Dec. 19, 1939. H. W. MILLER 2,183,686

ATTACHMENT FOR GRINDING MACHINES

Filed Jan. 20, 1939 4 Sheets-Sheet 1

Fig. 1.

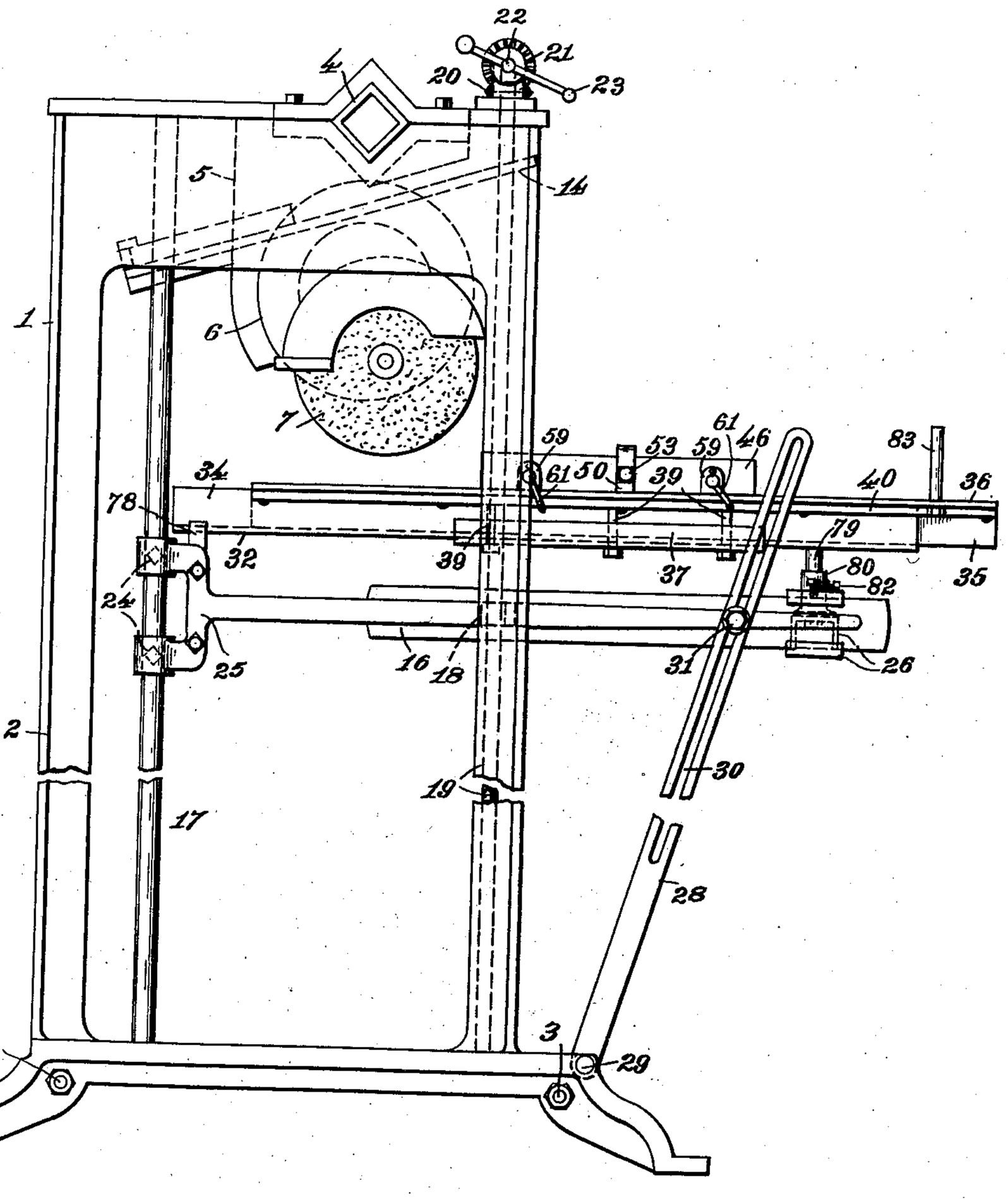

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