United States Patent [19]

Gangelhoff et al.

[11] **3,811,226**

[45] **May 21, 1974**

[54] **KNIFE GRINDING AND HONING MACHINE**

[76] Inventors: **Fred R. Gangelhoff,** 1691 Lake Ave., Largo, Fla. 33540; **Harry A. Beyer,** 2096 U.S. 19 S., Lot 1423, Clearwater, both of Fla. 33516

[22] Filed: **Dec. 19, 1972**

[21] Appl. No.: **316,554**

[52] **U.S. Cl.** ..... **51/80 R**

[51] **Int. Cl.** **B24b 3/00,** B24b 9/00

[58] **Field of Search** ..... 51/80 RA, 81 BS, 110, 165, 51/78, 354

[56] **References Cited**

UNITED STATES PATENTS

631,842	8/1899	Worden	51/80 R
1,180,727	4/1916	Kelly	51/80 R
1,370,381	3/1921	Tarbox	51/81 BS
2,228,385	1/1941	Burns	51/80 R
2,482,633	9/1949	Nichols	51/80 R
2,617,235	11/1952	Lindahl	51/80 R

Primary Examiner—Othell M. Simpson

Attorney, Agent, or Firm—Clarence A. O'Brien; Harvey B. Jacobson

[57] **ABSTRACT**

A pair of generally parallel shafts are supported from a base for simultaneous and equal inverse lateral shifting toward and away from each other and the shafts each include a plurality of grinding wheels mounted thereon for rotation therewith. The grinding wheels of one shaft may be overlapped in relation to the grinding wheels of the other shaft as the shafts are shifted toward each other and spring structure is provided and yieldingly urges the shafts toward each other. Adjustable abutment structure is provided for limiting movement of one of the shafts toward the other and a rotary motor is drivingly connected to the shafts for equally rotating the latter in opposite directions.

