

April 19, 1938.

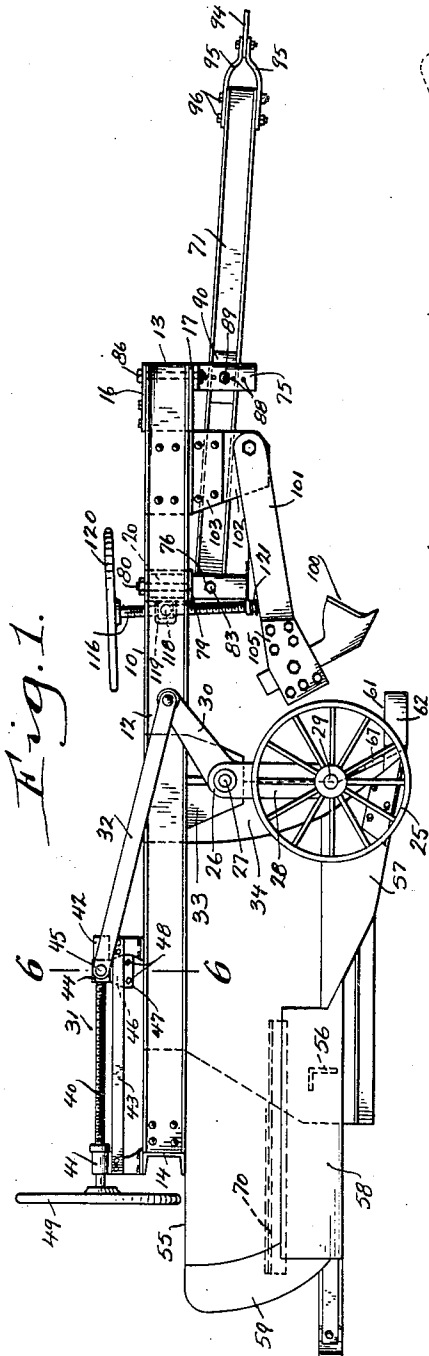
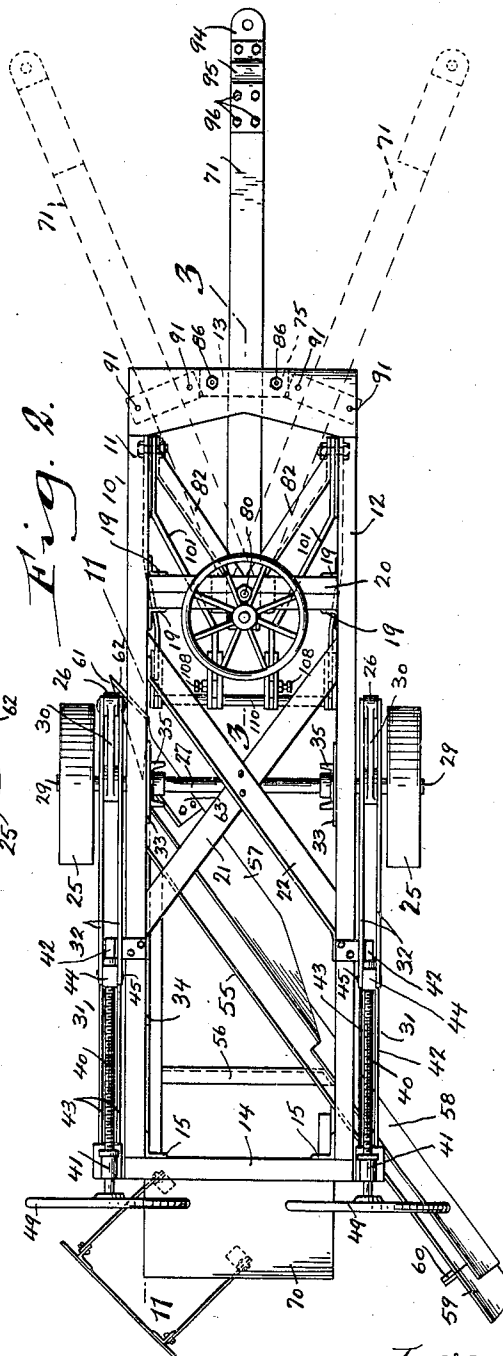
F. W. ALLAN

2,114,327

EXCAVATING MACHINE

Filed Feb. 16, 1937

3 Sheets-Sheet 1



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April 19, 1938.

