Aug. 20, 1935. F. S. HAAS ET AL 2,012,066

HEADSTOCK FOR MACHINE TOOLS

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Fig. 1

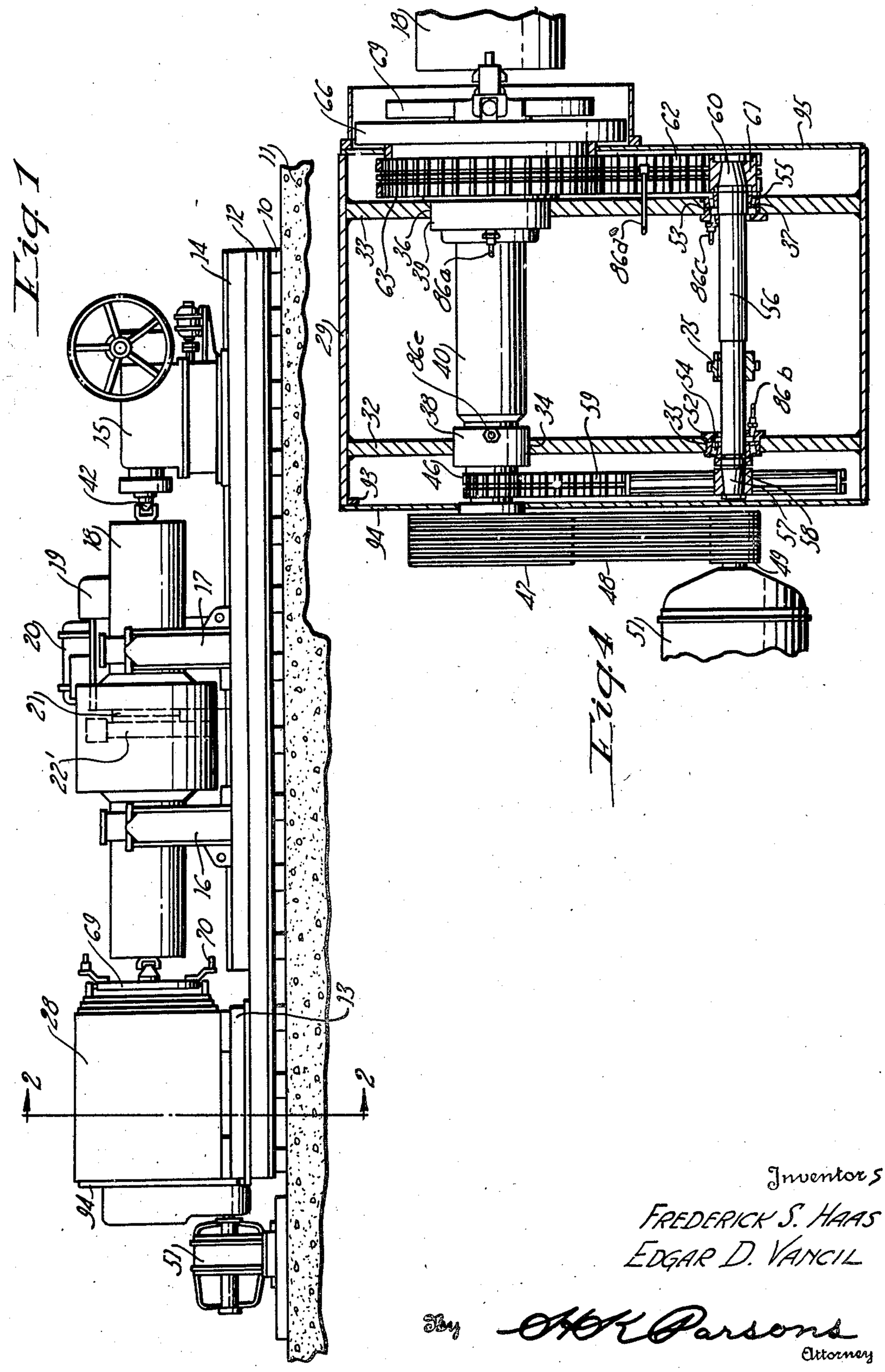

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