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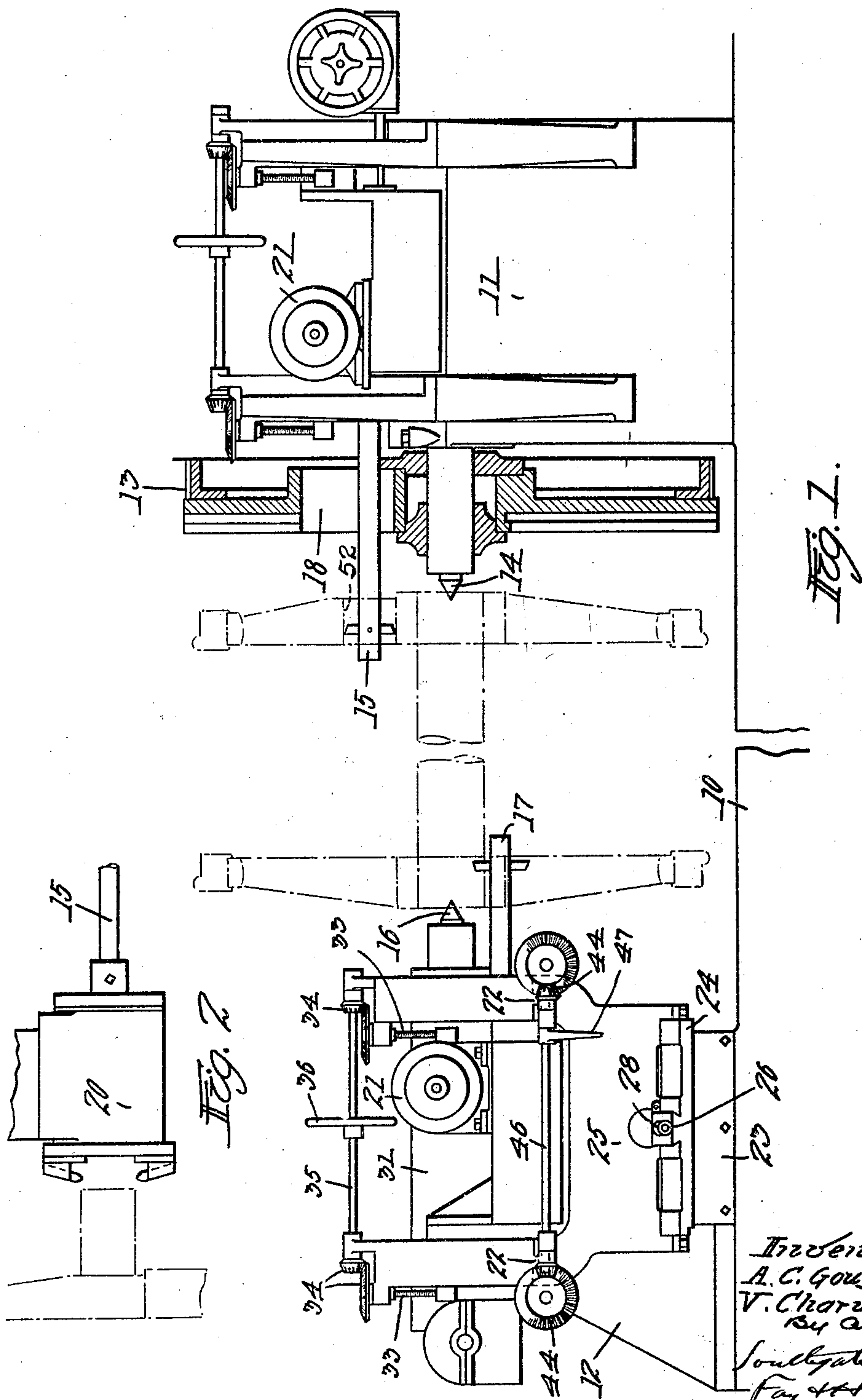
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QUARTERING AND THIRDS ATTACHMENT