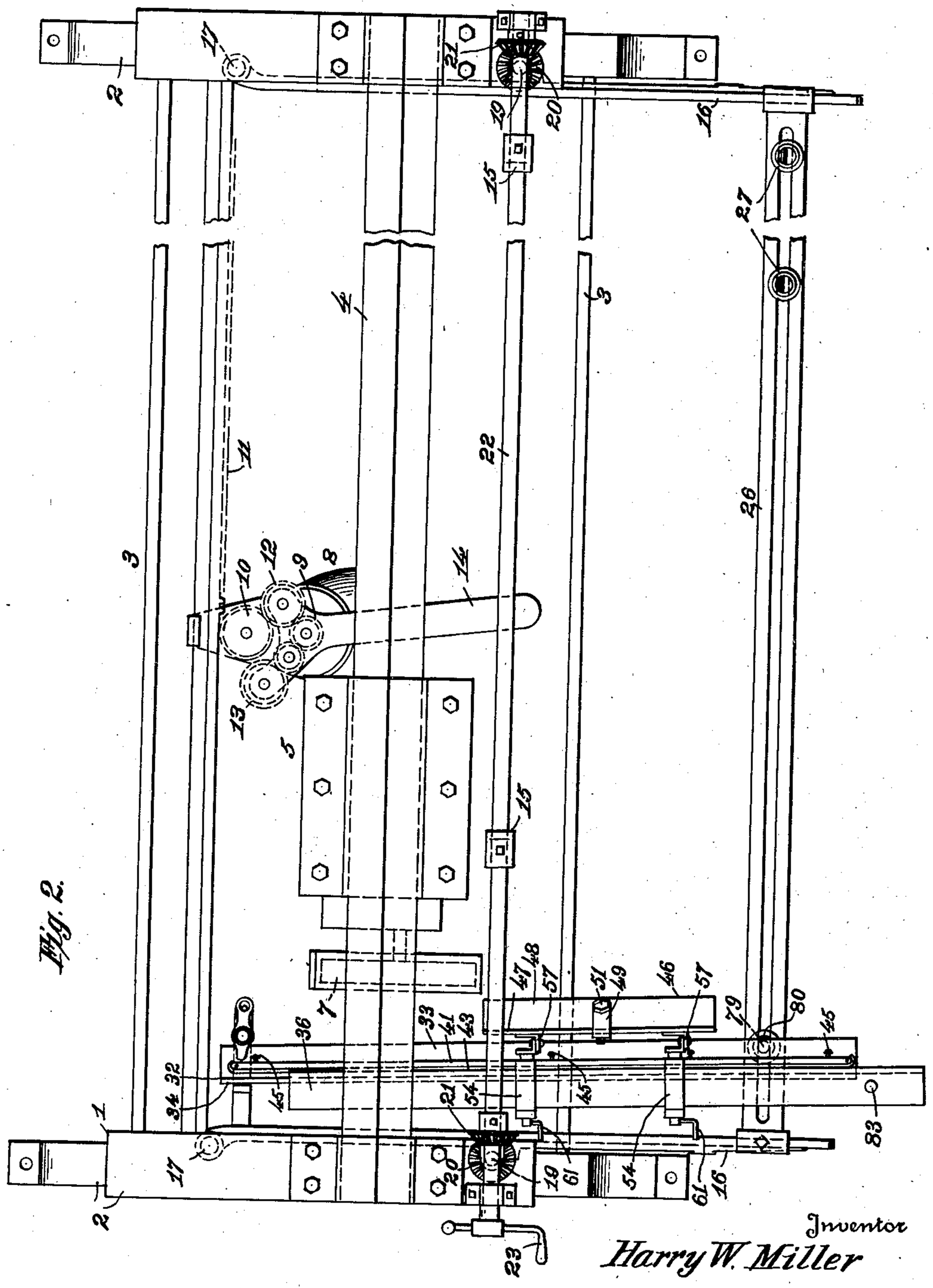
Fig. 2.



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ATTACHMENT FOR GRINDING MACHINES

Filed Jan. 20, 1939 4 Sheets-Sheet 3

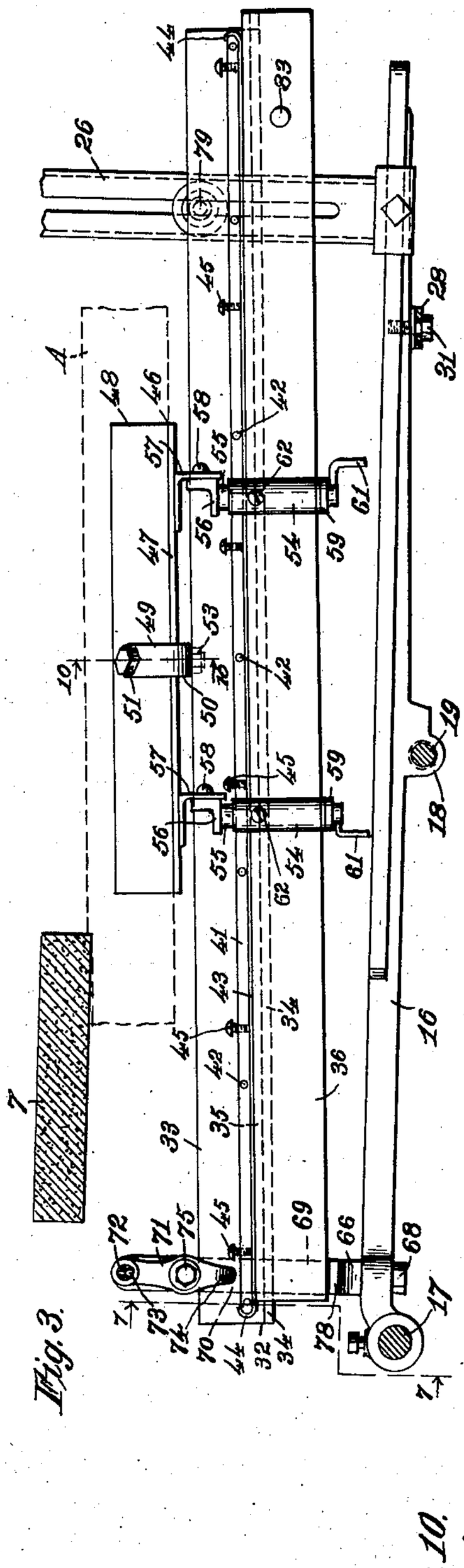

Fig. 3.

