Nov. 17, 1953

A. T. MEAD ET AL

2,659,184

TOOL SHARPENING MACHINE

Filed Feb. 11, 1952

3 Sheets-Sheet 1

Fig. 10

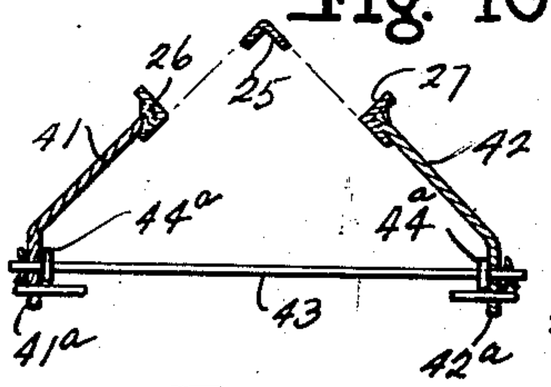


Fig. 11

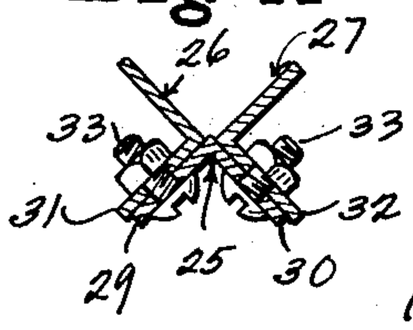


Fig. 1

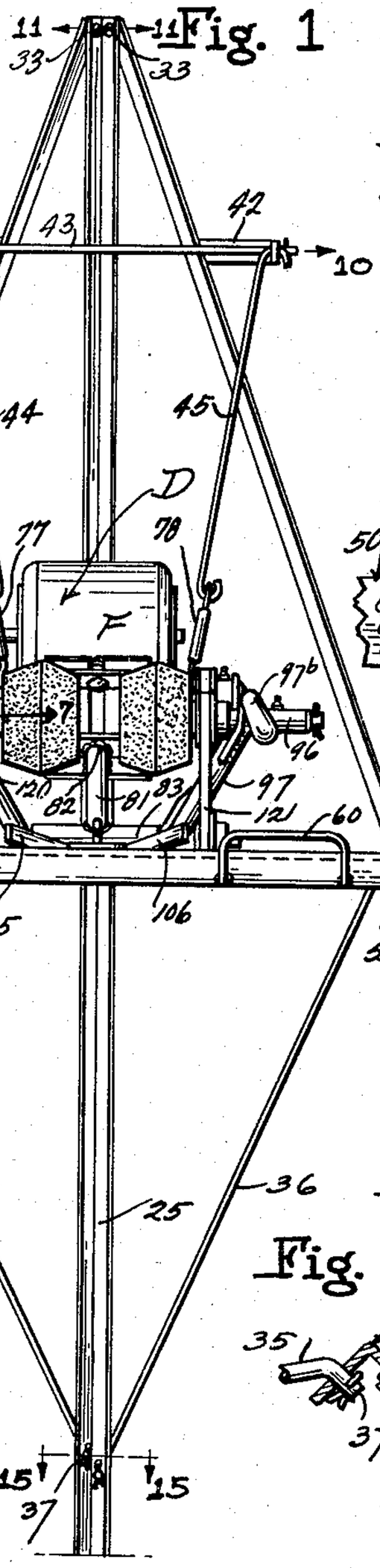


Fig. 14

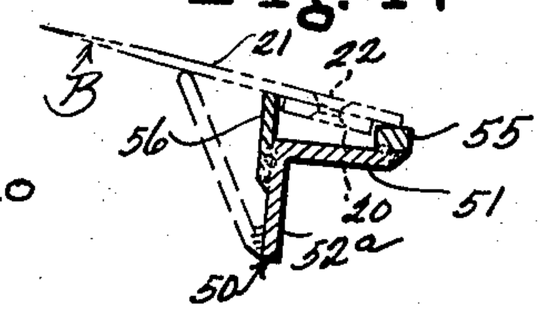


Fig. 12

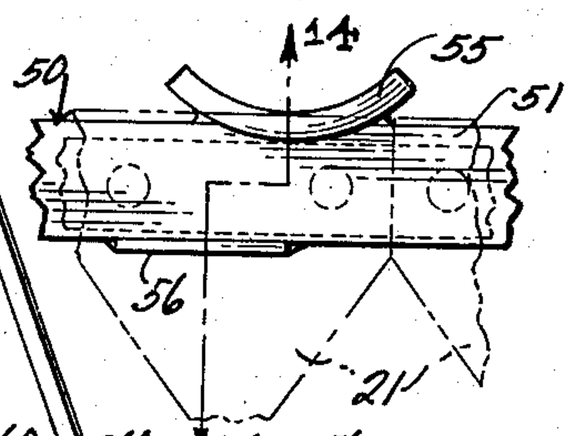


Fig. 15

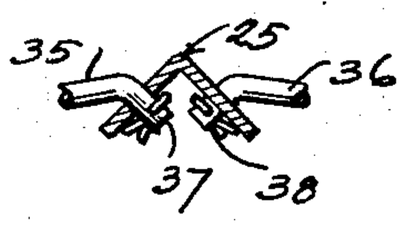


Fig. 13

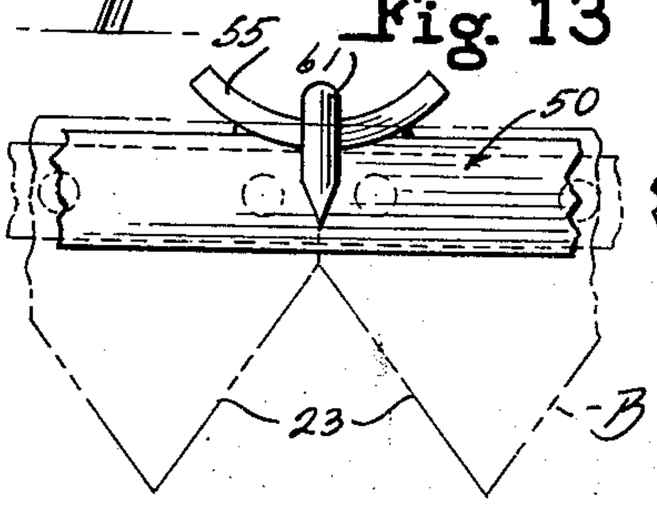
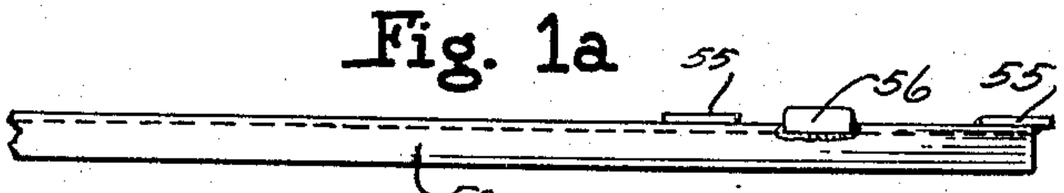


