

Nov. 19, 1929.

E. O'TOOLE

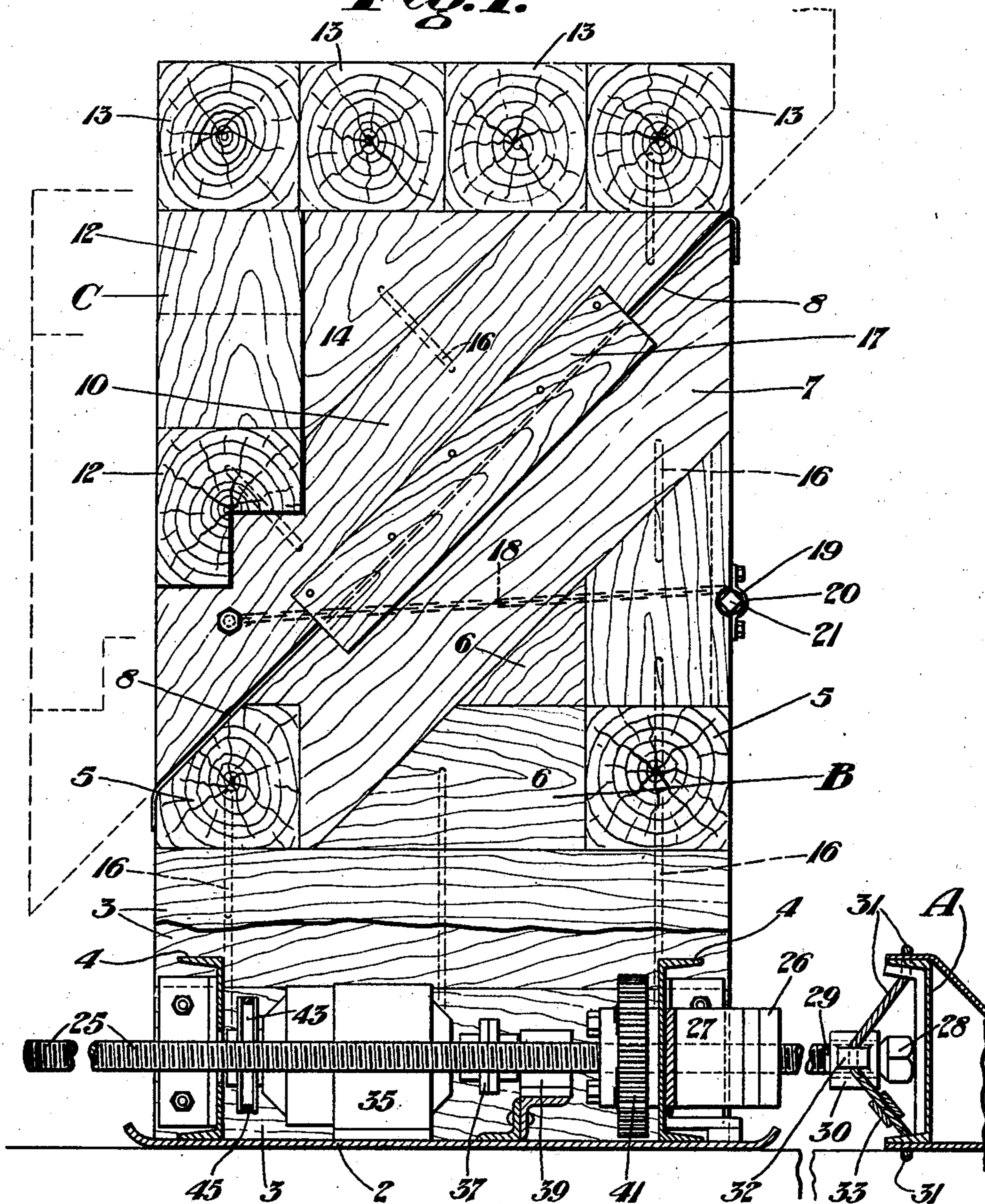
1,735,974

ROOF SUPPORT

Filed Aug. 26, 1927.