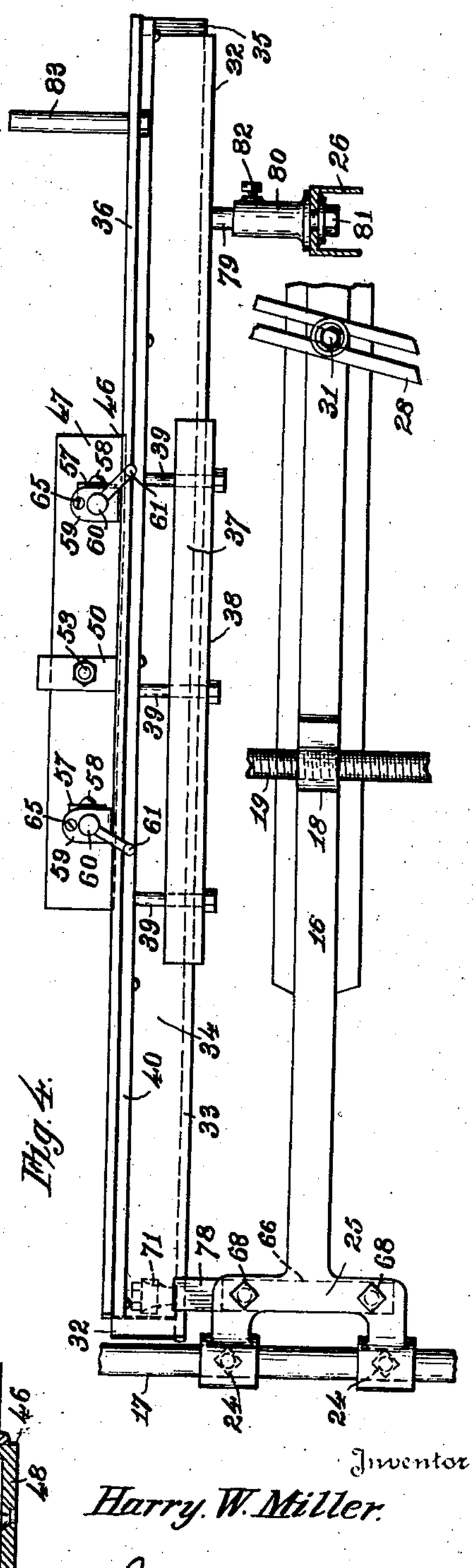

Fig. 4.

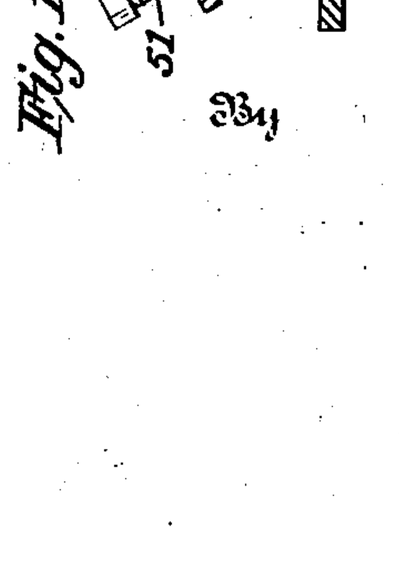

Fig. 10.

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Fig. 9.