Fig. 1a



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TOOL SHARPENING MACHINE

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Fig. 3

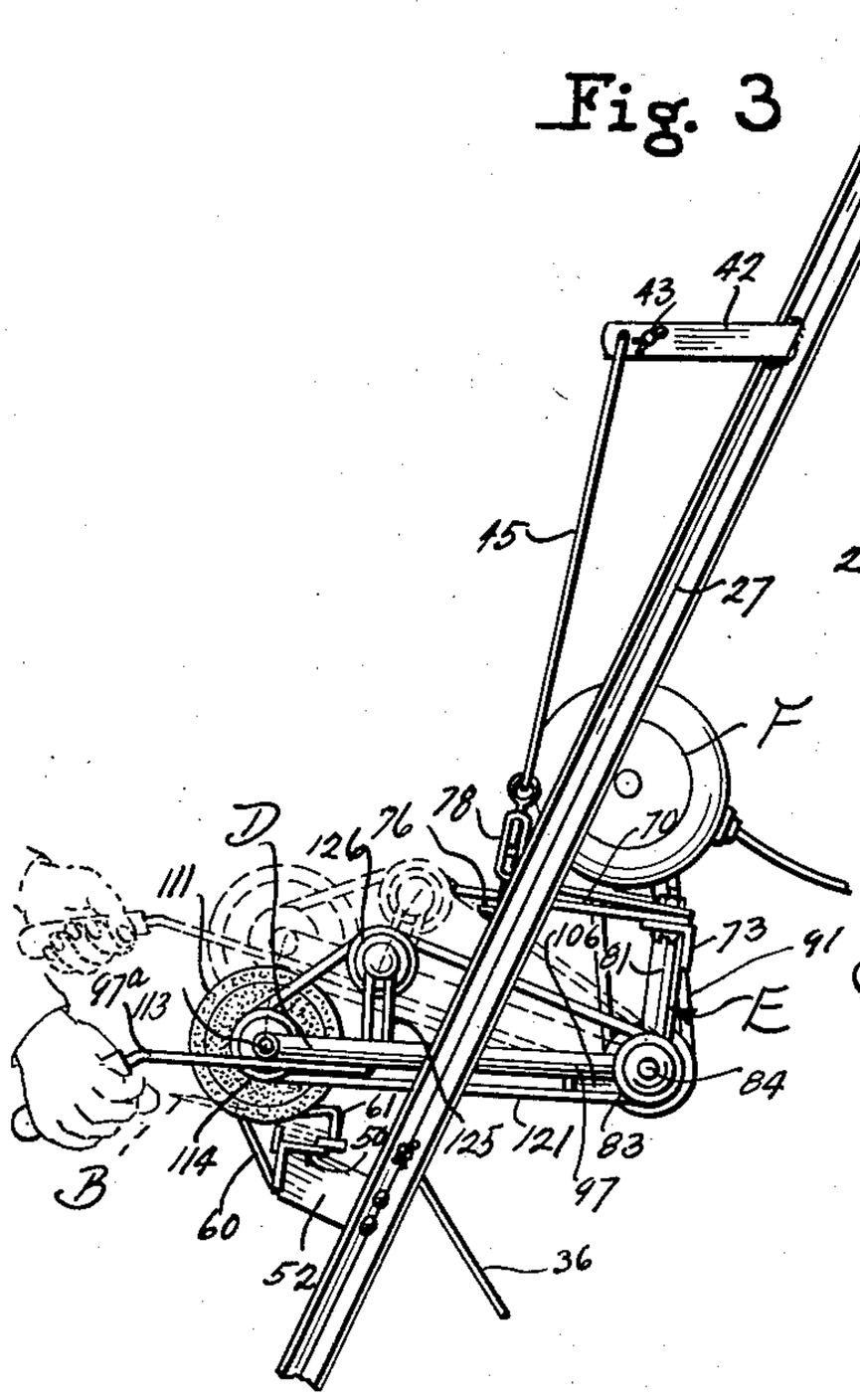


Fig. 2

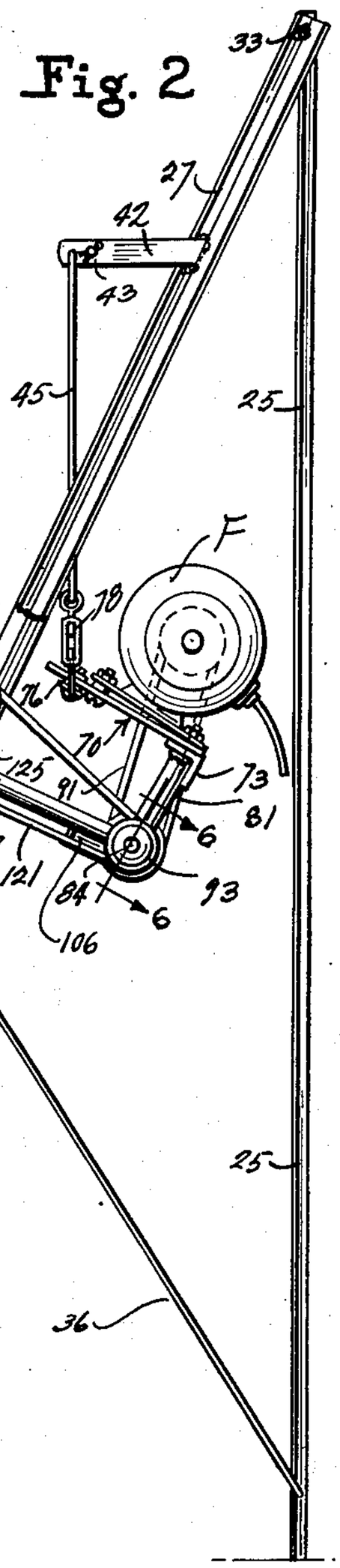


Fig. 9

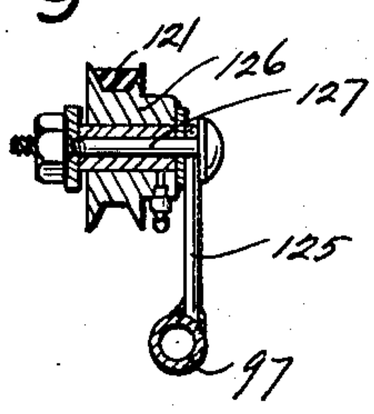
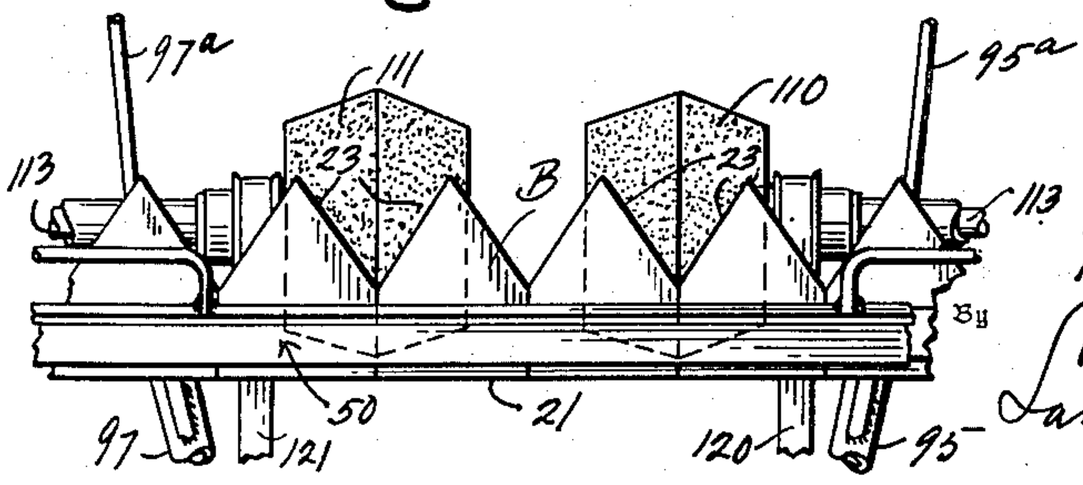