3 Sheets-Sheet 1

**Fig. 1.**



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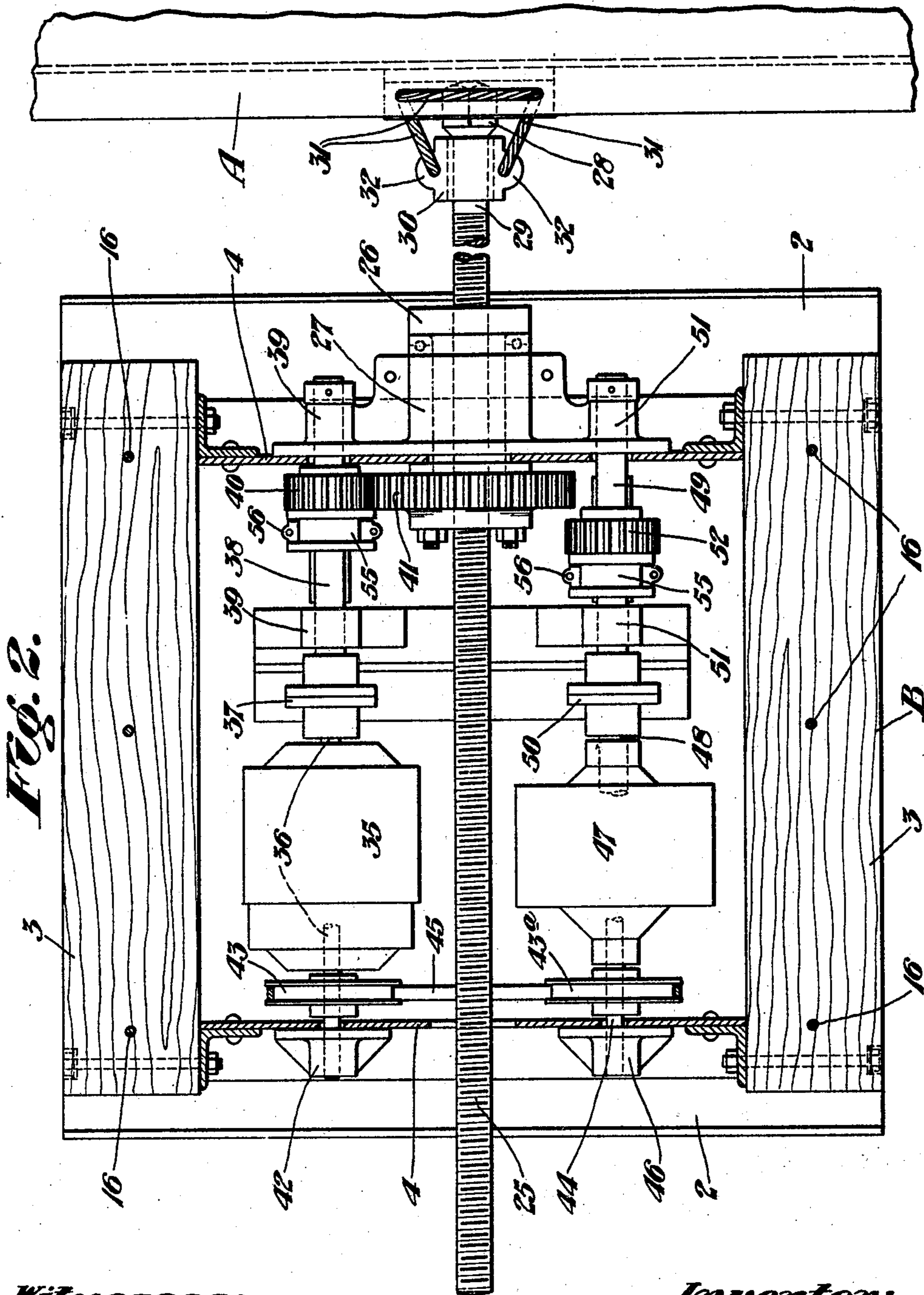


Fig. 2.

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Nov. 19, 1929.