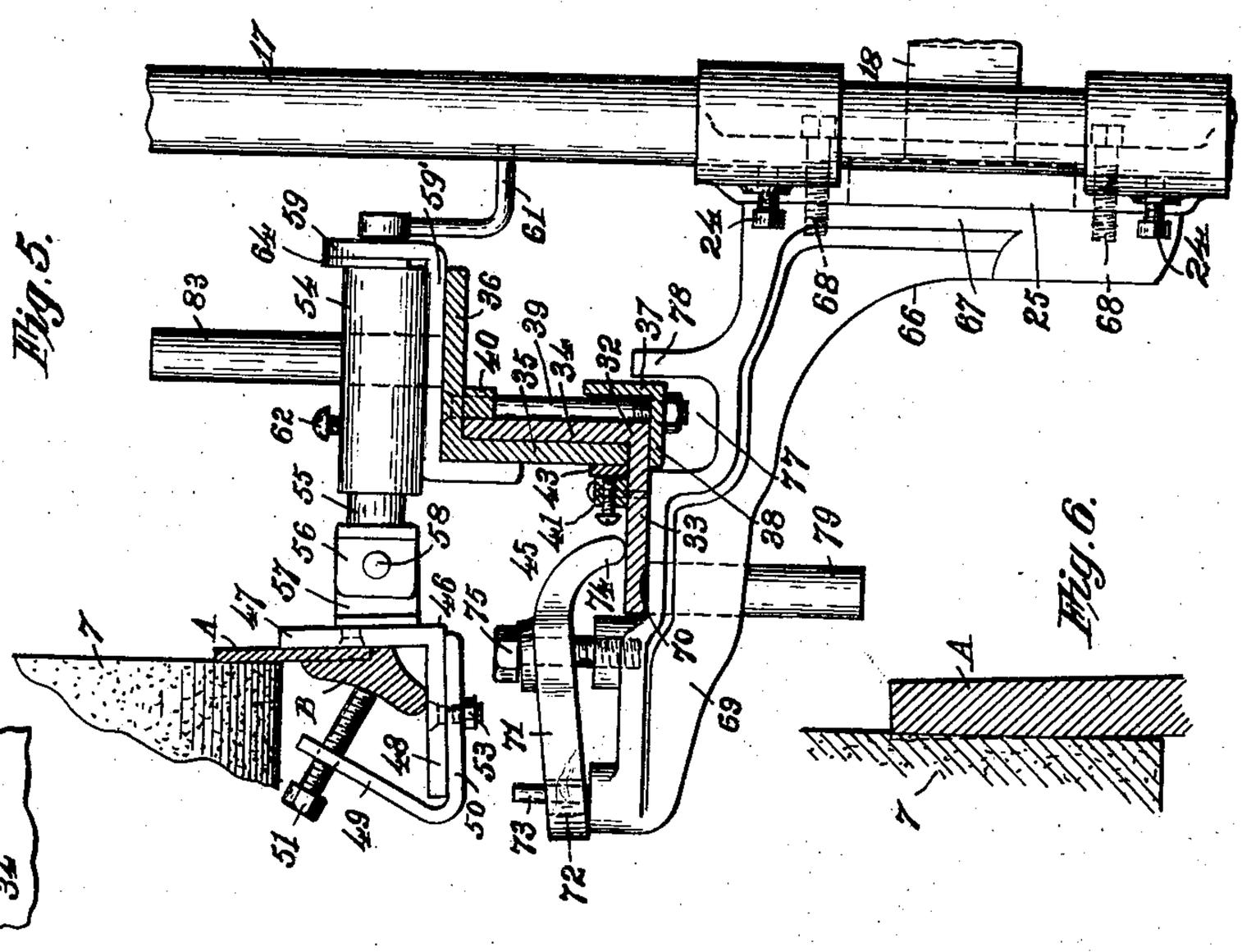

Fig. 5.

Fig. 6.