Fig. 16



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TOOL SHARPENING MACHINE

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Fig. 17

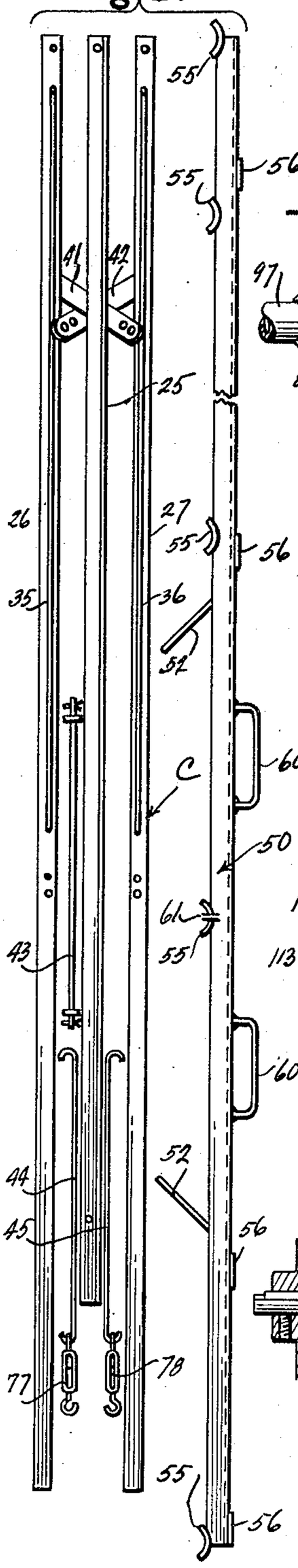


Fig. 4

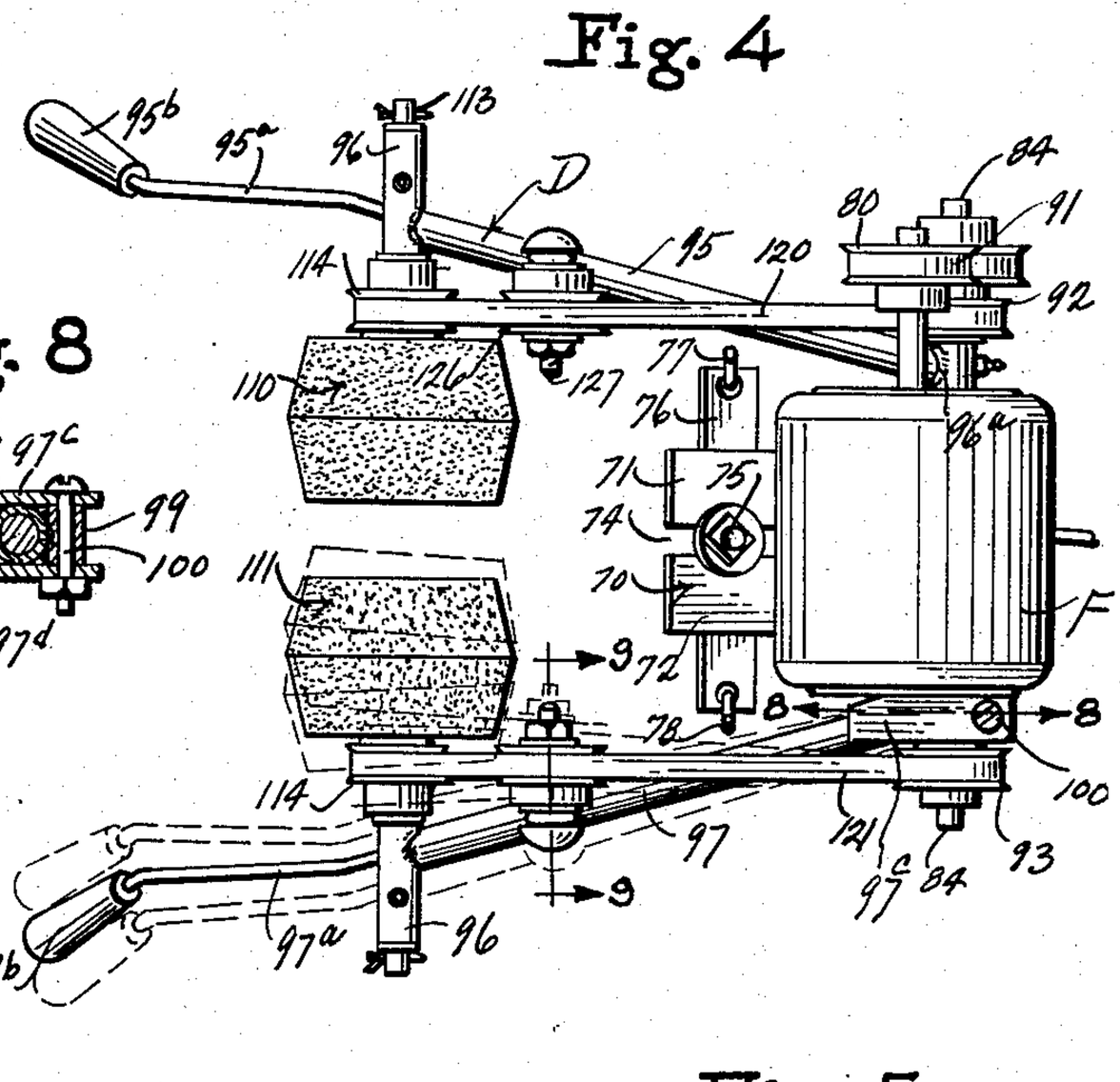


Fig. 8

Fig. 7

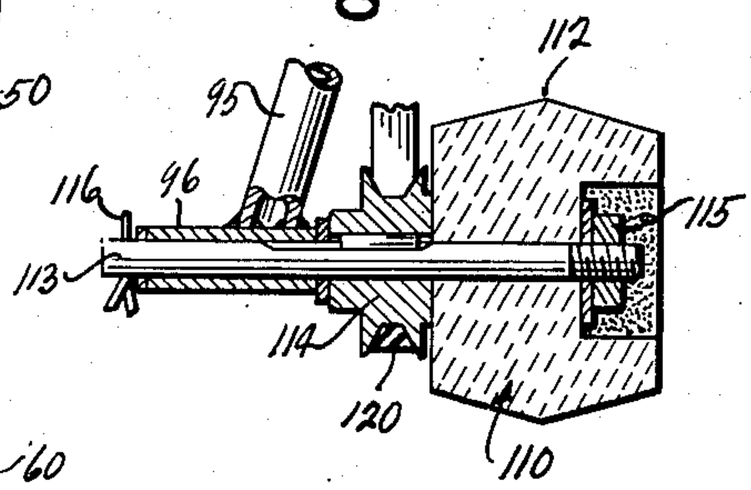


Fig. 5

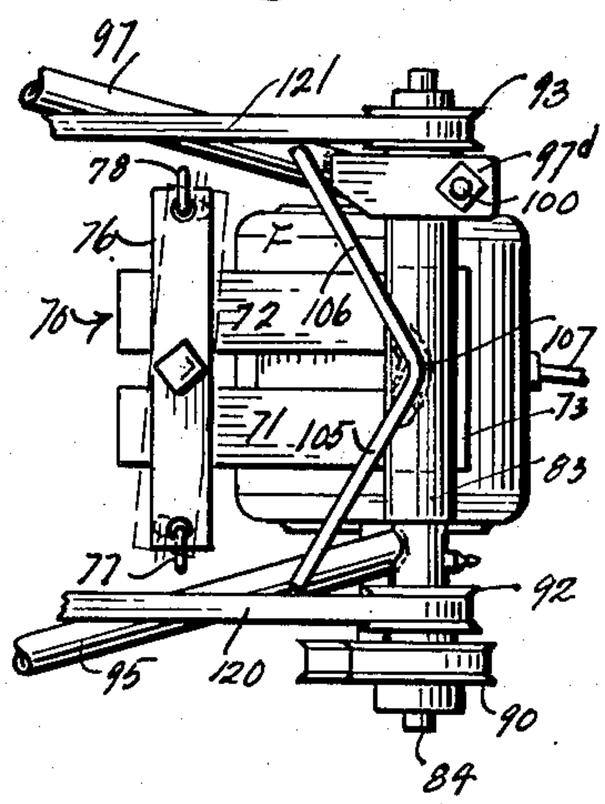
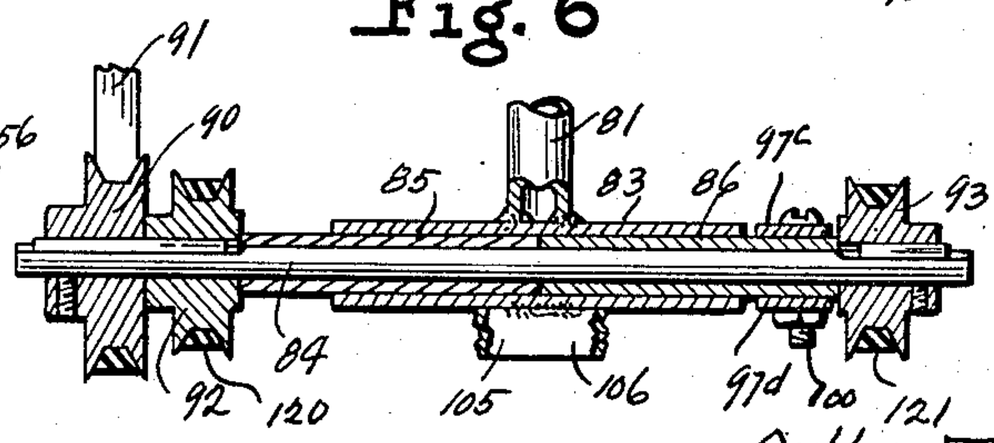


Fig. 6



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UNITED STATES PATENT OFFICE

2,659,184

TOOL SHARPENING MACHINE

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Wood River, Nebr.

Application February 11, 1952, Serial No. 270,992

3 Claims. (Cl. 51—33)

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This invention relates to improvements in sharpening machines.

The primary object of this invention is the provision of an improved sharpening machine particularly well adapted for the sharpening of sickle blades of mowing machines; the same including means for the simultaneous sharpening of a plurality of blades.

A further object of this invention is the provision of an improved machine for the grinding and sharpening of sickle blades wherein the grinding stone has a compound movement for the efficient uniform bevel sharpening of such blades as sickle bars of mowing machines; the sharpening stone being so efficiently mounted as to require little manual effort and skill upon the part of the operator to effect the blade sharpening.

A further object of this invention is the provision of an improved frame structure for the mounting of sickle blade sharpeners.

A further object of this invention is the provision of an improved grinding machine, including a plurality of sharpening wheels, each of which is adapted to sharpen the opposed facing edges of sickle blades, whereby a plurality of sickle blades may be simultaneously sharpened; the grinding wheels being so mounted as to provide for efficient relative adjustment towards and away from each other and for movement away from and along the edges of the blades to be sharpened.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views:

Figure 1 is a front elevation of the improved sickle blade sharpening machine.

Figure 1ª is a front elevation of the right end of a sickle bar supporting member.

Figure 2 is a side elevation of the improved machine showing the details thereof in rest position.

Figure 3 is a fragmentary side elevation, showing an operator sharpening a blade of a sickle. The dotted lines show a lifted adjustment position of the sharpening blade with respect to the sickle bar.

Figure 4 is a top plan view of the sharpening stone or wheel arrangement and means for driving the same.

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Figure 5 is a fragmentary bottom plan view of the motor and its mounting structure.

Figure 6 is an enlarged cross sectional view taken thru the motor countershaft drive structure for the grinding wheels, the view being taken substantially on the line 6—6 of Figure 2.

Figure 7 is a fragmentary cross sectional view taken substantially on the line 7—7 of Figure 1.

Figure 8 is an enlarged cross sectional view taken substantially on the line 8—8 of Figure 4, and showing the support mounting for one of the grinding wheels.

Figure 9 is an enlarged cross sectional view taken substantially on the line 9—9 of Figure 4, showing a belt tightener construction.

Figure 10 is a transverse cross sectional view thru the frame structure of the machine, taken substantially on the line 10—10 of Figure 1.

Figure 11 is a transverse cross sectional view thru the frame structure of the machine, taken substantially on the line 11—11 of Figure 1.

Figure 12 is a fragmentary plan view showing the supporting arrangement for a sickle bar as a part of the frame structure of the machine.

Figure 13 is a fragmentary plan view of another portion of the sickle bar supporting means.

Figure 14 is a transverse cross sectional view taken substantially on the line 14—14 of Figure 12.

Figure 15 is a transverse cross sectional view taken substantially on the line 15—15 of Figure 1.