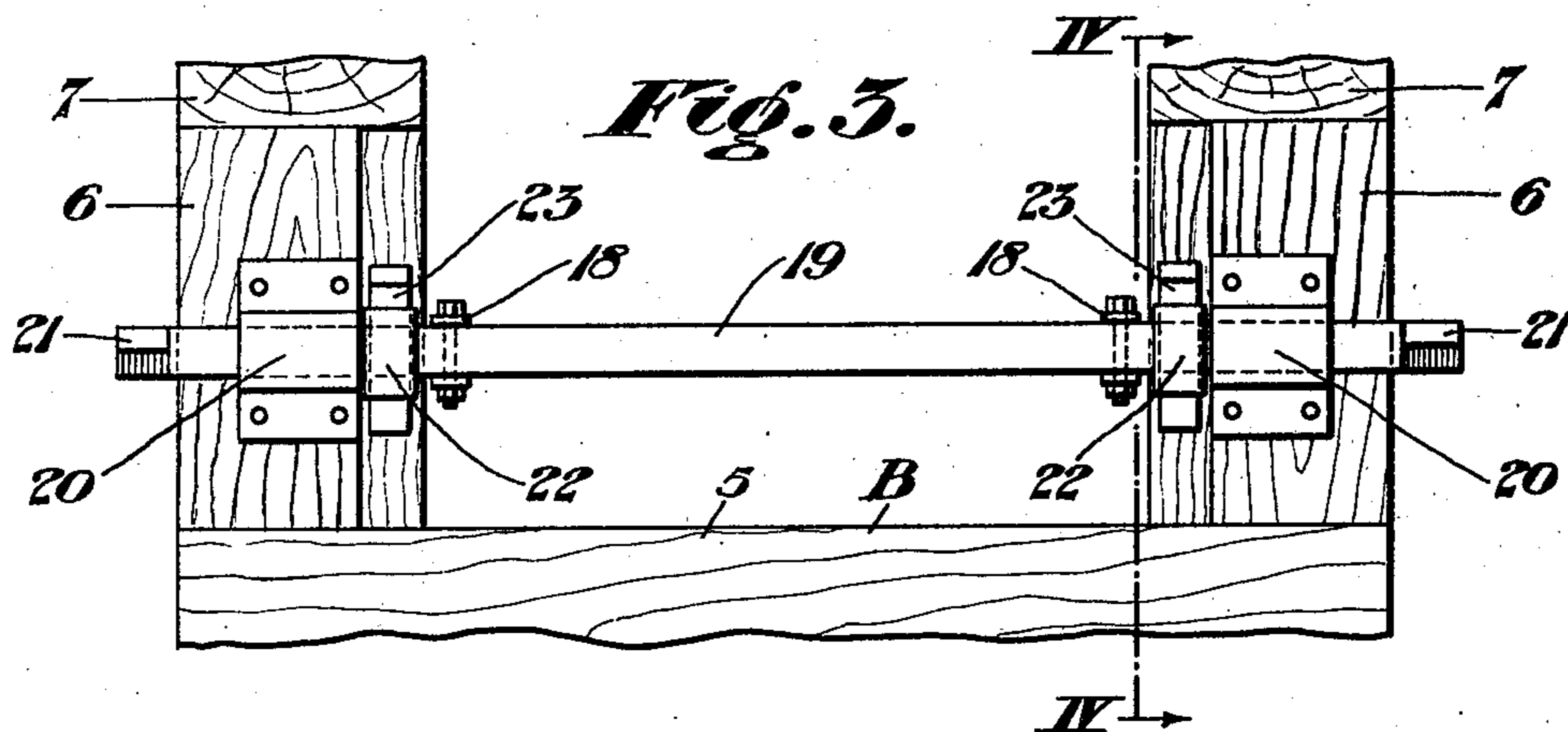
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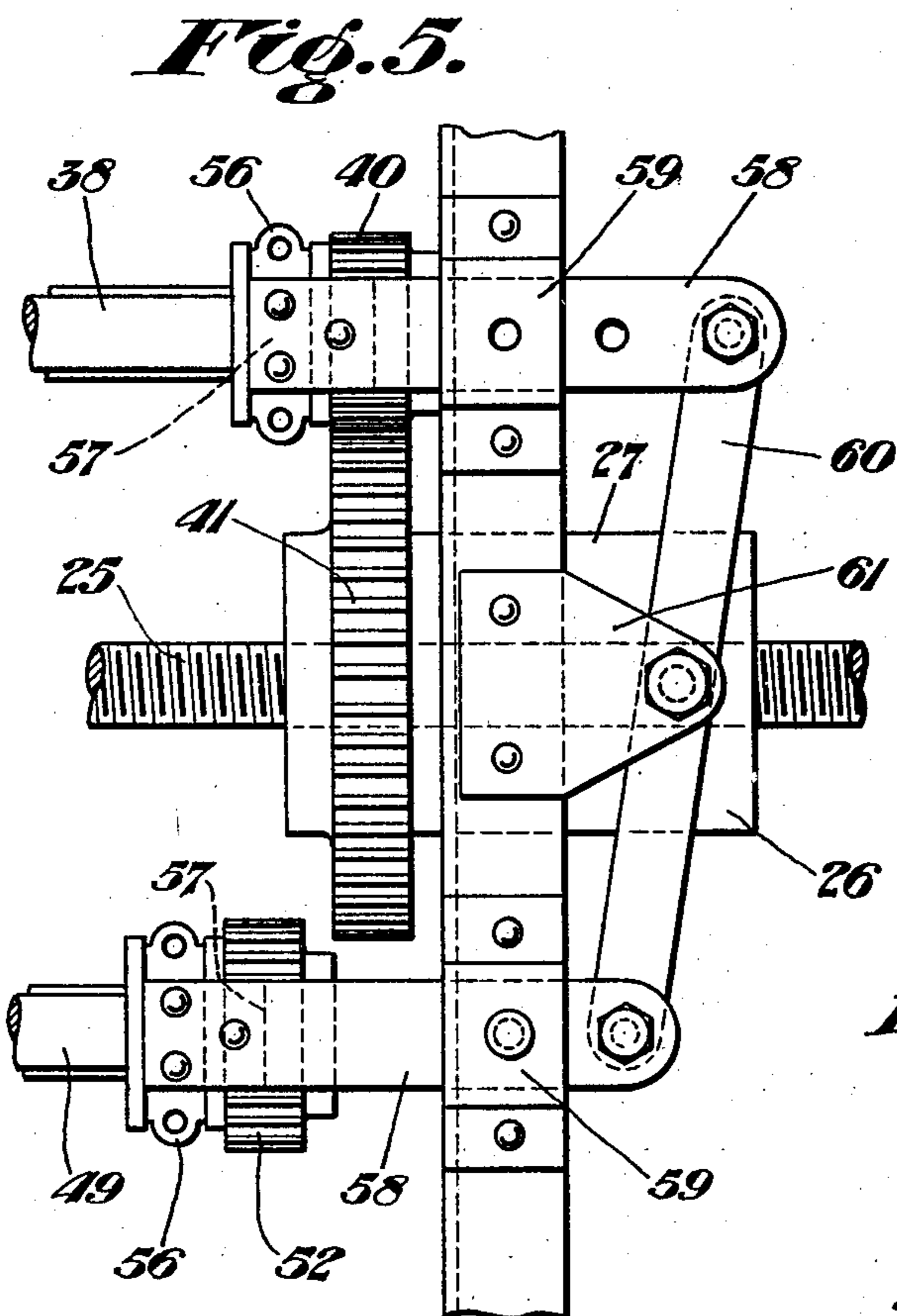