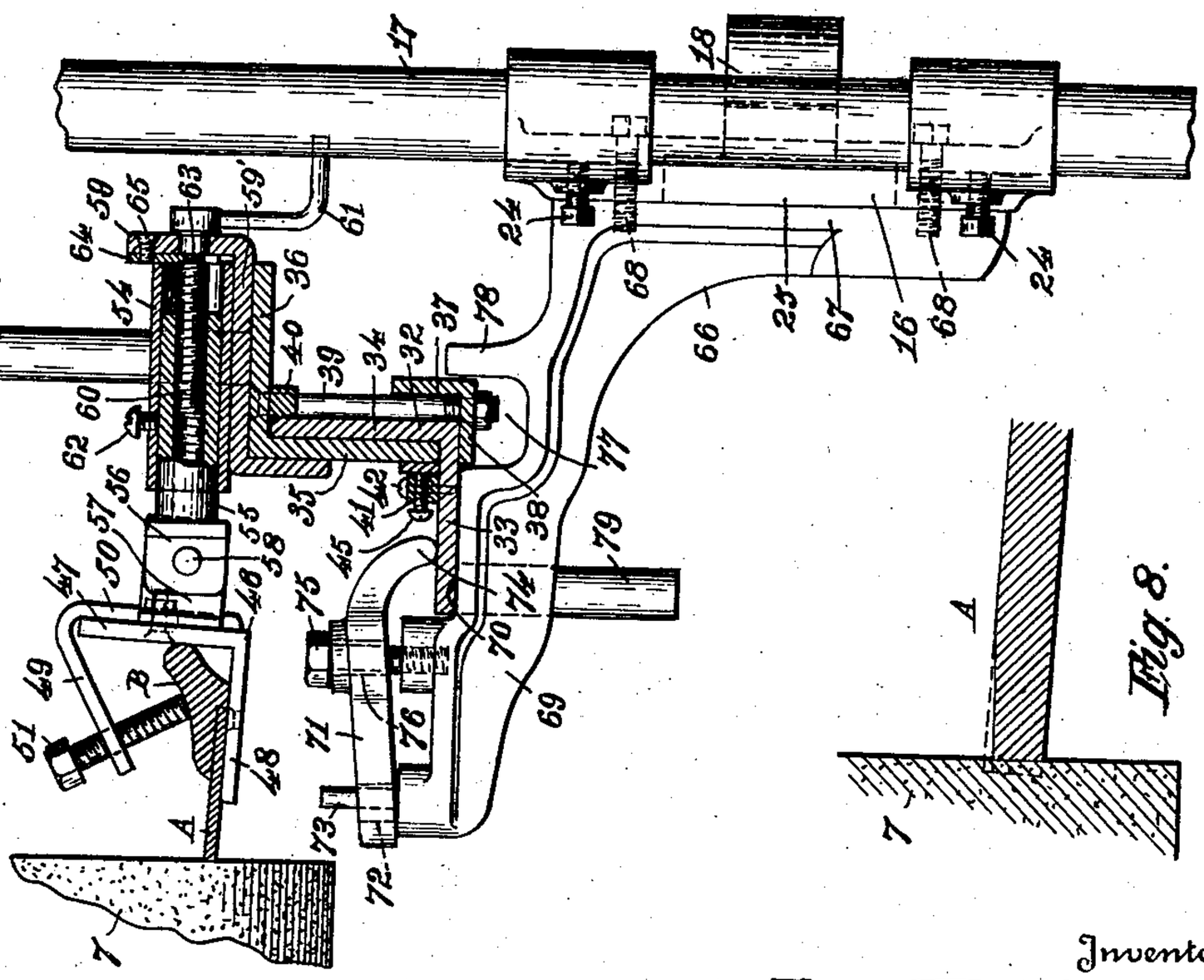

Fig. 7.

Fig. 8.

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UNITED STATES PATENT OFFICE

2,183,686

ATTACHMENT FOR GRINDING MACHINES

Harry W. Miller, Lancaster, Pa.

Application January 20, 1939, Serial No. 252,019

8 Claims. (Cl. 51—122)

My invention relates to grinding machines and particularly to a grinding machine adapted for sharpening the straight or stationary blades of lawn mowers. More specifically, my invention is an attachment for a grinding machine of the type disclosed in and covered by my Patent No. 1,916,063 granted June 27, 1933.

The grinding machine set forth in the above mentioned patent is for grinding the curved blades of lawn mowers; and the subject of the present application is, as above stated, an attachment for said machine whereby the same is adapted for grinding the straight blades, thereby making a machine adaptable for the complete sharpening of a lawn mower.

The object of my invention is to provide an attachment for a grinding machine of the class mentioned whereby the face of the blade may be presented to the grinding tool to true the same, and then the cutting edge presented to the tool to complete the sharpening. My invention further consists in a device as mentioned in which both the face and the edge of the blade may be presented to the tool at any desired angle, transversely. A further object of my invention is to provide a device as mentioned in which the blade may be presented to the tool at any desired angle longitudinally whereby the degree or depth of the cut may be regulated. A further object of my invention is to provide a device of the character mentioned wherein the rotary tool is held in stationary position and the work reciprocated across the lateral face thereof. A further object of my invention is to provide a device of simple construction which may be readily and quickly attached to the grinding machine and readily adjusted in position for use. Other objects will appear hereinafter.

With these objects in view my invention comprises a longitudinal member or guide ways adapted to be fixed to portions of the grinding machine, a carriage slidably mounted on said member, and a work holder pivotally mounted on said carriage on an axis substantially parallel to the path of travel of the carriage and located adjacent to the grinding tool. My invention further consists in a device as mentioned further characterized by means for moving the work holder toward or from the tool without changing the position of any of the other parts. My invention further consists in means for fixing one end of the longitudinal member or track to a part of the grinding machine and mounting the opposite end so that the same may be adjusted to vary the angular position of the device to regulate the degree of cut of the tool. My invention further consists in various details of construction and arrangements of parts all as will be fully described hereinafter and particularly pointed out in the claims.

My invention will be more readily understood by reference to the accompanying drawings forming a part of this specification and in which—

Figure 1 is a side elevation of a grinding machine with the attachment secured in position,

Fig. 2 is a plan view of the same,

Fig. 3 is a plan view of the attachment upon an enlarged scale, together with elements of the machine upon which the same is mounted,

Fig. 4 is an elevation of the same, parts of the supporting elements of the grinding machine being broken away and illustrated in section,

Fig. 5 is an enlarged transverse view of the same, parts of the attachment being illustrated in section, the section being taken substantially on the line 5—5 of Fig. 3, and illustrating the operation of truing the upper face of a lawn mower blade,

Fig. 6 is an enlarged detail view illustrating the action of the tool on the blade,

Fig. 7 is a view similar to Fig. 5 with other parts shown in section and illustrating the operation of sharpening the edge of the blade,

Fig. 8 is an enlarged detail view illustrating the action of the tool on the work,

Fig. 9 is a detail section on substantially the line 9—9 of Fig. 7, and

Fig. 10 is a detail cross section of the tool holder on the line 10—10 of Fig. 3 but illustrated on substantially the same scale as Figs. 5 and 7.