9 Claims, 4 Drawing Figures

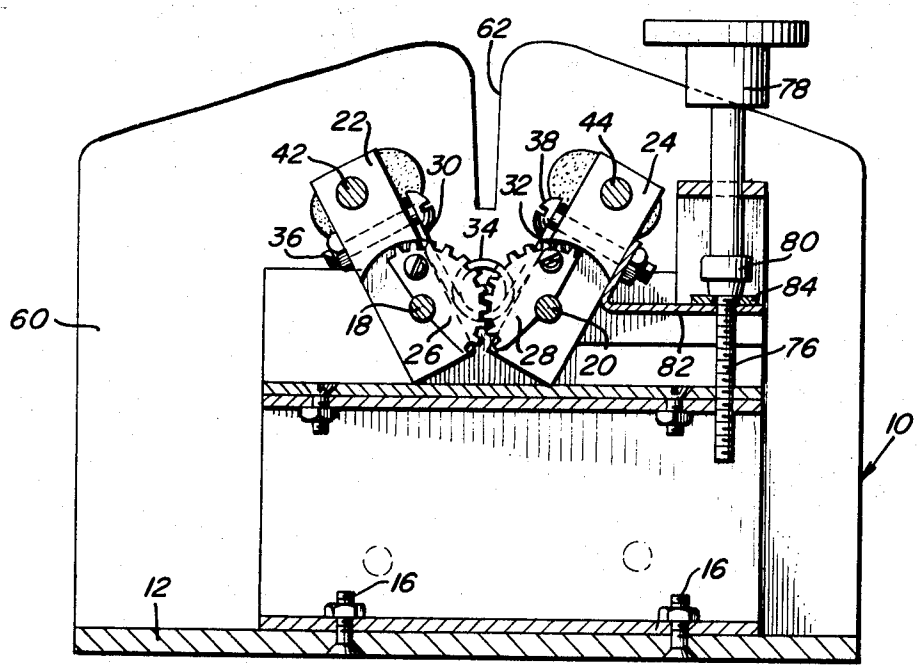


Fig. 1

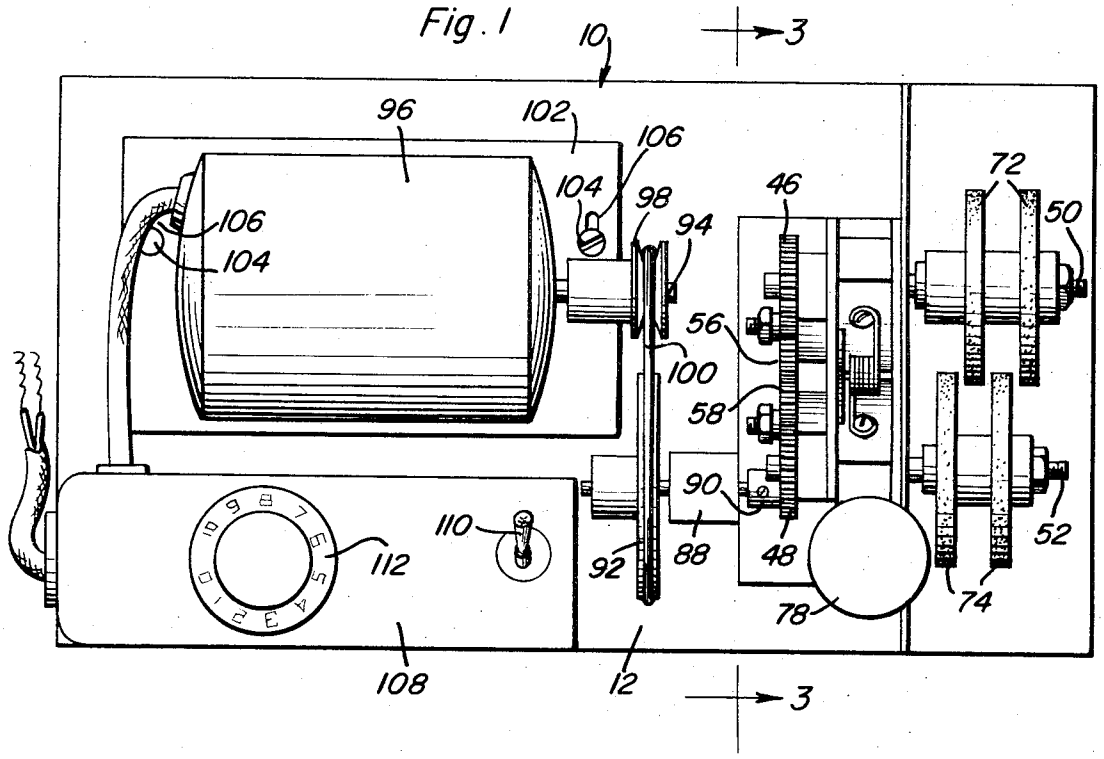

10
3
96
102
106
104
98
94
46
72
50
106
104
56
100
58
90
88
48
52
74
78
110
112
92
108
12
3