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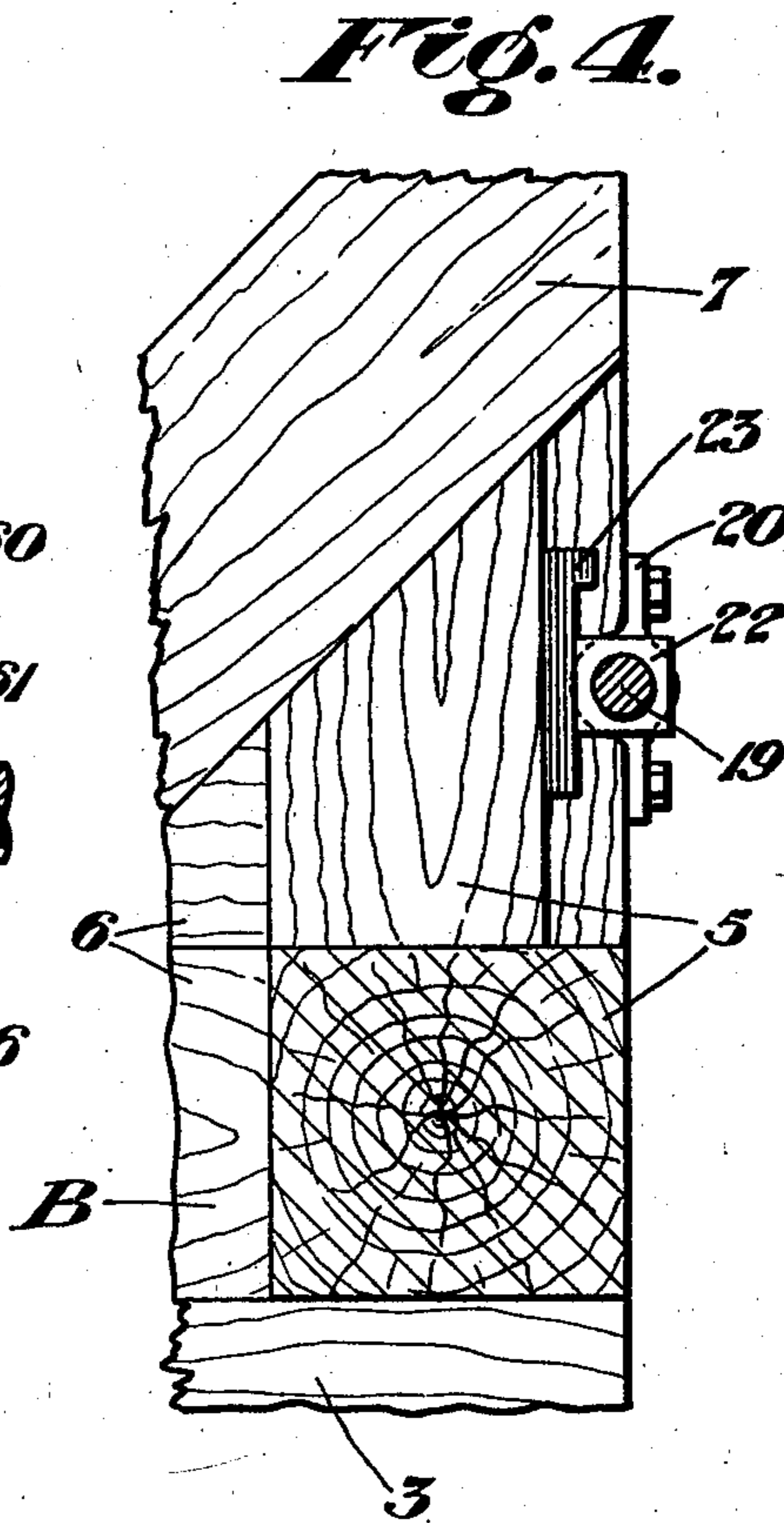
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*Fig. 3.*