Referring now to the drawings, 1 indicates generally the frame of a grinding machine such as covered in my aforesaid patent, and consists of the end members 2—2 connected at the base by tie rods 3—3 and at the top by a longitudinal bar 4. The bar 4 constitutes ways for a reciprocating carriage 5 which carries a housed motor 6 and a grinding tool 7. Also, mounted on the carriage is a gear casing 8 and a driven gear 9 connected by suitable idler gears to a gear 10 meshing with a fixed rack 11 on the frame, and by means of which the tool is reciprocated longitudinally of the machine when used for grinding the curved blades of lawn mowers. The gears 9 and 10 are connected by idlers 12 and 13 mounted upon a shiftable lever 14, which lever engages stop members 15 at the end of each longitudinal movement and thereby alternately shifts the gears 12 and 13 into engagement with the gear 10 to reverse the movement of the tool

carriage 5. This is all completely disclosed in my Patent No. 1,916,063 and needs no further description herein, as the reciprocating feature is not used in conjunction with the present invention. At each end of the frame are forwardly extending arms 16 which are mounted for vertical adjustment upon vertically disposed ways 17 fixed at their upper and lower ends to the top and bottom portions of the respective frame members. The arms 16 are provided with sleeves 18 through which are threaded vertical shafts 19. These threaded shafts have their lower ends mounted in the base of the frame, and the upper ends are journalled in the top thereof and are equipped with beveled gears 20 which mesh with gears 21 on a longitudinal shaft 22. The end of the shaft 22 is provided with a hand crank 23. It is obvious that by turning the crank 23 the arms 16 may be readily adjusted vertically. After the arms are adjusted to the proper height they may be securely fixed in position at their rear ends by set screws 24 threaded through the arms of the forked end 25 of the arm. Adjustably mounted on the outer ends of the arms 16 is a slotted member 26 upon which are adjustably mounted a pair of supports 27 for the cross bar of a lawn mower during the sharpening of the curved blades. The portion of the device above described is a brief summary of the grinding tool set forth in the aforementioned patent.

To avoid chattering when the grinder is in operation a brace member is provided for the outer ends of each arm. These each comprise a bar 28 pivotally mounted at 29 to the base of the frame and having a slot 30 extending the greater portion of its length, through which a binding screw 31 is projected and threaded into the arm 16. This member may or may not be used, and I have illustrated it in Figs. 1, 3 and 4 but have omitted it from Fig. 2 to avoid confusion.

The attachment, forming the subject of this application, comprises generally a track or guide ways, a reciprocating carriage slidably mounted thereon, a work holder on the carriage and means for attaching the track or ways to a grinding machine. The guide ways comprise an angle iron 32 consisting of a horizontal base flange 33 and a vertically disposed flange 34. The reciprocating carriages comprise a similar but inverted angle iron consisting of a vertical flange 35 in sliding engagement with the inner face of the flange 34, and a horizontal upper flange 36 which extends over the top of the flange 34 and in the opposite direction from the flange 33. To secure the sliding member to the ways a small angle iron 37 is provided having a flange 38 arranged beneath the guide member and held in position by bolts 39 having their heads countersunk in the flange 36. A longitudinal bar 40 is secured beneath the flange 36 and engages the outer upper edge of the flange 34. The upper edge of the flange 34 is thus held between the flange 35 and the bar 40. This bar 40 preferably extends the entire length of the sliding carriage but the member 37 is considerably shorter than the same, as shown clearly in Fig. 4. A bar 41 is fixed to the upper face of the flange 53 as by rivets 42 and extends substantially the length of the device.

Interposed between said bar and the flange 35 of the sliding carriage is a bearing strip 43 which is attached at its ends 44 to the ends of the bar 41. Adjusting screws 45 are threaded through the bar 41 at intervals to press the strip 43 against the lower outer face of the flange 35 thereby holding the same in firm but sliding engagement. This also provides means for taking up any wear of the parts.

Carried by the sliding member is the work holder 46 which consists generally in an angle iron having the substantially vertical and horizontal flanges 47 and 48 respectively, and a clamping device for holding the work therein. In using the device, the blade of the mower and the bar to which it is permanently attached, are removed from the mower and clamped in the work holder. In the drawings, A indicates the blade and B the bar. As it is sometimes desirable to grind both the upper face of the blade and its forward edge, it is necessary to be able to clamp the work to either of the flanges, and the clamping means must be so arranged as to not interfere with the tool. To this end I provide a reversible clamping device. This comprises a bar bent substantially at its center, forming legs 49 and 50 respectively, a screw 51 threaded through the leg 49, and means for attaching the leg 50 to either flange of the holder. Each flange 47 and 48 is provided with a countersunk aperture 52 to receive a bolt 53 so that the device may be selectively attached to the holder body 46. The screw 51 impinges against the bar B of the blade A, as shown in Figs. 5 and 7; said figures illustrating the two general positions of the blade for grinding, as will appear more fully hereinafter.