Filed June 30, 1927

2 Sheets-Sheet 1



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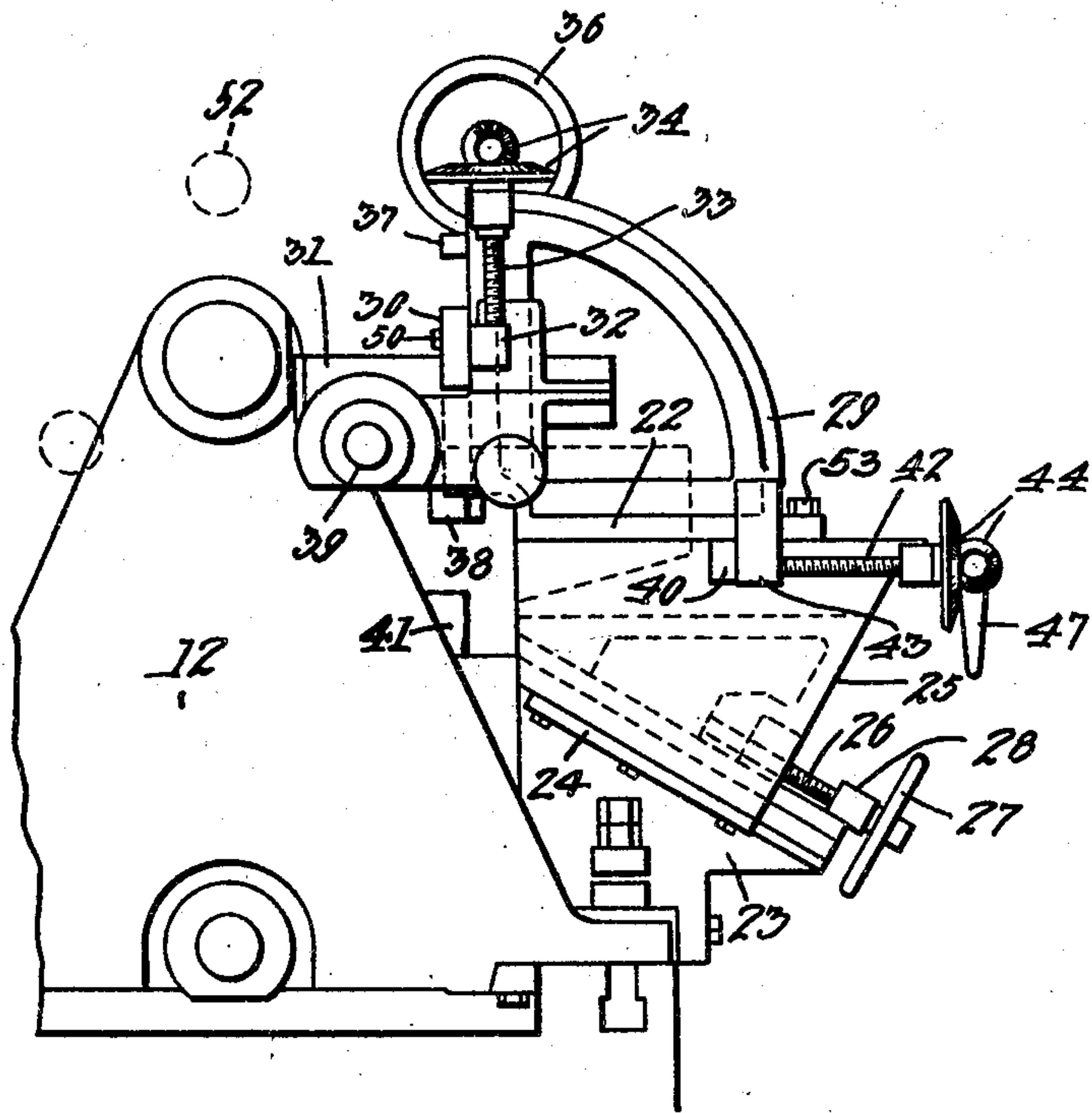


Fig. 3.