Fig. 3

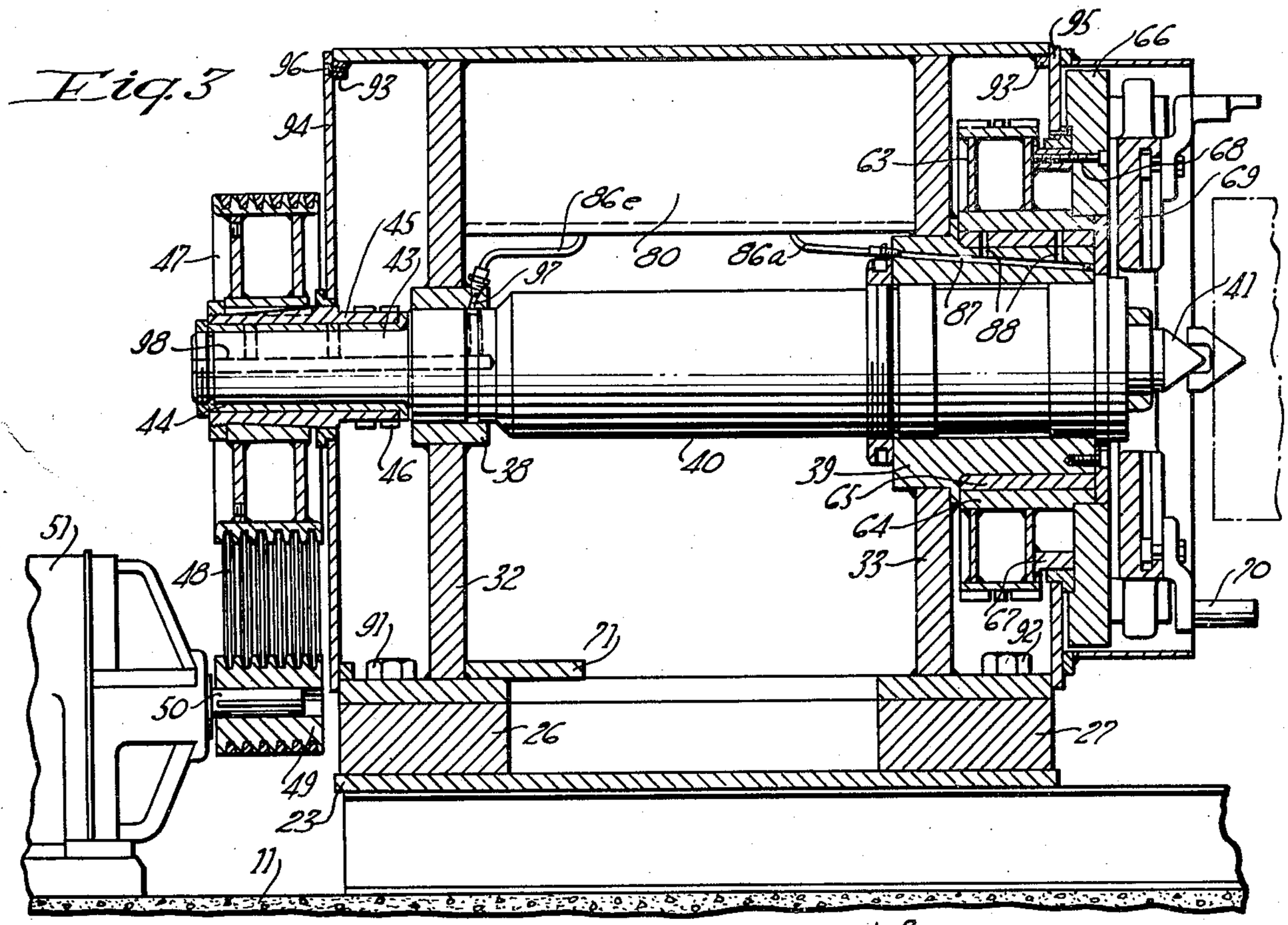
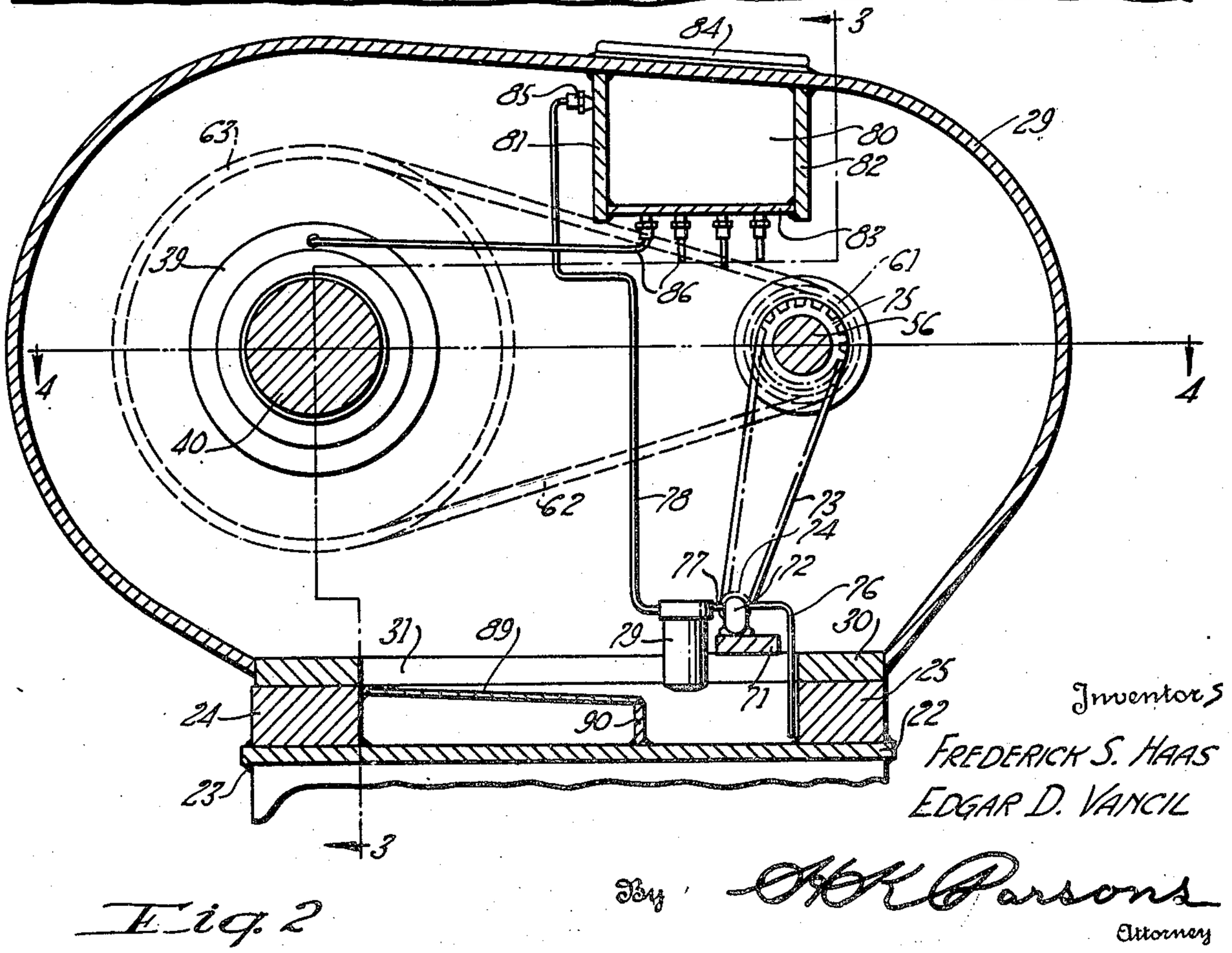