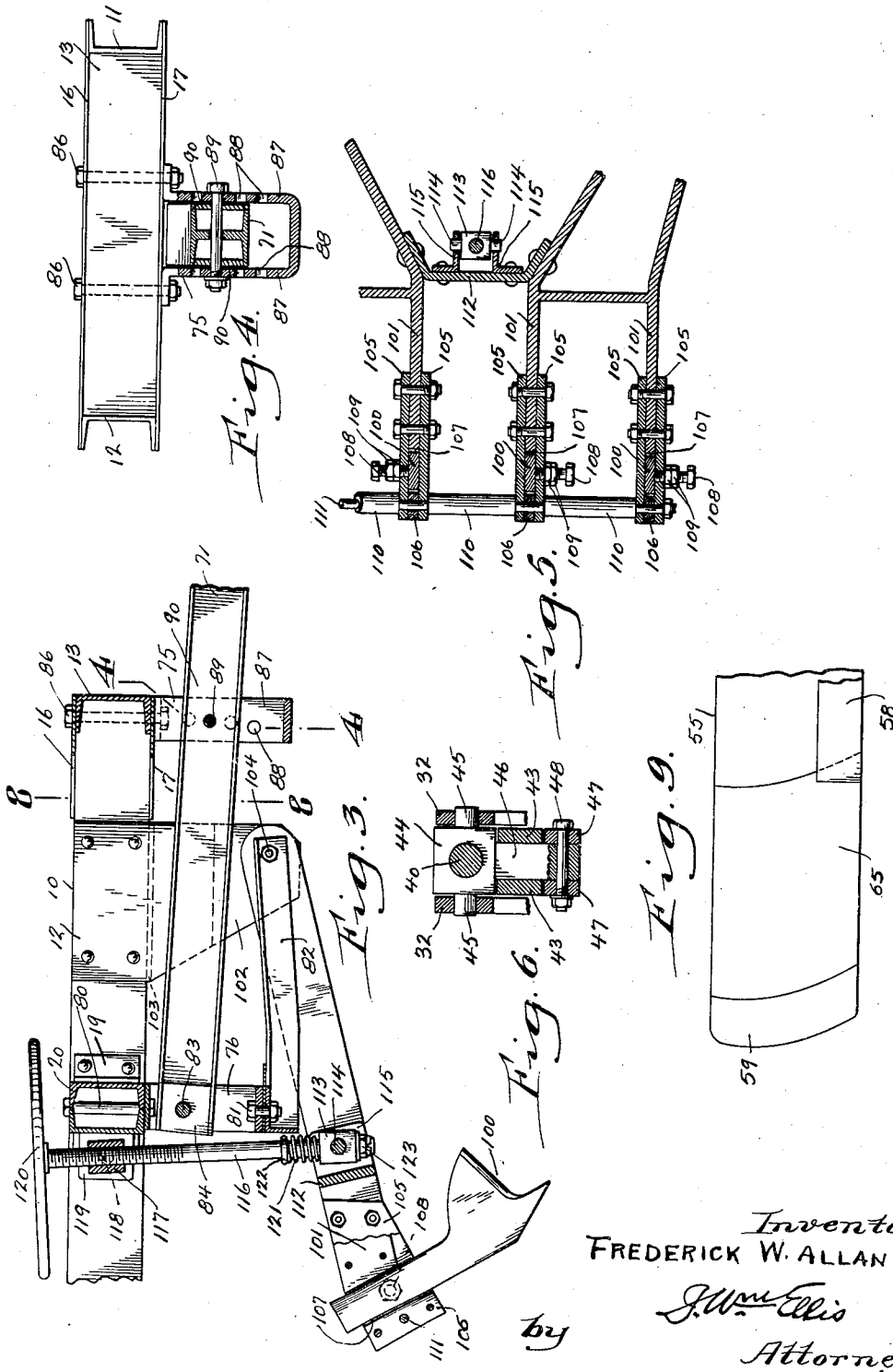
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

Fig. 8.