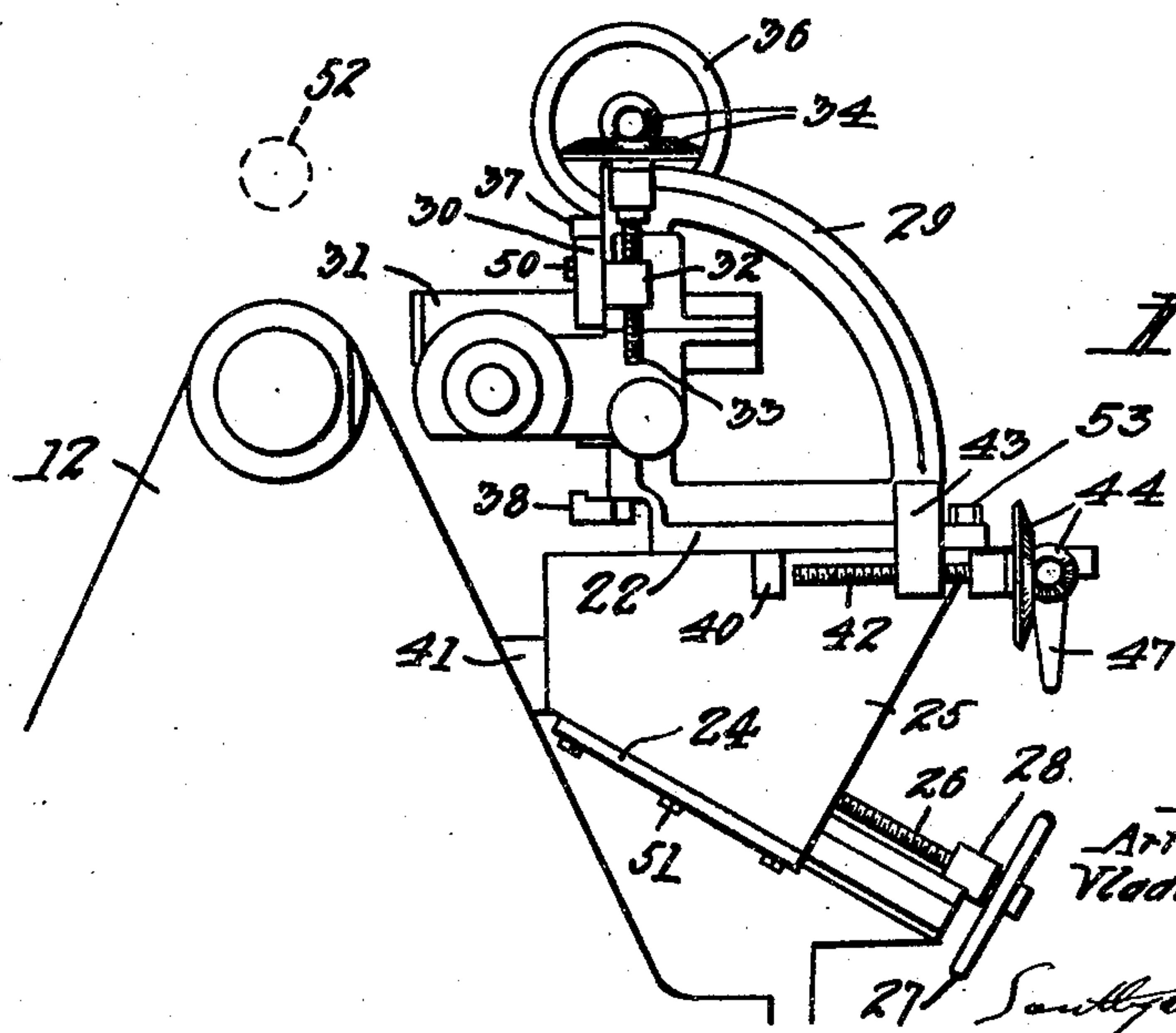


Fig. 4.