Figure 16 is a bottom plan view showing a sickle positioned upon the supporting frame of machine immediately below the grinding stones.

Figure 17 is a view showing the detached relation of the various parts of the frame structure of the machine.

In the drawings, wherein for the purpose of illustration is shown only a preferred embodiment of the invention, the letter A may generally designate the improved machine for the sharpening of sickle bars B. It preferably consists of a frame structure C for supporting the sharpening mechanism D.

It is well known to those skilled in the art that sickle bars for mowing machines are long and rather unwieldly. The blades are tapered at the opposite edges thereof. The sickle bar B preferably comprises an elongated supporting bar body 20 having the blades 21 secured thereto, as by riveting at 22. The blades are pointed and have opposite diagonally disposed edges 23, as shown in Figure 13.

The framework structure C is adaptable for

supporting the sharpening mechanism D as well as the sickle bar B in order that very little effort is required upon the part of the operator to manually control the machine for sharpening purposes.

The frame structure C comprises a tripod arrangement including a rear substantially vertically disposed supporting leg **25** and the diagonal downwardly divergent front supporting legs **26** and **27**. These legs are all of angled cross section, and preferably they are of steel. The arrangement in which they are connected is such as to enable them to be compactly folded for shipping and storage purposes. To that end, as shown in Figure 11 of the drawings, the flange portions **29** and **30** of the vertical leg **25** have a flange **31** and **32** of each of the legs **26** and **27** pivotally secured to the outer surfaces thereof near the tops of the legs **25**, **26** and **27**, as by pivot bolt structures **33**. This enables the angled cross sectioned legs to be vertically collapsed together into substantial parallelism.

Below the pivot top connection of these legs are disposed diagonal brace rods **35** and **36** respectively detachably connected at **37** and **38** to the lower portions of the flanges of the leg **25**, as is shown in Figure 1. From this location the rods **35** and **36** extend forwardly and upwardly and at their upper ends they are detachably connected at **39** and **40** to the legs **26** and **27** respectively. This provides an efficient brace structure for supporting the legs in tripod fashion. The brace rods **35** and **36** at their ends are right angled to effect such connections, and cotter pins detachably hold these ends in position in the openings of the flanges of the legs **25**, **26** and **27**, as shown in the drawings.

Connected as part of the frame structure C, but intended to support the grinding and operating mechanism D there are provided supporting arms **41** and **42** upon the forward flanges of the angle pieces **26** and **27**, as shown in Figures 1 and 10 of the drawing, having forwardly turned parallel ends **41a** and **42a** which are apertured for receiving the ends of a spreader bar **43**. The latter is detachable and provided with stop flanges **44a** thereon which holds the ends **41a** and **42a** properly spaced for the support of the mechanism D. These ends **41a** and **42a** are further apertured as shown in Figure 10 for the detachable connection of the hooked ends of supporting links **44** and **45**. To support the sickle bar a shelf or table **50** is provided. It is of angle cross section, as shown in Figure 14, including a top flange **51** and a rear depending flange **52a**. They are slightly out of horizontal and vertical respectively and in spaced relation they are provided with welded bracket extensions **52** properly angled with respect thereto for detachable connection by bolts **53** to the inner and forward flanges of the legs **26** and **27**, as shown in Figures 1 and 2 of the drawings. This arrangement not only aids in bracing the front legs of the tripod type frame, but also very stably supports the angle type table or shelf **50** for the sickle bar B. Suitable means is preferably provided upon the sickle bar supporting member **50** for holding the sickle bar at the properly inclined position, and for lateral sliding of the bar along the same in order that the blades may be successively laterally moved into grinding relation with the wheel structure of the sharpening mechanism D. Such means comprises guide pieces **55** welded to the top surface of the top flange

of the sickle bar supporting member **50**, and projecting upwardly therefrom, as shown in Figures **1a** and **17** of the drawings; the same presenting forwardly convex surfaces to assist in sliding of the bar B along the supporting table or member **50**. Along the front margin of the member **50**, the same is also provided with guide pieces **56** at the ends thereof and at intervals along the same, projecting upwardly above the top surface of the table **50**, and in the space between the rear surface of these guide pieces **56** and the forwardly facing convex surfaces of the guide pieces **55** is adapted to be socketed the body portion **20** of the sickle bar as shown in Figure 14. In this connection it is to be noted that the guide members **56** project upwardly above the top surface of the table flange **51** for a greater distance than the height of the guide pieces **55**, and inasmuch as the blades project forwardly and rearwardly of the sickle bar body **20**, the same will rest upon these top edges of the guide pieces and hold the sickle bar at an acute angle off horizontal, with the blades projecting forwardly and uppermost (see Fig. 14). Additional members **60**, each comprising a handle like structure, are welded to the front flange of the sickle bar supporting body **50**, and they are angled upwardly and their upper ends are so located that the blades of the sickle bar rest directly thereon for further support of the sickle bar and the blades thereof at each outer side of a sharpening wheel, as is well shown in the drawings. To hold the sickle bar upon the supporting table **50**, we prefer to provide a hook-shaped member **61** welded upon the bar at a location immediately between the sickle bar supporting portion **60** which includes an overhanging hook under which the sickle bar is disposed to prevent bodily upward movement of the sickle bar. The vertical portion of this hook holds the sickle bar against rearward movement as an incident of pressure contact of the sharpening stones with the blades, since tendency of the wheels would be to move the bar in a rearward direction.