*Fig. 5.*



*Fig. 4.*

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# UNITED STATES PATENT OFFICE

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## ROOF SUPPORT

Application filed August 26, 1927. Serial No. 215,591.

This invention relates to roof supporting apparatus for mines and, more particularly, to a combined roof supporting and mining machine advancing rig, and has for one of its objects the provision of a rig of this class which will be relatively cheap to construct and efficient in operation.

Another object is to provide a roof supporting apparatus of crib-like construction, whereby the tremendous strength necessary to support heavy mine roofs is had in a structure which may be readily handled and advanced by power as the mining operation advances.

A further object is to provide a roof supporting apparatus having the novel construction, combination and design of parts hereinafter described and illustrated in the accompanying drawings.

In the drawings—

Figure 1 is a side elevation of a roof support constructed in accordance with this invention.

Figure 2 is a sectional plan showing the power advancing mechanism.

Figure 3 is a fragmentary detail elevation showing the operating shaft for the support.

Figure 4 is a similar view taken on the line IV—IV of Figure 3.

Figure 5 is a fragmentary detail plan showing the clutch operating means for the advancing mechanism.

Referring more particularly to the drawings the letter A designates the rear frame member of a mining machine, such as that shown in my prior Patent No. 1,583,992, dated May 11, 1926. It will be understood, however, that the roof supporting apparatus of this invention is not limited to use with this mining machine but may be used with any type of mining machine desired.

The roof supporting apparatus comprises a body composed of lower and upper parts B and C, respectively. The lower part B comprises a base portion composed of a bottom plate 2, side beams or timbers 3, and a pair of end channel beams 4 connecting said side beams or timbers. The lower part B is further built up by timbers 5 extending trans-

versely to the side timbers 3, and by filler timbers 6 and capped by upwardly and forwardly inclined side timbers 7, so as to have its upper or top face inclined forwardly and upwardly to the horizontal. A metal wear plate 8 is secured along each side of the top face of the lower part B of the roof support to prevent wear and facilitate the operation of the upper part to be described.