Fig. 2



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HEADSTOCK FOR MACHINE TOOLS

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6 Claims. (Cl. 82—28)

This invention relates to improvements in machine tools and particularly to improvements in grinding machines, lathes and like tools.

One of the principal objects of the present invention is therefore the provision of an improved grinding machine and particularly the work terminal supporting mechanism of such a machine, such as the headstock.

Another object of the invention is the provision of a headstock particularly adapted for machines which operate on large work pieces such as the rolls used in paper and steel mills.

A further object of the invention is the provision of a fabricated structure, that is a headstock mechanism of improved design and form completely of welded sheets.

A still further object of the invention is the provision of a headstock, as just referred to, which co-operates with a bed or supporting mechanism of similar fabricated construction which provides mechanism co-operating with the said immediate headstock.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification, considered in conjunction with the accompanying drawings forming a part thereof and it is to be understood that any modifications may be made in the exact structural details there shown and described, within the scope of the appended claims, without departing from or exceeding the spirit of the invention.

In the drawings;

Figure 1 is a front elevation of a grinding machine embodying the improvements of the invention.

Figure 2 is a transverse sectional view taken substantially on line 2—2 of Figure 1.

Figure 3 is a longitudinal sectional view taken on line 3—3 of Figure 2.

Figure 4 is a horizontal sectional view taken on line 4—4 of Figure 2.

Throughout the several views of the drawings similar reference characters are employed to denote the same or similar parts.

The grinding machine as shown in the drawings comprises a plurality of blocks 10 mounted on a concrete floor 11. Supported on the blocks 10 is a bed 12 formed by welding longitudinal and transverse members to one another. To the bed 12 on the upper surface is provided a headstock base 13 from which project the usual guide ways 14. Mounted on the guide ways 14 at one end thereof is a tailstock 15 adapted to be shifted relative to the ways 14 toward and from the headstock base 13. Mounted on the ways 14 between the headstock base 13 and the tailstock 15 are journal rests 16 and 17 which support the work while being rotated and tooled.

Behind the work 18 is disposed a tool carriage 19 supporting a prime mover or electric motor 20. The electric motor 20 is belted or otherwise connected with the spindle 21 of the carriage for effecting its rotation. Fastened to one end of the spindle 21 is a grinding wheel 22'.

The headstock base 13 comprises a lower plate 22 which extends the full width of the bed 10 as seen in Figure 2. The base plate 22 is secured to the bed 10 by suitable welding and the like 23. Welded to the upper surface of the plate 22 are longitudinal bars 24 and 25, and similarly welded to the upper surface of said plate 22 between the bars 24 and 25 are the transverse bars 26 and 27. From the foregoing it will be noted that the headstock base 13 has a rectangular boxlike form and this box constitutes a lubricant reservoir for holding lubricant oil to be supplied to the rotating parts of the headstock.

The headstock, itself indicated generally by the numeral 28, comprises a substantially oval shaped member 29 formed by bending a single sheet of steel. One of the long sides of the member 29 is cut away, and welded into the opening thereof is a frame 30 having formed therethrough an opening 31 co-extensive with the area formed interiorly of the bars 24, 25, 26 and 27.

Extending transversely of the body member 29 and conforming to the contour thereof are transverse plate members 32 and 33. The members 32 and 33 are secured in position by being welded along each edge to the body member 29 and the frame 30. The cross members 32 and 33 are each provided with a pair of bores or holes 34 and 35 and 36 and 37. Welded into the bore 34 of the member 32 is a sleeve 38 which is in axial alignment with a sleeve 39 welded in the bore 36 in the member 33.

The sleeves 38 and 39 have secured therein a spindle 40 which is held against any movement relative to the said sleeves by sweating the same in position. From this it will be seen that the headstock of the present invention is of the dead spindle type, that is, one wherein the spindle is not rotated with the work. At the head end of the spindle it has projecting therefrom a center 41 which is in axial alignment with a center 42 projecting from the tailstock 15, the said centers determining between them the initial axis of rotation of the work 18 and further acting as termi-

nal abutments for the work during the tooling or grinding thereof.

By reference to Figure 3 it will be noted that the spindle 40 projects rearwardly of the sleeve 38 where it is reduced in diameter as at 43. Mounted on the said reduced end 43 of the spindle is a bushing 44 forming a bearing for a rotatable sleeve 45. The sleeve 45 has formed integral therewith a chain sprocket 46 and has keyed or otherwise secured thereto a pulley, sheave or the like 47. As shown in the drawings, the member 47 is a sheave having formed therein a plurality of grooves for the flexible transmission members or V belts 48. The belts 48 are in turn trained to a driving sheave 49 keyed or otherwise secured to the shaft 50 of the motor or prime mover 51. From this will be seen that the driving sleeve 45 is adequately rotated from the motor 51.

The bore 35 in the headstock transverse member 32 is in axial alignment with the bore 37 in the member 33 and respectively mounted in said bores are the outer races 52 and 53 of anti-friction bearings 54 and 55. These bearings 54 and 55 support for rotation a counter or jackshaft 56 which projects beyond the said supporting bearings. The portion of the shaft 56 which projects beyond the transverse member 32 is tapered as at 57 and has keyed or otherwise secured thereto a large silent chain gear 58. The chain gear 58 is in alignment with the chain sprocket 46 of the driving sleeve 45 and the said sprocket and keyway have trained about them a sprocket chain 59. The sprocket chain 59 transmits motion from the driving sleeve 45 to the jackshaft 56.

