June 6, 1939. C. L. OTT 2,161,311

GRINDING MACHINE

Filed Aug. 12, 1937 3 Sheets-Sheet 1

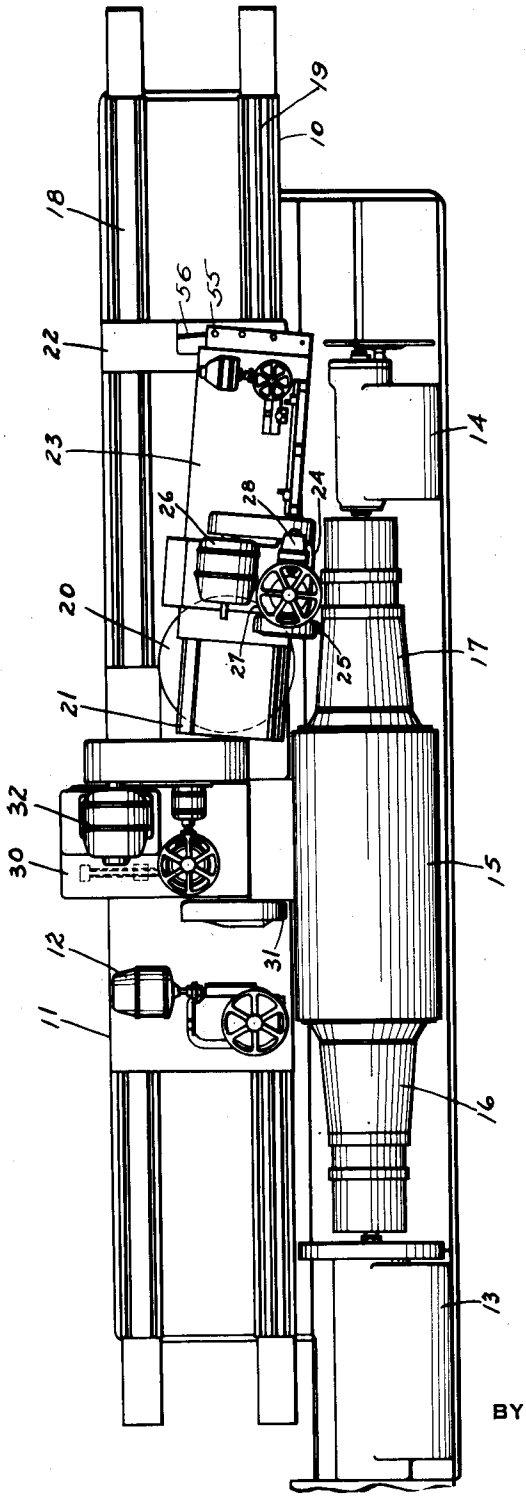


Fig 1

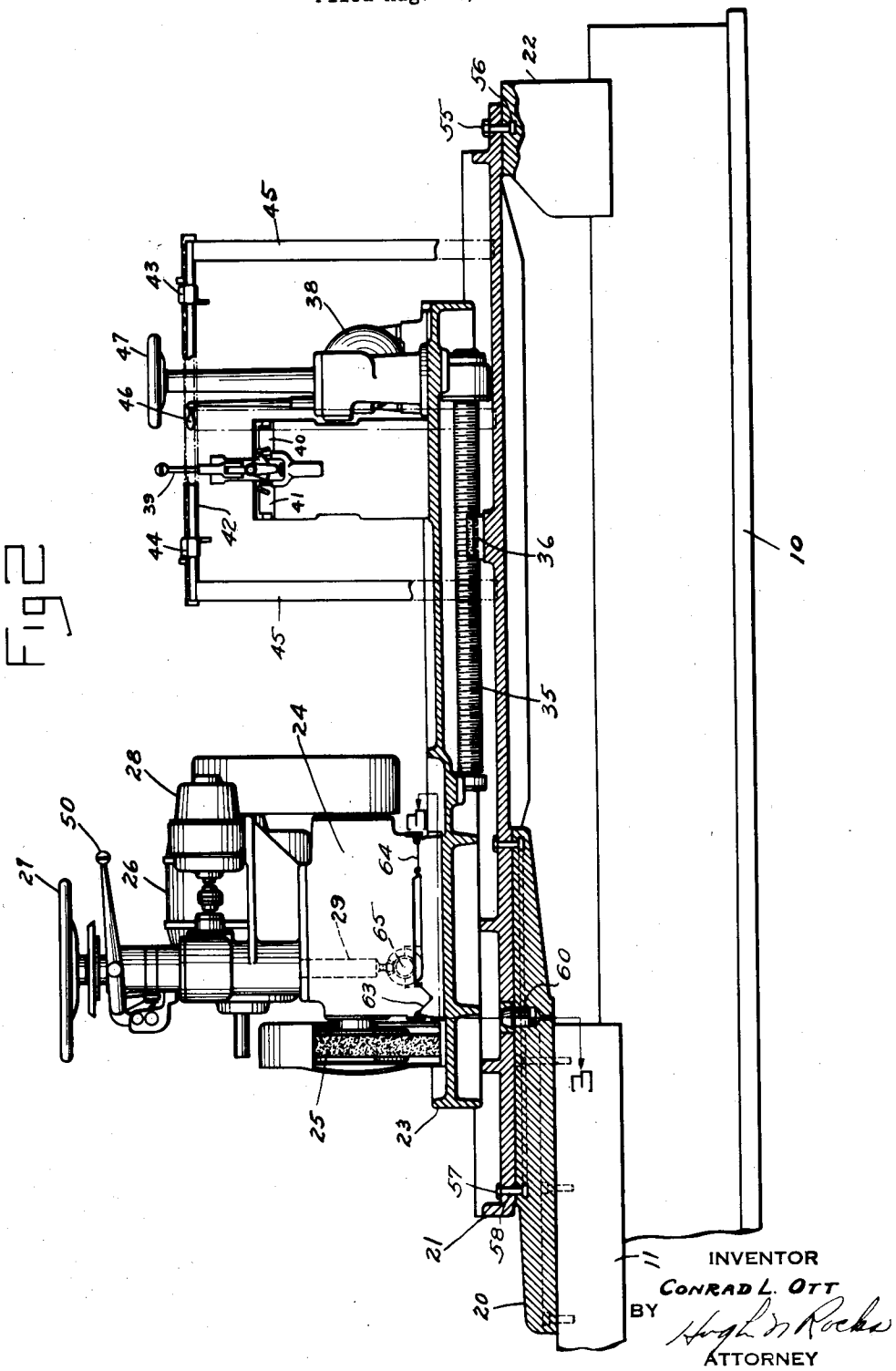
INVENTOR
CONRAD L. OTT
BY Hugh M Rocks
ATTORNEY