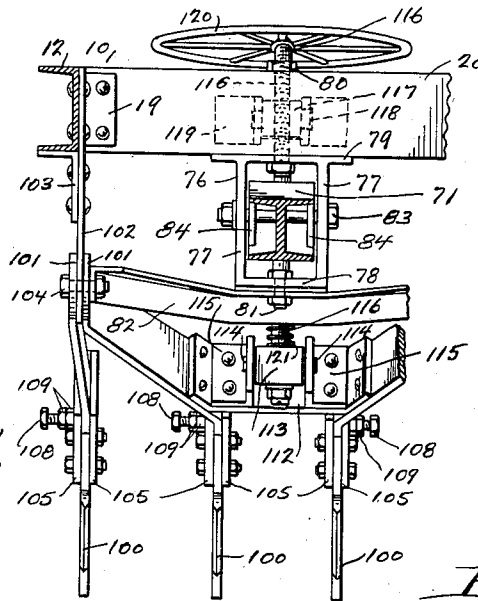


Fig. 10.

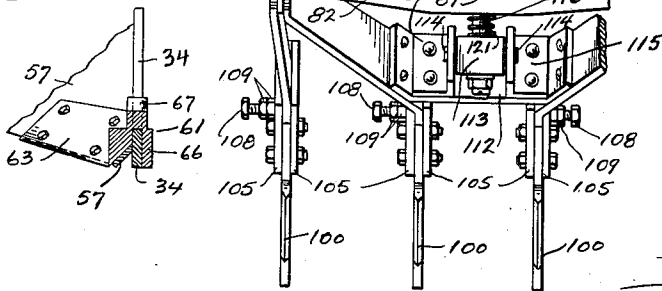


Fig. 12.

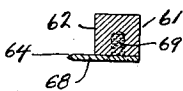


Fig. 7.

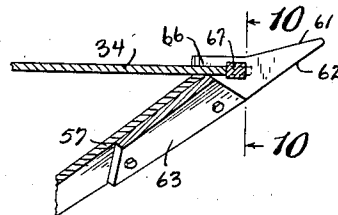
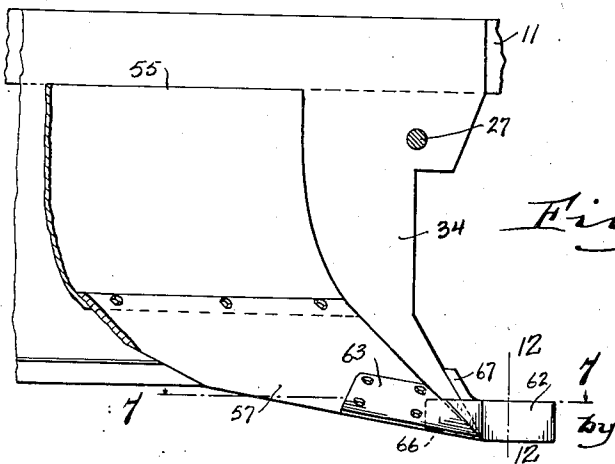


Fig. 11.

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UNITED STATES PATENT OFFICE

2,114,327

EXCAVATING MACHINE

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Application February 16, 1937, Serial No. 125,988

6 Claims. (Cl. 37—108)

My invention relates in general to excavating machinery, and in particular to that type of machine adapted for road-making.

My machine is particularly designed for use where roads are to be widened and extensions are to be formed. It is well known that in such cases the excavation is made along the edges of the existing road at a depth sufficient to accommodate the cement or other material forming the extensions, but no provision has been made for interlocking the extensions with the roadway.

One of the principal objects of my invention has been to provide a machine that will efficiently excavate for the extensions and at the same time undercut edges of the existing roadway so that the extensions will be interlocked with the existing pavement.

Another object has been to provide a machine by which the depth and width of the excavation can be easily and quickly controlled.