Fig. 2

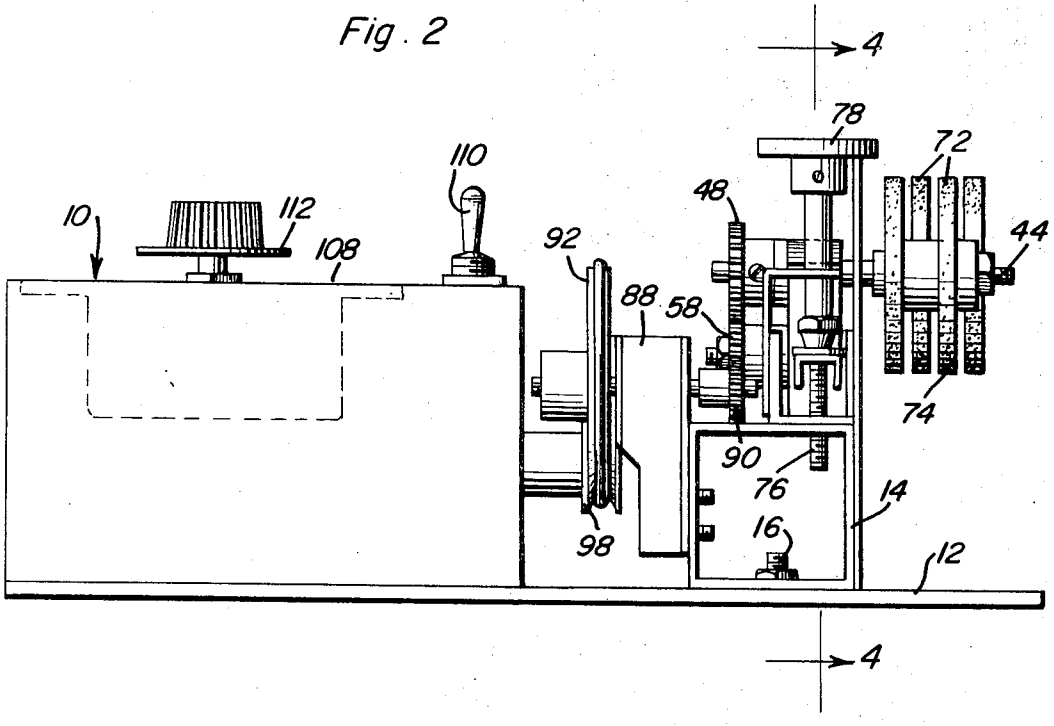

4
78
72
110
48
10
112
108
92
88
58
44
74
90
76
14
16
98
12
4

Fig. 3

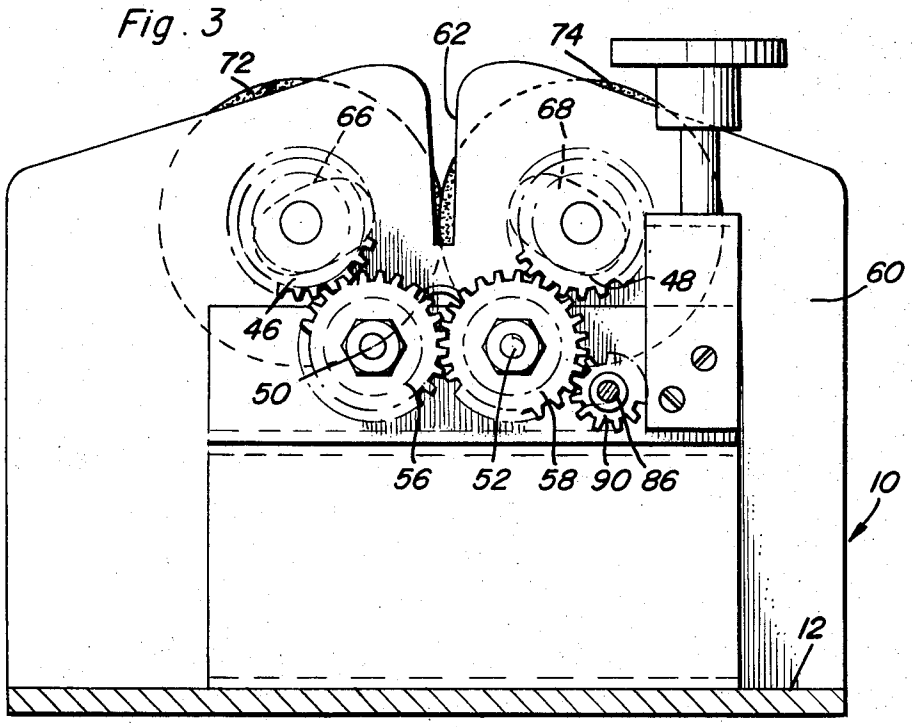
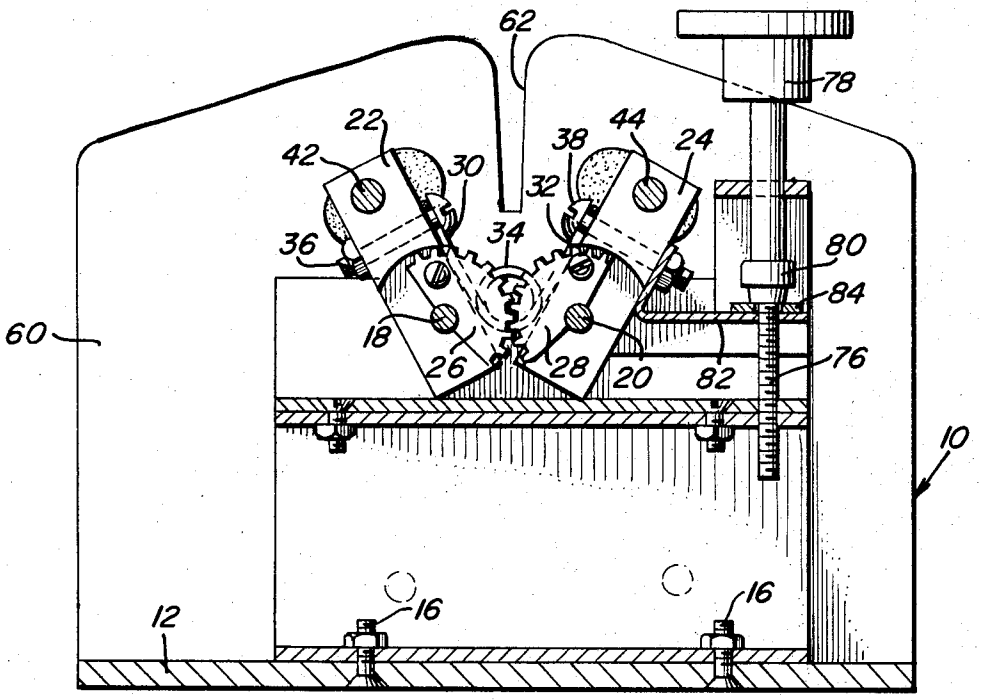