Referring to the sharpening mechanism D, the same has been provided for the purpose of movement of a plurality of sharpening wheels or stones with but little manual effort and without a great deal of skill to perfect a uniform and efficient sharpening action and bevelling of the blades of the sicklebar. It comprises a frame structure E, the parts of which are rigidly connected together for supporting the motor F; mounting the structure upon the depending supporting bars **44** and **45**, and for additionally rotatably supporting the various shafts, pulley wheels, handles and grinding wheels in an arrangement to be subsequently described.

The frame structure E preferably comprises a motor supporting platform **70**, best shown in Figures 2, 3, 4 and 5 of the drawings and comprising a pair of flat plates or strips **71** and **72** which at their rear ends are fixedly connected upon the upper flange of a cross angle piece **73** as by welding. These platform body strips **71** and **72** lie in the same plane but are relatively spaced from each other; the slot or spacing **74** therebetween serving to receive a detachable bolt construction **75**. This bolt construction **75** is mounted upon a swing seat type of supporting bar **76** centrally thereof and upon a fixed axis. The supporting bar **76** at its ends is connected to turnbuckle members **77** and **78** which at their opposite ends are connected to the lower hooked ends of the supporting bars **44** and **45**. The

turnbuckles 77 and 78 are of the usual construction, and may be elongated or shortened independently of each other between their end connections with the supporting bar or member 76 and the supporting and connecting rods 44 and 45, for the purpose of properly positioning details of the sharpening mechanism to be subsequently mentioned. The bolt construction 75 has an upwardly facing nut to enable release of a clamping effect upon the plates 71 and 72, and the bolt construction may be slid fore and aft along the slot 74 for reasons to be subsequently described.

The motor F is detachably mounted upon the platform structure 70, on the top thereof. It has a driving wheel 80 of the pulley type.

The frame structure E above mentioned furthermore includes a depending tubular standard 81 welded at its upper end to the platform angle piece 73 as shown at 82 in Figure 1. The lower end of this standard 81 is provided with a horizontally disposed tubular frame piece 83 welded thereto and best shown in Figure 6 of the drawings. The tubular frame piece 83 is adapted to receive the countershafting by means of which the grinding stones or wheels are driven from the motor. The shafting supported by this tube 83 preferably comprises a motor driven shaft 84 rotatably mounted in the internally babbitted passageways of sleeves 85 and 86 which are rotatably mounted co-axially within the frame tube 83. The sleeves 85 and 86 are independently pivoted in this frame tube 83 and themselves comprise part of a frame structure which has a pivoting movement in the tube 83 for the purpose of lifting and lowering the grinding wheels. The shaft 84 at one end is provided with a keyed pulley wheel 90 adapted to receive a belt 91 trained thereover; the belt being trained over the motor pulley wheel 80 to cause rotation of the shaft 84. In addition to the pulley wheel 90, there is also disposed on the shaft 84 a belt receiving pulley wheel 92 for driving one of the grinding wheels or stones, and the shaft 84 at its opposite end is provided with another similar pulley wheel 93 for driving the other grinding wheel or stone.

The outer end of the sleeve 85 is provided with a forwardly extending supporting arm 95 welded thereto, at 96a, as shown in Figure 4. This arm 95 may be tubular in nature and at its forward end it supports a horizontally disposed bearing tube 96 for receiving a shaft of one of the grinding wheels. At its outer end the other sleeve 86 is provided with a connection for the other grinding wheel supporting arm 97, which similar to the arm 95 extends forwardly and preferably divergent with respect to the arm 95. In contradistinction to the latter, the arm 97 is pivoted on an upright pivot, to the sleeve 86, to enable a slight lateral movement thereof in order to relatively move the grinding wheels laterally towards and away from each other for purposes to be subsequently mentioned. This connection comprises upper and lower plate portions 97c and 97d, shown in Figure 8, welded thereto, spaced to receive the outer end of the sleeve 86 therebetween. The sleeve 86 at this location between said plates is provided with a welded upright sleeve portion 99 defining a passageway for receiving a pivot pin or bolt 100; the latter connecting said plates for the lateral pivotal action of arm 97 above mentioned. Since the sleeves 85 and 86 are movable in a rotary direction with respect to each other it is perfectly obvious that

the arm 97 may be lifted with respect to the other arm 95, as shown in the dotted line position in Figure 3, and the same of course is true of the stone supported by the arm 95, since it can be lifted and lowered relative to the stone or grinding wheel supported by the arm 97. The lateral pivotal movement of the arm 97 upon the pivot pin or bolt 100 is rather limited, and the arc of such movement is controlled by the space between the extreme end of the arm 97 and the outer surfaces of the sleeve 86 as indicated at 102 in Figure 8 of the drawings.

Since the arms 95 and 97 are mounted for pivotal movement upon the shaft 84, some means must be provided for supporting them in a position below which they will not drop, and in which position the grinding wheels can be controlled for sharpening of the sickle bar blades. This supporting means preferably consists of a pair of forwardly and laterally extending supporting pieces 105 and 106, best shown in Figure 5 of the drawings, which are welded at 107 to and as part of the sleeve shaft supporting tube 83; the ends lying below the arms 95 and 97 for supporting the same, as shown in Figure 1.

The sharpening stones or wheels 110 and 111 are conventional in shape each including bevelled sharpening surfaces in order that adjacent edges of two blades of the sickle bar may be sharpened at the same time. The medial vertical plane at the juncture of these bevelled sharpening edges, designated at 112, in Figure 7 bears an important relation to positioning with respect to the blades of the sickle bar.