The end of the jackshaft 56 which projects beyond the traverse member 33 is provided with a tapered portion as at 60 to which is keyed or otherwise secured a silent chain sprocket 61. The sprocket 61 has trained thereabout a chain 62, in turn extending about a relatively large sprocket gear 63. The gear 63 is, therefore, in alignment with the sprocket 61 and the said gear includes a hub 64 which is mounted on a bushing 65 fastened to the spindle supporting sleeve 39.

The hub 64 of the gear 63 is provided with a reduced portion on which is fitted a face plate 66. In addition, the gear 63 has welded or otherwise secured thereto a ring member 67 provided with threaded bores receiving screws 68 which pass through plain bores formed in the plate 66.

Secured in any desirable manner to the face plate 66 is a chuck or driving plate mechanism indicated generally by the numeral 69 and including the driving dogs 70 which when connected with the work effect its rotation.

From the foregoing it will now be seen that the transmission train for rotating the work comprises the motor sheave 49 and compound sheave sprocket 47—46 carried by the rear end of the spindle and connected to the motor sheave by the belts 48. From the compound sheave sprocket 47—46 extends the belt 59 for rotating the jackshaft 56 through the chain 59 and sprocket gear 58. A similar chain 62 driven by a chain pinion on the shaft 56 rotates the bull gear 63 associated with the face plate and work driving assembly. In view of the massiveness of the parts involved in the headstock of this invention the bull gear 63 and chain gear 58 act as fly wheels or stabilizers when the work is set in motion and prevent to a surprising extent the formation of chatter marks, flats and the like on the work.

In order to lubricate the several rotatable members of the headstock assembly the headstock frame plate 30 has welded thereto and projecting therefrom in overlying relationship to the motor base reservoir, a shelf 71 which supports a pump 72 adapted to circulate the lubricant. The pump 72 is driven by a chain 73 which extends about a gear or the like 74 associated with the pump 72 and a driving sprocket 75 keyed or otherwise secured to the jackshaft 56.

The pump 72 has extending from one side thereof a suction pipe or line 76 which terminates at its other end at the base of the lubricant reservoir. Extending from the other side of the pump 72 is the discharge line 77 which empties into a second pipe or conduit 78 through an oil filter or the like 79. The upper end of the pipe or conduit 78 empties into an oil well indicated generally by the numeral 80 located above the bearings of the rotation members of the headstock assembly.

The oil well 80 is formed between the traverse members 32 and 33 by a pair of side plates 81 and 82 having their upper longitudinal edges welded to the under surface of the top portions of the headstock housing 29 and a bottom member 83 having its longitudinal edges welded to the side plates 81 and 82. The ends of both the side members 81 and 82 and the bottom member 83 are respectively welded to the traverse members 32 and 33. From this it will be seen that there has been provided a box or oil well which will contain a quantity of lubricant delivered thereto, as above explained, by the pump 72 from the reservoir. Access may be had to the well 80 through an aperture formed in the top of the housing member 29 and covered by a suitable cover plate 84.

It is through one of the oil well side members, 81 for example, that the lubricant is delivered to the well. For this reason the said side member has a coupling 85 therein to which the upper end of the conduit or pipe 78 connects. The lubricant is discharged from the well 80 through a series of discharge pipes or conduits 86 which terminate in the several rotatable bearings of the jackshaft, sheave pinion unit 47—46 and face plate assembly 66. For example, discharge pipe or conduit 86*a* from the oil well terminates in a duct or port 87 formed in the sleeve member 39, which duct through additional ports or ducts 88 lubricate the bearing on which the bull gear 63 or face plate assembly rotates. Also, the discharge pipe or conduit 86*e* terminates at a port 97 in the sleeve 38 which through the cross and longitudinal ports 98 lubricates the bearing for the compound sheave-pinion unit 47—46. Again, pipes 86*b* and 86*c* terminate at the anti-friction bearings 54 and 55 respectively for lubricating the said bearings, while the jackshaft 56 is being rotated and the pipe 86*d* extends through the transverse member 33 to overlie the chain 62 thereby supplying lubricant thereto during the driving thereof. Other pipes or conduits extend from the well to all of the bearings and parts within the headstock which need lubricant and from which it will be seen that the said bearings are adequately lubricated during the operation of the headstock.