72
62
74
66
68
48
60
46
50
56
52
58
90
86
10
12

Fig. 4


62
78
22
42
30
38
44
24
32
36
34
80
84
60
18
26
28
20
82
76
10
12
16
16

KNIFE GRINDING AND HONING MACHINE

The knife grinding and honing machine of the instant invention has been specifically designed to provide a means by which a precise sharpened edge may be formed on a cutting blade. The knife grinding and honing machine is constructed in a manner whereby sufficient support for the blade being sharpened is provided so that the blade will be properly guided while it is shifted longitudinally relative to the rotating grinding wheel of the machine. In this manner, even unexperienced persons may obtain the desired sharpened edge on a blade.

The main object of this invention is to provide a grinding and honing apparatus which may be utilized to sharpen substantially all types of blade instruments including knives, hatchets, axes and other straight bladed cutting instruments.

Another object of this invention is to provide an apparatus which will be capable of forming a specific bevel on each side of the blade to be sharpened and which may be adjusted to vary the angle of the bevel.

It is also another object of this invention to provide a sharpening apparatus which will be capable of forming a hollow ground cutting edge on a cutting blade.

A still further important object of this invention is to provide a sharpening device which will itself provide the majority of support and guidance for the blade being sharpened.

An ancillary object of this invention is to provide a blade sharpening apparatus which may be effectively adjusted so as to enable the grinding of the blade behind the cutting edge thereof.

Another very important object of this invention is to provide a blade sharpening apparatus utilizing overlapped grinding wheels and which will automatically compensate for slight irregularities in the grinding wheels.

A further object of this invention is to provide a blade sharpening apparatus which will be capable of forming the same level on each side of the cutting edge being formed.

Yet another important object of this invention is to provide a blade sharpening apparatus which may be adjusted during its operation so as to vary the bevel of the cutting edge being formed.

A final object of this invention to be specifically enumerated herein is to provide a blade sharpening apparatus in accordance with the preceding objects and which will conform to conventional forms of manufacture, be of simple construction and easy to use so as to provide a device that will be economically feasible, long lasting and relatively trouble-free in operation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

FIG. **1** is a top plan view of the knife grinding and honing machine of the instant invention;

FIG. **2** is a side elevational view of the assemblage illustrated in FIG. **1**;

FIG. **3** is an enlarged fragmentary vertical sectional view taken substantially upon the plane indicated by the section line **3—3** of FIG. **1**; and

FIG. **4** is an enlarged fragmentary transverse vertical sectional view taken substantially upon the plane indicated by the section line **4—4** of FIG. **2**.