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UNITED STATES PATENT OFFICE.

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QUARTERING AND THIRTHING ATTACHMENT.

Application filed June 30, 1927. Serial No. 202,719.

This invention relates to a special type of machine tool used for finishing the pins and boring the pin holes of locomotive drive wheel sets.

5 The principal object of the invention is to provide tool holding and locating attachments for such a machine by which the so-called quartering, well known in this industry, can be done and also thirding, which
10 requires setting the attachments at two positions, either 90° or 120° apart, without dismounting or replacing any of the elements. The invention also involves features of construction by which the machine can be used
15 for both of these purposes and the principle can be applied for finishing at other angles.

Reference is to be had to the accompanying drawings in which

20 Fig. 1 is a side elevation of a machine for the above-mentioned purposes provided with a compound quartering and thirding attachment set up for boring a three cylinder locomotive drive wheel set, parts being shown in section on a vertical central plane;

25 Fig. 2 is a fragmentary view showing the ordinary pin turning attachment which is used with this invention;

30 Fig. 3 is an end elevation of the tail stock showing the quartering and thirding attachment lowered for thirding; and

Fig. 4 is a similar view showing the attachment raised for quartering.

35 The quartering machines of the lathe type for the purpose of machining locomotive driving wheel sets of the ordinary type in which the two settings are 90° apart are well known. The three cylinder type of locomotive is used to some extent. One of the
40 axles on this type of locomotive has a crank pin in the center with the journals on each side between the crank and the wheels. In order to turn the pins, the setting has to be changed from 90° to 120° . For the purpose of boring also the same change has to
45 be made. This invention is designed, as stated, to provide for the setting of the attachment at 30° from the point of first setting and also to provide a construction in which the quartering can be done on the
50 same machine and with the same attachment with no different operation except that the adjustments are made in a different order.

This attachment consists of two separate

units, one attached to the head-stock and the 55 other attached to the tail-stock. With this attachment wheel sets having a right-hand lead only, can have both wheels bored or pins turned simultaneously. If wheel sets with a left-hand leads are to be handled, 60 then each pin hole or pin must be machined separately. A wheel set consists of two wheels on a shaft. The hole to be bored or pin to be turned on one wheel is not mounted in line with that on the other but is set off 65 to one side. On one side it is called left hand lead and on the other side right hand lead.

We have shown the invention as applied to a machine capable of performing both the 70 above mentioned operations in which the tail-stock 12 is adjustably mounted on a bed 10. The head-stock 11 is also mounted on the bed as usual, but the invention is shown as applied to the tail-stock. Journalled in 75 the head-stock is a face plate 13 which has a live center 14 which can be moved back and forth in the usual way in order to be placed in and removed from operative position. The tail-stock 12 is provided with a 80 dead center 16 also adjusted in the usual way. In Fig. 1 we have shown the two centers 14 and 16 in operative position supporting a driving wheel set shown in dotted lines. The cutting that is to be done on the 85 driving wheel set, as shown, is the boring operation but the turning is also done with the same settings. The boring is performed by two boring tools 15 and 17, the former of which passes through an elongated hole 90 18 in the face plate and the latter of which is supported by an out board bearing not shown. Both of them are driven in well known ways for performing their usual operations. We will not describe here the 95 construction and adjustment of the head-stock or tail-stock or the means for driving the same. They can be arranged as shown in Patent No. 1,522,674, granted January 13, 1925 to E. L. Fickett or in any other 100 way desired.