The lubricant, upon passing through the bearings which they lubricate, falls by gravity to the frame plate 30 from which the lubricant finds its way to the reservoir in the headstock base 13. To insure the lubricant being returned to the lowest point of said reservoir where the suction pipe 76 is located, the reservoir contains a drain board formed by an inclined plate member 89 inclining transversely of the headstock, as seen in Figure 2. The drain board or plate 89 is welded at one end to the longitudinal bar 24

and at the other end to a riser 90 held in position by welding its lower end to the base plate 22.

The headstock, as a whole, is securely attached to the base 13 by a plurality of bolts 91 and 92 respectively passing through the headstock frame plate 30 on opposite sides of the transverse members 32 and 33, the bolts 91 and 92 passing downwardly through plane perforations in the frame 30 into threaded bores in the transverse bars 26 and 27.

Secured, as by welding, at suitable intervals to the inner surface of the housing member 29 and the upper surface of the frame plate 30 and adjacent to the lateral edges thereof are blocks 93 through which are formed threaded perforations. Lying adjacent the said lateral edges of the headstock housing 29 are cover plates 94 and 95 through which pass cap screws 96 threaded into the threaded bores in the blocks 93. By this construction the headstock is completely enclosed, yet the interior of the headstock may be readily reached to adjust or inspect the chains 59 and 62 by merely removing the plates 94 and 95.

What is claimed is:

1. A fabricated headstock for use with machine tools comprising an enveloping member formed by bending to proper form a single sheet of material, a pair of spaced transverse members interiorly of the enveloping member and welded to the inner surface thereof, a frame at the lower end of the enveloping member having an aperture therethrough whereby access may be had to the interior of the enveloping member, said transverse spaced members having aligned bores therein, and a pair of spindle supporting sleeves welded to said transverse members within the aligned bores.

2. A fabricated headstock for use with machine tools comprising an enveloping member formed by bending to proper form a single sheet of material, a pair of spaced transverse members interiorly of the enveloping member and welded to the inner surface thereof, a frame at the lower end of the enveloping member having an aperture therethrough whereby access may be had to the interior of the enveloping member, said transverse spaced members having aligned bores therein, a pair of spindle supporting sleeves welded to said transverse members within the aligned bores, and cover plates for the edges of the enveloping member for completely enclosing the same.

3. A fabricated headstock for use with machine tools comprising an enveloping member formed by bending to proper form a single sheet of material, a pair of spaced transverse members interiorly of the enveloping member and welded to the inner surface thereof, a frame at the lower end of the enveloping member having an aperture therethrough whereby access may be had to the interior of the enveloping member, said transverse spaced members having aligned bores therein, a pair of spindle supporting sleeves welded to said transverse members within the aligned bores, an oil reservoir within the enveloping member and formed by welding side and base plates to the enveloping member and transverse members, and means for supplying lubricant to the well.

4. A fabricated headstock for use with machine tools comprising an enveloping member formed by bending to proper form a single sheet of material, a pair of spaced transverse members interiorly of the enveloping member and welded to the inner surface thereof, a frame at the lower end of the enveloping member having an aperture therethrough whereby access may be had to the interior of the enveloping member, said transverse spaced members having aligned bores therein, a pair of spindle supporting sleeves welded to said transverse members within the aligned bores, an oil reservoir within the enveloping member and formed by welding side and base plates to the enveloping member and transverse members, means for supplying lubricant to the well, a supporting base for the headstock having an area substantially co-extensive with the headstock frame, said base having a compartment formed therein in alignment with the aperture in the headstock frame, and means for securing the headstock to the base.

5. In a headstock of the class described the combination of a housing member including a pair of transverse supports, a supporting sleeve secured to each of said supports, a spindle carried by the sleeves against rotation, a driven member loosely journaled on the spindle, a face plate loosely journaled on one of the supporting sleeves, a jack shaft rotatably mounted in the transverse supporting members, a flexible transmission between the driven member on the spindle and the jack shaft, and a second flexible transmission between the jack shaft and face plate whereby the face plate is rotated.

6. In a headstock of the class described the combination of a housing member including a pair of transverse supports, a supporting sleeve secured to each of said supports, a spindle carried by the sleeves against rotation, a driven member loosely journaled on the spindle, a face plate loosely journaled on one of the supporting sleeves, a jack shaft rotatably mounted in the transverse supporting members, a flexible transmission between the driven member on the spindle and the jack shaft, a second flexible transmission between the jack shaft and face plate whereby the face plate is rotated, and a prime mover connected with the spindle driven member.

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