Referring now more specifically to the drawings, the numeral **10** generally designates the knife grinding and honing machine of the instant invention. The machine **10** includes a base **12** from which a mount **14** is supported. The mount **14** is secured to the base **12** by means of fasteners **16** and a pair of pivot shafts **18** and **20** are oscillatably supported from the mount **14** for angular displacement about generally parallel axes. The shafts **18** and **20** have a pair of swing support arms **22** and **24** supported therefrom and the arms **22** and **24** have sector gears **26** and **28** mounted thereon and meshed with each other. The arms **30** and **32** of a butterfly spring **34** are secured to the arms **22** and **24** by means of fasteners **36** and **38** and the butterfly spring **34** urges the upper free ends of the swing support arms **22** and **24** toward each other.

A pair of spindle shafts **42** and **44** are journaled from the free ends of the arms **22** and **24** and the rear ends of the spindles **42** and **44** have a pair of gear wheels **46** and **48** mounted thereon for rotation therewith. In addition, a pair of parallel intermediate shafts **50** and **52** are journaled from the mount **14** and have intermediate gear wheels **56** and **58** mounted thereon and meshed with each other. In addition, the wheels **56** and **58** are meshed with the wheels **46** and **48.**

The mount **14** includes an upstanding shield plate **60** including an upwardly opening notch **62** and a pair of upwardly convergent openings **66** and **68** formed therein through which the forward end portions of the shafts **42** and **44** project. The forward ends of the shafts **42** and **44,** disposed forwardly of the plate **60,** include pairs of axially spaced grinding wheels **72** and **74** and it may be seen from FIGS. **1** and **2** of the drawings that the wheel **72** may be overlapped relative to the wheel **74** when the shafts **42** and **44** are swung toward each other.

An upstanding abutment screw **76** has its lower threaded end threadedly engaged with the mount **14** and is provided with a hand-engageable knob **78** on its upper end. The intermediate portion of the screw **76** has an abutment **80** mounted thereon and an abutment arm **82** is secured to the arm **24** by means of the fastener **38** and includes a low friction pad **84** engageable by the abutment **80** to limit upward swinging movement of the arm **82** as viewed in FIG. **4** of the drawings so as to limit swinging movement of the upper ends of the arms **22** and **24** toward each other. Of course, as the screw **76** is threaded downward relative to the mount **14,** the wheels **72** and **74** are swung away from each other and as the screw **76** is threaded upwardly relatively to the mount **14** the wheels **72** and **74** are allowed to swing toward each other under the biasing action of the butterfly spring **34.**

A jackshaft **86** is journaled from a journal support **88** mounted on the mount **14** and the front end of the jackshaft **86** has a drive gear wheel **90** mounted thereon for rotation therewith and meshed with the wheel **58.** The rear end of the jackshaft **86** has a large diameter pulley **92** mounted thereon and the output shaft **94** of an electric motor **96** has a small diameter pulley wheel **98** mounted thereon in alignment with the pulley wheel **92.** An endless flexible belt **100** is trained about the pulley wheels **98** and **92** so as to drivingly connect the former to the latter.

The electric motor **96** includes a base plate **102** secured to the base **12** by means of fasteners **104** secured through transverse slots **106** formed in the mounting plate **102.** In addition, the electric motor **96** has a voltage controlling unit **108** operatively associated therewith. The unit **108** is supported from the base **12** and includes an on-off switch **110** as well as a variable voltage control **112** whereby operation of the motor **96** may be initiated by the switch **110** and the speed of rotation of the shaft **94** may be controlled by the control **112.** Of course, suitable wiring is provided with the voltage control and on-off switch serially connected therein.

When it is desired to sharpen a blade, the arm **82** may be positioned as illustrated in FIG. **4** of the drawings to cause the grinding wheels **72** and **74** to overlap in the manner illustrated in FIGS. **1** and **3** of the drawings. Then, the switch **110** and control **112** may be actuated in order to drive the spindles **42** and **44** at the desired speed. Thereafter, the blade to be sharpened may be introduced downwardly through the slot **62** and engaged with the wheels **72** and **74** while the blade is being moved longitudinally relative to the wheels **72** and **74.** If the bevel on the blade to be sharpened is to be smaller, the knob **78** may be turned to thread the screw **76** downwardly so as to swing the spindles **42** and **44** slightly further apart and reduce the overlap of the wheels **72** and **74.** Conversely, if the bevel is to be greater, the knob **78** may be turned so as to raise the screw **76** and thereby increase the overlap of the wheels **72** and **74.**