Each wheel 110 and 111 is preferably provided with a shaft 113, connected for rotation with the same by means of a nut 115 having a right hand threaded connection or a left hand threaded connection, obviously to prevent loosening during rotation of the grinding wheel. At the outer ends the shafts 113 are provided with pulley wheels 114. The shafts 113 are supported in the bearing sleeves 96 at the forward ends of the arms 95 and 97, for rotation therein. The shafts 113 are provided with cotter pins 116 to permit their removal from the sleeves 96. The stones 110 and 111 are fixedly clamped upon the shafts 113 for rotation therewith in clamped abutment against pulley wheels 114, by the nuts 115. This positions the grinding or sharpening wheels 110 and 111 in relatively spaced relation as shown in the drawings.

A driving belt 120 is trained over the wheel 92 of the shaft 84 and about the pulley 114 of the sharpening wheel 110. In similar manner a belt 121 is trained over the pulley 114 of the grinding wheel 111 and trained over the pulley wheel 93 of the shaft 84. Both of these belts 120 and 121 are provided with belt tightening means comprising inverted U-shaped guide pieces 125 welded to the arms 95 and 97, in about the position shown in Figures 2 and 3 of the drawings. These guide pieces 125 rotatably support idler pulley wheels 126, upon detachable shafts or pins 127, as shown in Figure 9, and the belts 120 and 121 are trained thereover in a manner to enable the tightening of said belts.

Forwardly extending from the arms 95 and 97 are provided handle extensions 95a and 97a of rod like formation; the forward ends of which are out turned and down turned and have handles 95b and 97b connected therewith, as shown in the drawings.

The sharpening mechanism D will be supported at rest in the position shown in Figure 2.

The balancing is of such nature that but slight downward pressure upon the handles 95b and 97b is necessary in order to move the wheels 110 and 111 downwardly into sharpening engagement with the blades of the bar supported upon the member 50. The pivotal down movement of the entire sharpening mechanism D lies at the points of connection of the turnbuckles 77 and 78 with the ends of the platform supporting bar 76; the arc of movement in depressing the wheels bring them downwardly and to the rear for properly positioning with respect to the blades of the sickle bar. Forward and rearward movement of the sharpening wheels 110 and 111, by the operator, will automatically sharpen a bevelled edge on each of four different blades at one time. The relative spacing with respect to the blades is shown in Figure 16. The sickle bar B may be readily slid longitudinally of the supporting member 50 due to the fact that the sickle bar is well guided for such sliding action.

The sharpening wheels 110 and 111 can be moved towards and away from each other laterally, as shown in Figure 4, to compensate for blade spacing due to wear upon the teeth, and the blade spacing of various makes of sickle bars. The equalizing bar 76 plays a very important part in proper positioning of the sharpening equipment. It can be moved forwardly and rearwardly upon the platform structure 70 as above described for the purpose of adjusting the balance of the machine and in order that the sharpening wheels will be at the right height above the sickle bar blades. It is noted that the equalizing and aligning bar 76 has a definite pivot axis connection relative to the platform so far as lateral movement thereon is concerned, although loosening of the bolt will enable the equalizing bar to be swung at either of its ends forwardly or rearwardly for the purpose of moving the sharpening wheels or stones 110 and 111 to the right or left for correct centering. The sharpening wheels must touch the sickle blades simultaneous so that the above adjustments are necessary and very important as are also the adjustment of the turnbuckles. The lifting action of one sharpening wheel arm with respect to the other is only done when the sickle blades are bent or out of place. The two arms 95 and 97 may be moved laterally relative to each other, as shown in Figure 4, to compensate for eccentric or other type spacing of the blades.

The frame structure C of this invention is not entirely necessary for the support of the sharpening equipment D, since the latter could be suspended from an overhead support, and the sickle bar could rest upon a conventional table or other foundation support.

From the foregoing it can readily be understood that an improved blade sharpening mechanism for sickle bars has been provided which will enable a relatively unskilled operator to accurately and uniformly sharpen the blades of a sickle bar with little manual effort.

Various changes in the shape, size and arrangement of parts may be made to the form of invention herein shown and described without departing from the spirit of the invention or scope of the claims.

We claim:

1. In a sickle sharpening mechanism the combination of a frame including a platform, a motor mounted upon the platform, a shaft rotatably supported upon said frame in parallelism with the axis of the motor, means connecting said motor for the rotation of said shaft, rotatable sharpening wheels, supporting arms rotatably supporting said wheels, means independently mounting said arms upon said shaft for independent pivotal lifting and lowering action of the wheels relative to said shaft, means for laterally moving one of said wheels and its arm with respect to the other wheel, and means connecting said wheels with said shaft for the simultaneous drive of said wheels.

2. In a sickle sharpening mechanism the combination of a frame including a platform, a motor mounted upon the platform, a shaft rotatably supported upon said frame in parallelism with the axis of the motor, means connecting said motor for the rotation of said shaft, rotatable sharpening wheels, supporting arms rotatably supporting said wheels, means independently mounting said arms upon said shaft for independent pivotal lifting and lowering movements of the wheels relative to said shaft, means for laterally moving one of said arms and its wheel with respect to the other wheel, means connecting said wheels with said shaft for the simultaneous drive of said wheels, a supporting structure, and means for the overhead suspending swinging movement of said platform and frame for fore and aft movement upon said supporting structure.

3. A frame for the support of sickle bar sharpening mechanism comprising a substantially vertically disposed rear leg, substantially diagonally disposed front legs pivotally connected to the upper end of said rear leg, a sickle bar supporting table horizontally supported by said diagonally disposed front legs, a guide means on said table for the lateral sliding support of a sickle bar thereon, a pair of diagonal bars each connected to the lower end of said rear leg and extending forwardly and divergent with respect to each other and having connection with the front legs intermediate the ends of said front legs.

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