The upper or top part C of the roof supporting apparatus is composed of side beams or timbers 10, a pair of rear end timbers 12, transversely extending top timbers 13, and a filler block 14. The side beams or timbers 10 are inclined forwardly and upwardly on an angle to the horizontal at the same degree as the angle of incline of the top face of the bottom part B, so that said top or upper part C will fit on and co-operate with the bottom or lower part B to form a substantially rectangular body when the parts are in alignment.

The several timbers, beams, and filler blocks of the parts B and C are secured together by dowel pins 16, or bolts and the like.

A pair of guide plates or boards 17 are secured to the outside face of each of the side timbers 7 of the lower part B of the roof supporting apparatus and project above the upper face of the timbers 7 so as to guide and prevent sidewise movement of the upper part C relative to the part B.

The upper part C of the supporting apparatus or crib is adapted to be slidably moved transversely backward or forward or in the direction of the inclined faces of the lower and upper parts B and C of the apparatus, relative to the lower part B. During the above movement the inclined lower face of the upper part C is adapted to ride on the similarly inclined upper face of the lower part B and, therefore, the upper part C will be forced to move vertically either upward or downward, according to whether the part is being moved forwardly or rearwardly. When the part C is forced upwardly it will engage and support the mine roof and when it is allowed to move downwardly it will be released from the roof and the whole ap-

paratus will be free to be advanced or moved to a new position.

In order to facilitate the movement of the part C relative to the part B I have provided a pair of chains or cables 18 which have one end secured to the opposite sides of the part C adjacent its lowest point and have their other ends secured to a winch shaft 19 journaled in bearings 20 on the part B.

The ends of the shaft 19 are squared as at 21 to receive a wrench for turning the shaft to take up the chains or cables 18 and cause the part C to move forwardly and upwardly.

In order to lock the shaft 19 against rotation and thus lock the part C in its adjusted position, the shaft 19 is provided with squared portions 22 adjacent each of the bearings 20, and wedges 23 are provided and are adapted to be driven home between the front timbers 5 of the part B and the squared portions 22 of the shaft. When it is desired to release the shaft 19 in order to lower or further adjust the position of the upper part C, the wedges are knocked out of locking position and the shaft is freed for movement in either direction. It will be understood, of course, that I do not wish to be limited to the use of the locking wedges 23, since various other forms of locking mechanism may be used to hold the shaft 19 against rotation.

In order to advance the mining machine located in front of the roof supporting rig I provide a feed screw or shaft 25 which has a threaded engagement with a nut 26 journaled in a bearing 27 secured to the forward end channel beam 4.

The forward end of the shaft 25 is provided with a head 28 and a squared shank portion 29. A collar 30 is fitted over the squared portion 29 of the shaft and is secured to the rear frame member A of the mining machine by a flexible cable 31, which is passed through suitable apertures in the flanges of the frame member A and through apertured ears 32 on the collar, and has its ends secured together by a clamp 33. The head 28 extends beyond or forward of the collar 30 and is adapted to be engaged against the web of the frame member A. The above described connection between the collar 30 and the mining machine forms a flexible connection to facilitate the movement of the mining machine and the roof supporting crib over the uneven mine floor.

A motor 35 is mounted on the bottom plate 2 of the portion A of the roof supporting apparatus and has its armature shaft 36 extended at both ends. The forward end of the armature shaft 36 is connected by a flexible coupling 37 to a power shaft 38 journaled in bearings 39 and having a pinion 40 slidably keyed thereon and adapted to be engaged with and disengaged from a drive gear 41 secured to the nut 26.

The rear end of the armature shaft 36 is

journaled in a bearing 42 and carries a sprocket 43 which is connected to a sprocket 43<sup>a</sup> on a shaft 44 by a silent chain 45. The shaft 44 is journaled at its rear end in a bearing 46 and has its forward end journaled in and connected to a standard speed reducing unit 47.

A drive shaft 48 extends from the speed reducing unit 47 and has its forward end connected to a shaft 49 by a flexible coupling 50. The shaft 49 is journaled in bearings 51 and has a pinion 52 slidably keyed thereon and adapted to be meshed with and unmeshed from the drive gear 41 secured to the nut 26.