Means are provided for mounting the work holder on the carriage, said means being so constructed and arranged as to permit adjustment of the holder from and toward the carriage and also permit angular adjustment of the holder transversely of the path of longitudinal movement of the same. To this end, a pair of sleeves 54 are mounted transversely of the upper flange 36 of the carriage and slidably mounted therein are telescopic members 55, each terminating in a head 56 to which a corresponding lug 57 on the work holder is pivotally connected on a longitudinal axis by pivot pins 58. These pivot pins are formed of set screws projecting through the lugs 57 and threaded into heads 56, whereby an angular adjustment (transversely) of the work holder may be readily made. Adjacent the opposite end of each sleeve 54 from the work holder is an upstanding lug 59 in which is swiveled a screw 60 threaded into the respective telescopic member 55. The lug 59 is secured to the flange 36 of the carriage and to this end is formed with a base 59' which is interposed between said flange and the respective sleeve 54 and welded or otherwise secured to each. The screw is provided with a crank 61 or similar means for turning the screw whereby the work holder may be moved toward or from the grinding tool 7. After the telescopic members and the work holder carried thereby have been adjusted they are held in position by a set screw 62 threaded through the sleeve 54 and impinging against the telescopic member 55. To prevent longitudinal movement of the screw 60 the same is provided with an annular groove 63 which is engaged by a bifurcated key 64 as illustrated in Figs. 7 and 9. The key is held in position by a screw 65 extending through the respective lug 59 and threaded into said key.

To secure the inner end of the guide member in fixed position, I provide a clamp for holding said end, said clamp being arranged on a bracket detachably secured to the arm 16 adjacent its inner end. 66 indicates the bracket having a base 67 secured by tap bolts 68 to the portion 25 of said arm. By this means the bracket may be

readily attached to and detached from the yoke end 25 as desired. The bracket also includes a substantially horizontal arm 69 having a seat 70 upon which the end of the guide member 32 rests. On the end of said arm 69 is carried a clamping member for securely holding the adjacent portion of the flange 33 upon said seat. This clamp comprises a bar 71 having an aperture 72 adjacent one end to receive an upwardly projecting pin 73 provided on the end of the arm 69 and has a downwardly curved opposite end 74 to engage the guide member flange 33, as shown clearly in Figs. 5 and 7. A clamping screw 75 extends through an aperture 76 intermediate the ends of the bar 71, and is threaded into the bracket arm 69 for forcing the arm against the guide member and securing it in position upon the bracket. The bracket is also recessed at 77 to accommodate the angle iron 37 of the carriage when necessary; and an upwardly extending lug 78 adjacent said recess assists in positioning the attachment on the bracket.

The opposite end of the guide ways from that attached to the bracket 66, is adjustably secured to the cross bar 26. To this end, the guide member is provided adjacent its outer end with a depending stem 79 which is slidably mounted in a vertical sleeve 80. This sleeve is mounted for longitudinal adjustment on the slotted cross bar 26 of the machine. The sleeve 80 is held in adjusted position on the bar by binding screw 81, and the stem 79 is held in position in the sleeve by a set screw 82. The outer end of the slide member is provided with a vertically extending handle 83 by means of which the slide is manually actuated.

In using the device for sharpening the stationary blade of a lawn mower, the grinding machine to which it is to be attached must be set to prevent reciprocation of the carriage 5 which may be done by arranging the carriage so that the gear 10 lies beyond the teeth of the rack. However, this may be accomplished in any preferred way according to the design of the machine to which the device is attached. This will hold the rotary tool 7 in fixed position. The bracket 66 is then secured to the portion 25 of the arm 16 by means of the bolts 68. If preferred, this bracket may be left in position as it does not interfere with the operation of the grinding machine when sharpening the curved blades of the mower. The attachment is then positioned with one end resting upon the seat 70 and the stem 79 is arranged within the sleeve 80 carried by the bar 26. The clamp screw 75 is then tightened to hold the rear end of the guide member firmly on the seat 70, and after the device is levelled the set screw 82 is tightened to support the forward end in proper vertical position. This is all the operations that are necessary to attach the device to the grinding tool.

If the straight or stationary blade of the mower is in good condition and merely needs sharpening, it is placed in the work holder 46 in the position shown in Fig. 7. However, this blade is sometimes bent or the upper face adjacent the cutting edge is damaged, in which event it is necessary to grind and refinish the upper surface. If such is the case the blade is first put in the work holder as illustrated in Fig. 5 as it is desirable to true the upper face of the blade before sharpening. In facing the blade it is impossible and impractical to face the entire upper surface, so that it is necessary to grind the same at an angle to the original face, as shown in Figs. 5 and 6 of the drawings. To this end, the screws 58 constituting the pivot pins, hereinbefore described, are loosened, the work holder set at the desired angle and the pivot screws again tightened to maintain the work holder in adjusted position. A tool 7 having been positioned in approximate position for work on the blade, the final adjustment between the tool and blade may be made by means of the screws 60. In sharpening the blade the work is passed across the side of the rotary tool instead of across the periphery thereof. After the blade is in position, the operator grasps the handle 83 and slides the carriage so as to carry the work across the face of the tool as shown in Fig. 5. It will be noted with reference to Fig. 2 that the attachment is arranged at a slight angle, and the depth of the cut may be regulated by this angular adjustment which is made by a moving sleeve 80 on the bar 26. After passing the blade across the tool, should it be found that it is necessary to cut slightly deeper this may be done by moving the sleeve 80 slightly to the right or by adjusting the work holder by means of the screws 60.