June 6, 1939. C. L. OTT 2,161,311

GRINDING MACHINE

Filed Aug. 12, 1937 3 Sheets-Sheet 2

Fig 2



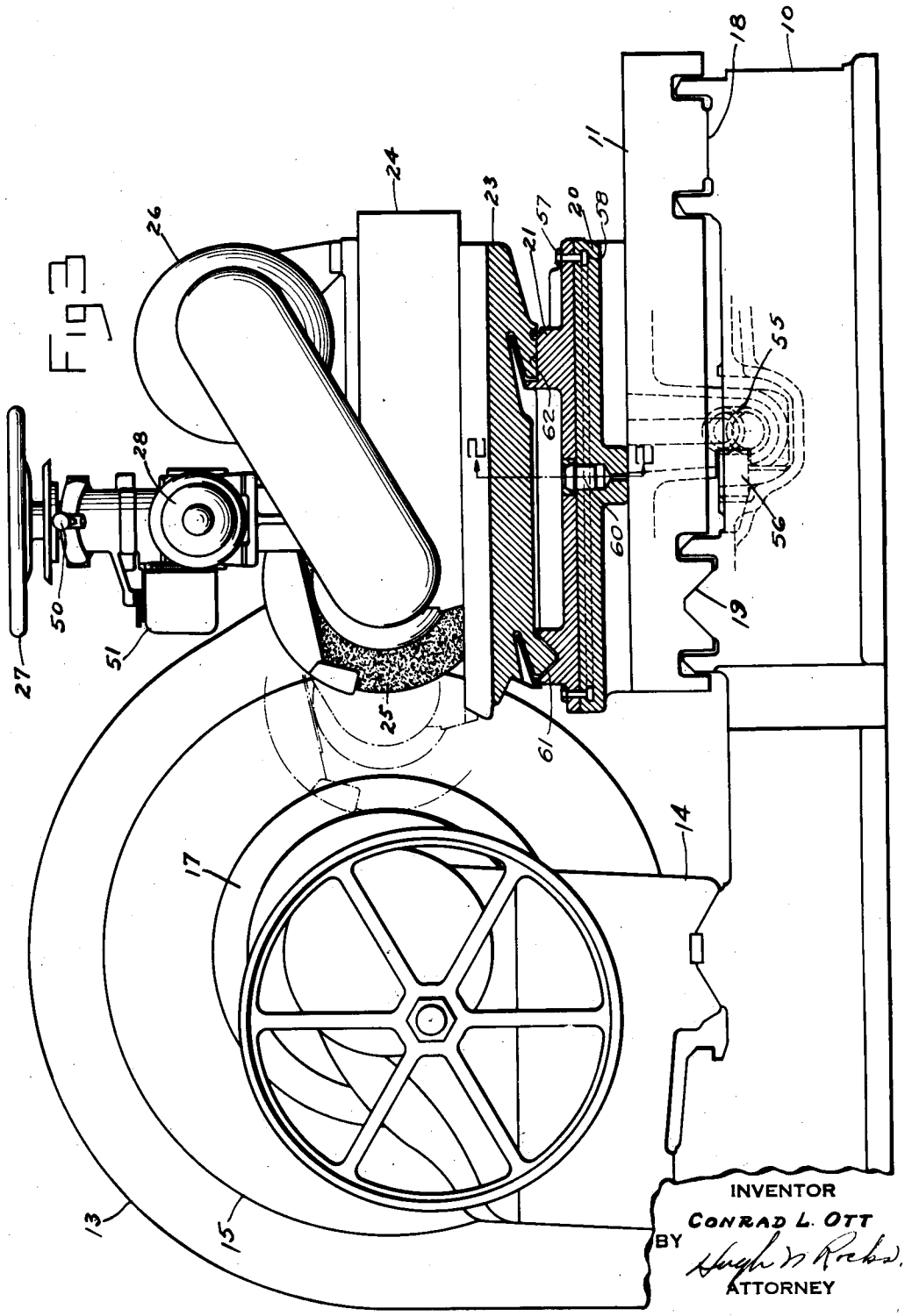
INVENTOR
CONRAD L. OTT
BY Hugh D. Rocks
ATTORNEY