The shaft 38 is connected direct to the motor armature shaft 36 and is rotated at the same speed as the motor and therefore, is the high speed drive shaft. This high speed drive shaft 38 and the pinion 40 are rotated counter-clockwise so as to drive the nut 26 in a clockwise direction and thus move the roof supporting apparatus forward relative to the shaft 25 and the mining machine A.

The drive shaft 48 is a low speed shaft and the shaft and its pinion 52 are rotated in a clockwise direction so as to rotate the nut 26 in a counter-clockwise direction and thus force the shaft 25 forward relative to the nut 26 and roof supporting apparatus against the mining machine to feed it into the coal or other material being mined.

The pinions 40 and 52 are each provided with grooved neck portions 55 to receive the shifting collars 56 and the yokes 57. The yokes 57 are each provided with forwardly projecting levers 58 which project forwardly through guides 59 on the forward channel 4 and have their forward ends pivotally connected to the opposite ends of a rocking lever 60 which is pivoted intermediate its ends on a bracket 61 secured to the beam 4. The pinions 40 and 52 are adapted to be shifted into and out of mesh with the drive gear 41 by rocking the lever 60 and the construction is such that the pinions are interlocked so that one is unmeshed before the other is meshed.

The above described roof supporting and mining machine advancing rig is simple in construction, cheap to manufacture, and has sufficient strength to support the heaviest of roof loads.

While I have shown and described one specific embodiment of my invention it will be understood that I do not wish to be limited thereto since various modifications may be made without departing from the scope of my invention as defined in the appended claims, for instance, the advancing mechanism may be omitted entirely, or a different form of advancing mechanism may be employed, in order to adapt the roof support to different uses.

It will also be understood that the crib or body of the device may be built up from timber or metal beams and that the words

"timbers" and "beams" are used interchangeably throughout the specification and claims, and are to be construed in their broadest sense so as to include either metal or timber beams.

I claim—

1. A crib support for mine roofs comprising a two-part body, each of said parts being built up from a plurality of timbers arranged with their longitudinal axes at right angles, one of said parts being arranged above and supported on the other part, said parts having their contacting faces inclined to the horizontal, a shaft journaled in bearings on one of said roof support parts, at least two chains secured to the other of said roof support parts and to said shaft, said shaft being adapted to be rotated to take up and let out said chains whereby the roof support part to which said chains are secured will be moved transversely in the direction of said inclined faces and forced also vertically, due to said inclined faces.

2. A crib support for mine roofs comprising a two-part body, each of said parts being built up from a plurality of timbers arranged with their longitudinal axes at right angles, one of said parts being arranged above and supported on the other part, said parts having their contacting faces inclined to the horizontal, a shaft journaled in bearings on one of said roof support parts, at least two chains secured to the other of said roof support parts and to said shaft, said shaft being adapted to be rotated to take up and let out said chains whereby the roof support part to which said chains are secured will be moved transversely in the direction of said inclined faces and forced also vertically, due to said inclined faces, and means independent of the means for rotating said shaft for releasably locking said shaft against rotation.

3. A combined roof support and advancing rig for use with mining machines comprising a two-part crib-like body, each of said parts being built up from a plurality of timbers arranged with their longitudinal axes at right angles, one of said parts being arranged above and supported on the other part, said parts having their contacting faces inclined to the horizontal, means for moving the upper part transversely in the direction of said inclined faces whereby said parts will be forced to work vertically, a screw shaft mounted in the lower part of said rig, a nut on said shaft and journaled in said rig, and power means for rotating said nut to advance said shaft and force said shaft against the machine to be advanced.

4. A combined roof support and advancing rig for use with mining machines comprising a two-part crib-like body, each of said parts being built up from a plurality of timbers arranged with their longitudinal axes at right angles, one of said parts being

arranged above and supported on the other part, said parts having their contacting faces inclined to the horizontal, means for moving the upper part transversely in the direction of said inclined faces whereby said parts will be forced to work vertically, a screw shaft mounted in the lower part of said rig, a nut on said shaft and journaled in said rig, and power means for rotating said nut in one direction to feed said shaft forward against the machine to be advanced, and in the reverse direction to retract said shaft and advance said rig.

In testimony whereof, I have hereunto set my hand.

EDWARD O'TOOLE.

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