After the upper face of the blade has been properly dressed, the blade is released from the holder, the work clamp removed and placed into the position shown in Fig. 7, the blade placed in the work holder as shown in said figure and the tool and work adjusted into proper relationship in a manner similar to that above described. The edge of the blade is then ground by reciprocating the carriage across the face of the tool and the depth of the cut may be regulated in like manner as above described. Fig. 6 illustrates the cut made in dressing the upper face of the blade and Fig. 8 illustrates the cut made in sharpening the edge, the dotted lines illustrating the portions of the blade removed during the operations, although considerably exaggerated for the purpose of illustration.

It is obvious that in using the device with a grinding machine of the character mentioned, the arms 16 and bar 26 supporting the device may be vertically adjusted into proper position with relation to the tool by means of the screws 19 and that the grinding tool may be arranged in fixed position adjacent to the work holder. After the work is in proper adjusted position, the only operation necessary is to reciprocate the carriage on the guide so as to move the work across the face of the tool. If, on the first reciprocation it is found that the cut has not been deep enough to give a perfect finish the outer end of the device may be moved slightly to the right, as above mentioned and the carriage may be again reciprocated making a deeper cut.

I claim:

1. In a grinding machine of the class described, a frame, a rotary tool and a vertically adjustable support comprising a pair of substantially horizontal arms and a transverse bar connecting said arms, in combination with guide ways having one end secured to one of said arms and the opposite end adjustably secured to said transverse bar, a carriage slidably mounted on said ways and a work holder on said carriage, substantially as described.

2. In a grinding machine of the class described, a frame, a rotary tool and a vertically adjustable support comprising a pair of substantially horizontal arms and a transverse bar connecting said arms, in combination with guide ways having one end secured to one of said arms and the opposite end adjustably secured to said trans-

verse bar, a carriage mounted for reciprocation on said ways in combination with a work holder comprising an angle iron consisting of substantially vertical and horizontal flanges, lugs secured to the outer face of one of said flanges, and pivotally secured to said carriage on an axis longitudinal of the same, and a work clamp comprising a V-shaped member, means for securing one leg of said member to the outer face of either of said flanges, and a work engaging clamp screw threaded through the opposite leg of said member, substantially as described.

3. In a grinding machine of the class described, a frame, a rotary tool and a vertically adjustable support comprising a pair of substantially horizontal arms and a transverse bar connecting said arms, in combination with guide ways having one end secured to one of said arms and the opposite end adjustably secured to said transverse bar, a carriage slidably mounted on said ways and a work holder on said carriage, and means for moving the work holder laterally with relation to the carriage.

4. In a grinding machine of the class described, a frame, a rotary tool and a vertically adjustable support comprising a pair of substantially horizontal arms and a transverse bar connecting said arms, in combination with guide ways having one end secured to one of said arms and the opposite end adjustably secured to said transverse bar, a carriage mounted for reciprocation on said ways, sleeves mounted transversely of said carriage, telescopic members arranged within said sleeves, a work holder mounted on the ends of said telescopic members and means for adjusting said telescopic members to position the work holders with relation to the tool.

5. In a grinding machine of the class described, a frame, a rotary tool and a vertically adjustable support comprising a pair of substantially horizontal arms and a transverse bar connecting said arms, in combination with guide ways having one end secured to one of said arms and the opposite end adjustably secured to said transverse bar, a carriage mounted for reciprocation on said ways, sleeves mounted transversely of said carriage, telescopic members arranged within said sleeves, a work holder pivotally attached to said telescopic members on an axis longitudinal of the work holder, and means for adjusting said telescopic members to position the work holders with relation to the tool.

6. An attachment for a grinding machine of the character mentioned comprising guide ways formed of an angle iron having a horizontal and a vertical flange, a carriage comprising a similar angle iron having a vertical flange in sliding contact with the inner face of the vertical flange of the ways and a horizontal flange extending across the upper edge thereof, a member extending beneath the angular corner of said ways and fixed to said carriage for maintaining the same on said ways, a bearing strip mounted on the inner face of the horizontal flange of the ways and engaging the lower portion of the vertical portion of the flange of the carriage, a work holder mounted on the carriage, and means for attaching the device to a grinding machine, substantially as described.

7. In a grinding machine of the class described, a frame, a rotary tool, and a vertically adjustable support comprising a pair of substantially horizontal arms and a transverse bar connecting said arms, in combination with a bracket secured to one of said arms adjacent its inner end, guide ways having one end resting on said bracket, a clamp for securing the adjacent portion of the guide ways to said bracket, a vertical sleeve adjustably mounted on the transverse bar, a depending stem on said ways adjacent its outer end and vertically adjustable within said sleeve, a carriage slidably mounted on said ways, a work holder on said carriage, and a handle on said carriage for manipulating the same, substantially as described.

8. An attachment for grinding machines of the character mentioned comprising guide ways, a carriage slidably mounted on said ways, a pair of sleeves transversely mounted on said carriage, telescopic members arranged within said sleeves, a swiveled screw threaded in each of said telescopic members, a work holder having a pair of lugs pivotally connected to the outer ends of said telescopic members on an axis longitudinal of the carriage and work clamping means on said holder, substantially as described.

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