June 6, 1939. C. L. OTT 2,161,311

GRINDING MACHINE

Filed Aug. 12, 1937 3 Sheets-Sheet 3

Fig 3



INVENTOR
CONRAD L. OTT
BY Hugh D. Roche
ATTORNEY

Patented June 6, 1939

2,161,311

UNITED STATES PATENT OFFICE

2,161,311

GRINDING MACHINE

Conrad L. Ott, Detroit, Mich., assignor to Landis Tool Company, Waynesboro, Pa.

Application August 12, 1937, Serial No. 158,786

5 Claims. (Cl. 51—49)

My invention relates to a machine for grinding steel mill and other rolls and particularly the means for grinding taper necks on such rolls.

It is an object of my invention to provide means for grinding tapers on rolls which are too large to be accommodated on the swivel type of work support.

A further object is to provide means for traversing the grinding wheel at an angle to the work.

A further object is to provide an auxiliary grinding wheel unit having self contained feed and traverse mechanisms and which may be removably mounted on a grinding machine.

Heretofore the grinding of tapered necks on steel mill rolls has been limited to comparatively small rolls such as can be supported by the traversing work carriage. The grinding of tapers on such a machine simply requires that the swivel table be set for the desired taper, the carriage reciprocated past the grinding wheel. When grinding the larger rolls the grinding wheel is reciprocated and the work is mounted on a fixed support which can be neither swiveled nor reciprocated. Several attempts have been made to utilize various forms of crowning mechanisms for grinding tapers. Such mechanisms are not designed for this purpose and are generally unsatisfactory.

I have found that the best results are obtained by the use of a grinding wheel unit which may be mounted in such a manner that it may be adjusted to any angle relative to the axis of the work within a given range and which may be reciprocated along the work in the direction of adjustment to grind a tapered surface.

Figure 1 is a plan view of a heavy type roll grinding machine showing the application of my invention.

Figure 2 is a front elevation partly in section along the line 2—2 of Figure 3.

Figure 3 is an end elevation partly in section on line 3—3 of Figure 2.

In the drawings, Figure 1, numeral 10 indicates the bed of a roll grinding machine of the type shown and described in the Good patent, No. 1,904,827, granted April 18, 1933, 11 a wheel carriage slidably mounted in ways 18 and 19 thereon and driven by a motor 12 through suitable gearing including a worm 55 carried by said carriage and a rack 56 on the bed 10. A grinding wheel base 30, grinding wheel 31 and motor 32 are slidably mounted on the carriage for movement transversely thereof. Headstock 13 and footstock 14 rotatably support a roll 15 having taper necks 16 and 17.

An auxiliary carriage includes a table 21 which has one end adjustably mounted on guide block 22 which in turn rests on ways 18 and 19. Said guide block has a curved T-slot 56 and the table may be secured thereto by means of T-bolt 55. The other end of table 21 is pivotally mounted on a swivel base 20 which in turn rests on and is bolted to carriage 11. Said table is mounted for adjustment about pivot 60 and may be secured in any adjusted position by means of T-bolts 57 in T-slots 58. A carriage 23 is slidably mounted in ways 61 and 62 on table 21. Carriage 23 may be reciprocated by means of a lead screw 35 mounted thereon in operative engagement with a halfnut 36 secured to table 21. The means for rotating said screw consists of a reversible motor 38 driving thru any suitable speed change mechanism. Said table 21 may also be moved manually by handwheel 47 which may drive thru said speed change mechanism. Motor 38 may be reversed by lever 39 thru switches 40 and 41. Means for reversing said motor automatically consists of a pair of upright supports 45 on table 21. Said supports carry a dog rack 42 on which a pair of dogs 43 and 44 are adjustably mounted. A wheel support 24 is slidably mounted in ways 63 and 64 at the left hand end of carriage 23. A grinding wheel 25 is rotatably mounted in said wheel support and driven by a motor 26.