It will be understood that the head-stock is manipulated generally as in said patent and that the machine is shown as set up 105 for boring. The unit attached to the head-stock is mounted directly over the center of the main spindle with vertical adjustment to the boring bar for different stroke pin

holes. The boring bar passes through an elongated hole in the face plate and is supported by an adjustable bearing fastened to the face plate not shown. The same
 5 mechanism is used for crank pin turning and burnishing, but in that case other well known elements are used, including a turning tool 20 as shown in Fig. 2. The main
 10 difference between this machine and the one shown in said Fickett patent is that here the tail-stock attachment can be set in two positions which permit adjustment for length of
 15 engine stroke along two definite planes, either 90° or 120° from the plane of adjustment of the head-stock attachment. The boring and turning operations are performed in the same way and by the same
 20 mechanism on both machines. The tool for boring or turning is adjusted as to position and is driven by the usual means from motors 21.

On the side of the tail-stock is fixed a bracket 23 or it may be made integrally if desired. It is regarded as stationary as it
 25 moves only when the tail-stock is adjusted back and forth on the bed. On its upper surface it has a guide 24 in the form of ways or the like inclined at an angle. This particular machine is designed for thirding
 30 and involves the placing of the tool at an angle of 30° below the horizontal to provide for operating at 120° from the vertical. This guide therefore is made at an angle of 30° to the horizontal, sloping upwardly to-
 35 ward the centers but not in line therewith. On this guide is placed an angle block 25 which has a lower surface inclined at 30° and resting on and moving in this guide. The block has a horizontal upper surface.
 40 With the block is connected a screw 26 having a hand wheel 27. The screw passes through a collar 28 fixed to the base 23 whereby the block can be adjusted up and down the incline.

On the horizontal upper surface of the block 25 is a guide or ways 22 arranged in horizontal position and carrying slidably thereon a frame made up of two sides 29. This frame has vertical ways on which move
 50 guides 30 on which is a movable tool locating attachment 31. This attachment is provided with nuts 32 at its opposite sides into which extend vertical screws 33 which, by bevel gears 34, are connected with a hori-
 55 zontal shaft 35 on which is fixed a hand wheel 36. By the rotation of this hand wheel the attachment 31 can be moved up and down on the frame 29. This frame is provided with two stops 37 and 38 for limiting the motion of the attachment 31. The
 60 attachment is provided with a guide passage 39 for the boring bar.

The angle block 25 is provided with a positive stop 40 for limiting the motion of
 65 the frame 29 horizontally toward the work

while the tail-stock itself is provided with a positive stop 41 for limiting the motion of the angle block 25 in the direction toward the work. The frame 29 is moved back and forth on the guides 28 by two screws 42
 70 passing through nuts 43 fixed to the frame and operated by bevel gears 44. These bevel gears are located on a cross shaft 46 supported by the angle block 25 and a ratchet wrench 47 on that shaft is used to turn the
 75 shaft and to adjust the frame 29 toward and from the work.

In operation, if a two cylinder locomotive drive wheel set is to be quartered the adjustments are to be made in the following
 80 order. The attachment 31 is raised by operation of the hand wheel 36 until it comes to a limit against the positive stop 37. It is then clamped in position by screws 50. The angular block 25 is then moved forward
 85 by operation of the hand wheel 27 to carry the block up the incline against the positive stop 41 on the base and then clamped in position by screws 51. The parts are then in the position shown in Fig. 4.

It will be seen that with this device applied to the tail-stock and the machining at the head-stock being done on the circle 52 vertically above the center, the machining at the
 90 tail-stock end will be done at 90° therefrom through the center of the passage 39 in Fig. 4. The adjustment for the length of stroke is made by moving the frame 29 by means of the ratchet wrench 47 toward and from the center line of the work.

It will be seen that, as the passage 39 and the work centers are on the same horizontal axis, at 90° from the line between the centers and the center of the circle 52, this adjustment will take place without changing
 105 the angularity. Furthermore, on account of the two positive stops, there is no necessity for any fine adjustment, except for the distance between the centers and the axis of the boring bar centered in the passage 39.

