said first shaft; and universal joint means connecting said coupler to said second shaft.

4. A knife sharpener comprising: a power unit including a housing having an opening in one wall thereof and a motor driven first shaft located within said housing in alignment with said oepning, the end of said first shaft being spaced from said opening; a grinding wheel casing having an end wall and a tubular member extending therefrom, said tubular member being of lesser diameter than said opening and of such length that when inserted in said opening to the extent permitted by engagement of said end wall with said one wall its end portion is in close proximity to the end of said first shaft; means for detachably securing said casing to said power unit with said tubular member extending through said opening into close proximity to the end of said first shaft; a second shaft carried by said casing and extending within said tubular member; a grinding wheel fixedly mounted on said second shaft; a coupler extending axially from said second shaft, said coupler having a clutch surface arranged to engage the end of said first shaft; and universal joint means connecting said coupler to said second shaft, said universal joint means including means allowing limited axial movement of said coupler with respect to said second shaft and spring means biasing said coupler toward said first shaft.

5. A knife sharpener comprising: a power unit including a housing having an opening in one wall thereof and a motor driven first shaft located within said housing in alignment with said opening, the end of said first shaft being spaced from said opening; a grinding wheel casing having an end wall and a tubular member extending therefrom, said tubular member being of lesser diameter than said opening and of such length that when inserted in said opening to the extent permitted by engagement of said end wall with said one wall its end portion is in close proximity to the end of said first shaft; a support member disposed within said housing between the end of said first shaft and said opening, said support member having a resilient detent element biased into engagement with said tubular member and being arranged to hold said tubular member in fixed relation to said housing; said tubular member having an aperture therein positioned so as to receive said detent element; a second shaft carried by said casing and extending within said tubular member; a grinding wheel fixedly mounted on said second shaft; a coupler extending axially from said second shaft, said coupler having a clutch surface arranged to engage the end of said first shaft; and universal joint means connecting said coupler to said second shaft.

6. A knife sharpener comprising: a power unit including a housing having an opening in one wall thereof and a motor driven first shaft located within said housing in alignment with said opening, the end of said first shaft being spaced from said opening; a grinding wheel casing having an end wall and a tubular member extending therefrom, said tubular member being of lesser diameter than said opening and of such length that when inserted in said opening to the extent permitted by engagement of said

end wall with said one wall its end portion is in close proximity to the end of said first shaft; means for detachably securing said casing to said power unit with said tubular member extending through said opening into close proximity to the end of said first shaft; a second shaft carried by said casing and extending within said tubular member, the end portion of said second shaft adjacent said end portion of said tubular element having a longitudinal slot therein and being of tubular configuration; a grinding wheel fixedly mounted on said second shaft; a coupler extending axially from said second shaft in telescopic relation therewith, said coupler having a clutch surface arranged to engage said frusto-conical surface on the end of said first shaft; and universal joint means connecting said coupler to said second shaft, said universal joint means including a cross-pin secured to said coupler so as to be in sliding engagement with said slot, and a spring within said second shaft biasing said coupler axially toward said first shaft.

7. A knife sharpener comprising: a power unit including a housing having an opening in one wall thereof and a motor driven first shaft located within said housing in alignment with said opening, the end of said first shaft being spaced from said opening and having a frusto-conical surface thereon; a grinding wheel casing having an end wall and a tubular member extending therefrom, said tubular member being of lesser diameter than said opening and of such length that when inserted in said opening to the extent permitted by engagement of said end wall with said one wall its end portion is in close proximity to the end of said first shaft; a support member disposed within said housing between the end of said first shaft and said opening, said support member having a resilient detent element biased into engagement with said tubular member and being arranged to hold said tubular member in fixed relation to said housing; said tubular member having an aperture therein positioned so as to receive said detent element; a second shaft carried by said casing and extending within said tubular member, the end portion of said second shaft adjacent said end portion of said tubular element having a longitudinal slot therein and being of tubular configuration; a grinding wheel fixedly mounted on said second shaft; a coupler extending axially from said second shaft in telescopic relation therewith, said coupler having a cup-shaped clutch surface arranged to engage said frusto-conical surface on the end of said first shaft; and universal joint means connecting said coupler to said second shaft, said universal joint means including a cross-pin secured to said coupler so as to be in sliding engagement with said slot, and a spring within said second shaft biasing said coupler axially toward said first shaft.

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