If, after being used for some time, the wheels **72** and **74** become slightly out of round, inasmuch as the free ends of the arms **22** and **24** are free to move away from each other against the biasing action of the butterfly spring **34,** slight irregularities of the wheels **72** and **74** may be compensated for. In addition, inasmuch as the arms **22** and **24** are geared together for simultaneous swinging toward and away from each other, the movement of one pair of wheels away from the blade being sharpened due to irregularities in those wheels will also cause movement of the other wheels away from the blade being sharpened. This of course will maintain the bevel on opposite sides of each longitudinal portion of the blade being sharpened the same and enable the machine to more quickly compensate for irregular grinding wheels.

Inasmuch as the grinding wheels **72** and **74** may be rotated at reasonably high speed for grinding purposes and at low speeds for lapping purposes, an extremely true cutting edge may be formed on the blade being sharpened. Also, inasmuch as the free ends of the arms **22** and **24** may be swung apart sufficiently to cause the wheels **72** and **74** to move out of overlapping relation, the blade being sharpened may be ground behind the edge to be sharpened.

In addition to the preceding, it is to be noted that the grinding wheels **72** and **74** rotate in counterclockwise and clockwise direction, respectively, as viewed in FIG. **3** of the drawings so as to insure against the frictional engagement of the wheels **72** and **74** tending to pull the blade being sharpened down between the grinding wheels. Also, the grinding wheels **72** and **74** are disposed on the side of the shield plate **60** remote from the drive assembly for the shafts **42** and **44** thereby insuring that the drive assembly will not be subject to grinding wheel dust during grinding operations or splash during wet grinding operations. Further, shields may be provided for all but the adjacent marginal portions of the grinding wheels **72** and **74** if desired. Such shields may be supported from the arms **22** and **24** and include mounting portions swingable through the slots **66** and **68.**

When the wheels are overlapped an adverse angle is obtained for truing the edge of a blade to be sharpened. Also, suitable shields (not shown) may be provided and carried by the shafts **42** and **44** for effectively closing the openings **66** and **68** against grinding wheel particles and lubricant splash passing through the openings **66** and **68.**

The variable speed motor **96** will of course be set at slow speed operation during wet grinding operations to reduce the possibility of splashing the liquid lubricant being used and a suitable sheet metal covering (not shown) may be provided and supported from the shield plate **60** to enclose the drive mechanism exclusive of or including the pulley wheels **92** and **98** as well as the endless belt **100.**

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. A knife grinding and honing machine comprising a base, two generally parallel shafts, means supporting the shafts from the base for simultaneous inverse lateral shifing toward and away from each other, means yieldingly urging said shafts toward each other, means adjustably limiting movement of at least one of said shafts toward the other, said shafts having grinding wheels mounted thereon including overlapped outer peripheral portions, and motor means drivingly connected to said shafts.

2. The combination of claim **1** wherein said shafts are oscillatable about generally parallel axes spaced to one side of a plane containing the first-mentioned axes.

3. The combination of claim **1** wherein said means supporting the shafts for simultaneous inverse lateral shifting toward and away from each other include means enabling the shafts to be sufficiently shifted away from each other to cause the grinding wheels mounted thereon to move out of overlapped relation.

4. The combination of claim **1** wherein each of said shafts has a plurality of axially spaced grinding wheels mounted thereon.

5. The combination of claim **1** wherein said motor means is drivingly connected to said shafts for rotating the latter equally in opposite directions of rotation.

6. The combination of claim **5** wherein each of said shafts has a pluraality of axially spaced grinding wheels mounted thereon.

7. The combination of claim **6** wherein said means supporting the shafts for simultaneous inverse lateral shifting toward and away from each other include means enabling the shafts to be sufficiently shifted away from each other to cause the grinding wheels mounted thereon to move out of overlapped relation.

8. The combination of claim 7 wherein said shafts are oscillatable about generally parallel axes spaced to one side of a plane containing the first-mentioned axes.

9. The combination of claim 8 wherein said motor means includes means for infinitely varying the speed of rotation of said shafts between predetermined low and high speeds.

* * * * *