In the case of a three cylinder locomotive, a thirding operation is desired to make the two machining actions at 120° apart around the work centers. For this purpose the attachment is first lowered by turning the
 115 hand wheel 36 in the opposite direction until the attachment 31 comes up against the stop 38. The attachment is then clamped as before. Now the frames 29 are moved forward by the ratchet wrench 47 to the
 120 positive stop 40 on the angle block 25. Then the frames are clamped in position by screws 53. The parts are now in the position shown in Fig. 3.

It will be observed that no fine adjustments have been required and that the parts are merely brought up against positive stops and there clamped. The adjustment for the length of stroke is made by moving the angle
 125 block 25 along the ways 24 by means of the

hand wheel 27. This block can be adjusted to any desired position in this way to vary the distance between the axial line of the centers and the center of the passage 39.

5 This determines the stroke in this case.

It will be seen that by these means both quartering and thirding can be accomplished on the same machine and without change in the parts. The parts do not have to be
10 taken off or disconnected to perform the two different operations but they merely have to be manipulated in a different order and clamped in different places.

It will be understood, although the most
15 practical use of this invention known to us is in the quartering and thirding of locomotive drive wheel sets and the only angles required for that particular purpose are those specifically shown, yet the same principle can be applied where other angles are
20 required. In that case the angle of the block 25 or its angular relation with the frame 29 will be changed in accordance with the particular angle of the work. The final adjustment of the stroke is parallel to a line
25 between the centers on which the work is supported and the axis of the metal working tool. It will also be understood that this machine, with this attachment is adapted to
30 be used for both boring and pin turning and also to be used for trailer sets without necessarily dismounting, or interfering with, these parts that have been described.

Locomotive drive wheel sets having a right
35 hand lead only, can have both wheels bored simultaneously or both pins turned simultaneously. When wheel sets with left hand leads are to be operated upon each pin hole or pin must be machined separately. The
40 particular characteristic of this attachment is that it is adjustable vertically and horizontally in independent ways and provided with means whereby the stroke can be adjusted by a separate adjustment along the
45 line of the centers, as described. Thus it can do quartering with adjustment along a horizontal plane and thirding with adjustment along a plane at 30° to the horizontal. These adjustments, in each case, are made
50 after the tool is otherwise set.

Although we have illustrated and described only a single form of the invention we are aware of the fact that modifications can be made therein by any person skilled in the
55 art without departing from the scope of the invention as expressed in the claims. Therefore we do not wish to be limited to the details of construction otherwise than as set forth in the claims, but what we do claim
60 is:

1. In a metal working machine, the combination with a pair of centers for supporting the work, metal working means adjacent to one center and offset therefrom for operating on the work at that end, and means
65

adjacent to the other center and offset therefrom in a different direction for operating on the work at that end, of an attachment for holding the second means, adjustable in two directions, to permit change in the positions around the centers at which the work is done.

2. In a metal working machine, the combination with head and tail centers for supporting the work, and means adjacent to a
75 center for machining the work at that end, of means for holding and locating a second machining means off center at the other end, and means for adjusting the holding means horizontally and vertically, independently of each other, whereby the last named machining means can be brought into a desired alignment with the centers and held in that alignment while being adjusted toward and from the work, or into a position in a different alignment with the centers and held at a constant angle thereto while being adjusted toward or from the work along that angle.

3. In a metal working machine, the combination with a head-stock, a tail-stock, each having a center in alignment with each other for supporting the opposite ends of the work, a metal cutting tool mounted to turn on an axis parallel with the axis of said centers at a distance therefrom, an attachment for supporting said tool, and means for adjusting said attachment to permit of the operation of the tool either at an angle of 90° or at an angle of 120° from a given point, and means for adjusting the attachment in a direct line toward the axes of the centers in either one of its positions.