The means for feeding the wheel toward and from the work consists of a screw 65 driven thru bevel gearing or other suitable means from a vertical shaft 29. A motor 28 serves to actuate said feeding means at a rapid rate for positioning said wheel for grinding. A lever 50 actuates a switch (not shown) for controlling said motor 28. The feeding mechanism may be actuated manually during grinding by means of handwheel 27.

Operation

During the grinding of the body of a roll the taper grinding attachment is not kept on the machine. When it is desired to grind a tapered surface such as the necks 16 and 17 on roll 15, the attachment is placed on the machine with the guide block 22 resting on guide surfaces 18 and 19. The swivel plate 20 is placed on carriage 11 and bolted thereto. Carriage 11 is then traversed so as to bring wheel 25 to a position opposite one of the tapered surfaces 17. Screws 57 are loosened and the table 21 swiveled about pivot 60 to the desired angle. Screws 57 are then

tightened and carriage 23 may be traversed at an angle to the axis of the work. Wheel 25 is positioned rapidly by motor 28 and is thereafter fed by handwheel 27. When the wheel 25 begins to grind, screw 35 is set into motion by shifting lever 46 which actuates a clutch not shown to connect motor 38 with screw 35. As the carriage 23 moves to left or right, lever 39 engages one or the other of dogs 43 and 44, whereupon said lever is oscillated to actuate one of the switches 40 or 41 to reverse motor 38 and cause carriage 23 to travel in the opposite direction. Alternate traversing and feeding movements are effected until the neck has been ground to the desired size and finish. The wheel is then backed off far enough to clear the body of the roll and carriage 11 is traversed to place wheel 25 opposite the neck 16. Table 21 is again angularly adjusted so that the path of travel of wheel 25 will be parallel to the surface of neck 16. The wheel will then be moved to grinding position and the operation performed on neck 17 will be repeated on neck 16.

I claim:

1. A grinding machine comprising a work support, a grinding wheel support, a grinding wheel mounted thereon, mechanisms for effecting relative transverse and longitudinal movements of said supports, a second wheel support attached to said first mentioned wheel support and movable longitudinally in response to movement of said first mentioned wheel support, a grinding wheel mounted thereon, mechanisms for effecting relative transverse and longitudinal movements of said second grinding wheel and means to effect said movements at an angle to said first mentioned longitudinal and transverse movements.

2. A grinding machine comprising a bed, a work support mounted thereon, a grinding wheel carriage slidably mounted on ways in said bed for movement longitudinally thereof, a grinding wheel support slidably mounted on said carriage for movement transversely thereof, a second carriage also slidably mounted on said ways, a grinding wheel support on said carriage which is slidable in two directions transversely of each other, means whereby said support may be adjusted angularly and means for traversing said support at an angle to the work which is proportional to the amount of said adjustment.

3. A grinding machine comprising a base, work supporting means mounted thereon, a carriage slidable longitudinally in ways on said bed, a wheel support slidable transversely on said carriage, mechanism for effecting said longitudinal movement, a second carriage one end of which is supported on said ways, the other end of which rests on said first carriage, a grinding wheel support on said second carriage, power mechanisms for effecting relative longitudinal and transverse movements of said wheel support and means for causing said longitudinal movement to take place at an angle to the direction of movement of said first carriage.

4. A grinding machine comprising a bed, a work support mounted thereon, a carriage slidably mounted in ways on said bed, a wheel support slidably mounted for movement transversely of said carriage, mechanism for providing said longitudinal movement, a second carriage comprising a table, a guide block in said ways for supporting one end of said table, a swivel plate removably secured to said first carriage for pivotally supporting the other end of said table, means on said guide block whereby said table may be angularly adjusted, longitudinal ways on said table, a carriage slidably mounted on said ways, a grinding wheel support slidably mounted on said carriage for movement transversely thereof and power mechanism on said carriage for effecting longitudinal movement thereof.

5. A grinding machine comprising a bed, means carried thereby for rotatably supporting a work piece having a tapered surface to be ground, a grinding wheel carriage mounted on said bed for longitudinal movement parallel with the axis of rotation of the work piece, an auxiliary grinding wheel carriage mounted on said first named carriage for movement in a longitudinal direction parallel with the taper of the surface to be ground, and a grinding wheel support carried by said last named carriage for movement in a direction transversely of the direction of movement of said auxiliary carriage.

CONRAD L. OTT.