4. In a metal working machine for operating on locomotive driving wheel sets and the like, at opposite ends, the combination with head and tail centers for supporting a set, and means adjacent to a center for machining the work at that end, of means for holding and locating a machining means off center at the other end, and means for adjusting the holding means horizontally and vertically independently of each other, whereby the machining means can be brought into horizontal alignment with the centers and held in alignment while being adjusted toward and from the work, or into a position not in horizontal alignment with the centers and held at a constant angle thereto while being adjusted toward or from the work along that angle.

5. In a machine for finishing wheel sets, the combination with a pair of centers for supporting the set, metal working means adjacent to one center for operating on the set at that end and at a point located in a predetermined angular position around the centers, and means adjacent to the other center for operating on the set at that end at a point in a different angular position, of an attachment for controlling the location of
130

the second named means, adjustable in two directions, to permit change in the angle between the two points at which the work is done.

5 6. In a machine of the character described, the combination with a center for supporting the work at one end, of an attachment for controlling the position of a metal working tool, a guide at a definite angle to the
10 horizontal, a block having an inclined bottom resting on and adjustable along said guide, and having horizontal ways at its top, a frame adjustable along said ways and having means for supporting the tool, and
15 means for adjusting the attachment vertically to two limiting positions.

7. In a quartering and thirding machine for locomotive driving wheel sets, the combination with a center for supporting the
20 work at one end, of an attachment for controlling the position of a metal working tool, a guide at 30° to the horizontal, a block having a 30° bottom resting on and adjustable along said guide and having horizontal
25 ways at its top, a frame adjustable along said ways, and means for adjusting the attachment vertically.

8. In a quartering and thirding machine for driving wheel sets, the combination with
30 a head and tail stock, each having a center for supporting the sets at their ends, of a support provided with a guide extending upwardly at an angle of 30° toward said centers, an angular block having a bottom
35 surface located parallel with said guide and resting thereon and its top surface horizontal, means for adjusting the block up and down the incline, means for clamping the block in adjusted positions, a stop for preventing the movement of the block toward
40 the centers beyond a certain point, the block having horizontal guides along its upper surface, a frame adjustable along said horizontal guides toward and from the centers,
45 and an attachment carried by said frame and having a guide for a metal working tool parallel with the axis of the centers, said attachment being adjustable.

9. In a quartering and thirding machine
50 for driving wheel sets, the combination with a head and tail-stock, each having a center for supporting the sets at their ends, of a

support provided with a guide extending upwardly at an angle, an angular block having
55 a bottom surface located parallel with said guide and resting thereon, means for adjusting the block up and down the incline, guides along its upper surface, a frame movable along said guides toward and from the
60 centers, screw means for adjusting the frame toward or from said centers, a stop on the block for limiting the motion of the frame toward the centers, an attachment carried by said frame and having a guide for a
65 metal working tool parallel with the axis of the centers, means for adjusting the two ends of said attachment vertically, stops on said frame for limiting the adjustment of the attachment in its upper and lower positions,
70 and means for clamping the attachment in positions to which it is adjusted.

10. In a quartering and thirding machine for locomotive driving wheel sets, the combination with a head and tail-stock, each
75 having a center for supporting the sets at their ends, of a support provided with a guide extending upwardly at an angle of 30°, an angular block having a bottom surface located parallel with said guide and resting
80 thereon, horizontal guides along its top surface, means for adjusting the block up and down the incline, means for clamping the block in adjusted positions, a stop for preventing the movement of the block toward the centers beyond a certain point, frames
85 movable along said horizontal guides toward and from the centers, screw means for simultaneously adjusting the frames toward or from said centers, a stop on the block for limiting the motion of the frames toward
90 the centers, an attachment carried by said frames and having a guide for a metal working tool parallel with the axis of the centers, means for adjusting the two ends of said attachment vertically, stops on said frames
95 for limiting the attachment in its upper and lower positions, and means for clamping the attachment in positions to which it is adjusted.

In testimony whereof we have hereunto
affixed our signatures. 100

ARTHUR C. GOUGH.
VLADIMIR CHARUSHIN.