A further object has been to provide suitable spreaders whereby the material removed may be carried some distance away from the excavation formed by the machine.

Moreover, my machine is equipped with means for loosening the material to be excavated.

Furthermore, my device is provided with safety means so that the machine cannot be subjected to strain beyond a desired maximum limit.

Moreover, my machine is so designed that it can be drawn by power means either in line with such means or in offset relation therewith.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings, of which:

Fig. 1 shows a side elevation of my complete machine.

Fig. 2 is a plan view thereof.

Fig. 3 is an enlarged, fragmentary, sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is an enlarged, front, sectional view and is taken on line 4—4 of Fig. 3.

Fig. 5 is an enlarged, fragmentary, sectional, plan view showing details of the scarifier arm.

Fig. 6 is an enlarged, transverse, sectional view taken on line 6—6 of Fig. 1.

Fig. 7 is an enlarged, sectional, plan view of the forward end of the landside plate and molding board showing my undercutting tool attached thereto.

Fig. 8 is a fragmentary, sectional elevation taken on line 8—8 of Fig. 3.

Fig. 9 is a fragmentary, side view of the molding board with an extended spreader blade.

Fig. 10 is an enlarged, sectional elevation of

my undercutting tool and is taken on line 10—10 of Fig. 7.

Fig. 11 is an enlarged, fragmentary, side elevation of my device with one of the supporting wheels removed.

Fig. 12 is a sectional view of a modified undercutting tool taken at the position indicated at line 12—12 of Fig. 11 showing a cutting blade attached to the undercutting tool.

My device comprises a frame 10 made preferably of structural steel having its sides 11 and 12 and its ends 13 and 14 preferably of channel-iron. The frame is reinforced at the rear by means of angle-irons 15 and at its front end by means of a top plate 16 and a bottom plate 17 suitably riveted or bolted to the members. Near the forward end there is provided a cross member 20 made also preferably from two channel-iron sections facing each other, as clearly shown in Fig. 3. This cross member is preferably braced by means of corner angles 19. The center of the frame is provided with an X-brace composed of angle-irons 21 and 22 in crossed relationship and secured together at their center and at their ends to the frame side members.

Supporting wheels 25 are arranged at a point substantially midway of the frame. A bell-crank 26 is arranged at each side of the frame and each of them is pivotally mounted upon a shaft 27, extending across the frame so that each of them may be adjusted independently of the other. The shaft 27 is suitably supported in a bearing plate 33 at the side frame member 12 and by the landside plate 34, to be hereinafter described, at the side 11 of the frame. The plate 33 and the bearing portion of the plate 34 are each supported and reinforced by means of a channel-iron section 35. At the lower end of the arm 28 of each bell-crank lever is rigidly mounted a short shaft 29 upon which each supporting wheel 25 is rotatably disposed. Each bell-crank is also provided with an upwardly and forwardly extending arm 30 to which one of the wheel adjusting means 31 is connected by means of connecting links 32.

Each of the wheel adjusting means 31 comprises an adjusting screw 40 which is mounted adjacent each of the side members 11 and 12 and at the rear of the frame in suitable bearings 41 and 42. Arranged below the screw 40 are two interspaced guide bars 43. An adjusting nut 44 is mounted upon the screw 40 and has trunnions 45 formed at its opposite sides. The rear ends of the connecting links 32 are mounted upon these trunnions 45.

The nut 44 rests upon the top surfaces of the

guides 43 and it is provided with a downwardly extending arm 46 which passes down between the adjacent surfaces of the guides 43 and extends some distance below the lower surfaces of the guides. A guide plate 47 is secured to each side of the lower end of the arm 46 preferably by means of bolts 48 (see Fig. 7). These guide plates are so positioned that their upper surfaces will come in bearing contact with lower surfaces of the guide bars 43 so as to hold the nut 44 in proper bearing contact with the top surfaces of the guide bars. Each of the screws 40 extends rearwardly beyond the bearing 41 and each is provided on its outer end with an operating hand wheel 49.

Secured to the inside face of the side member 11 is the landside plate 34. This plate is arranged in parallel relation with the side members 11 so that it will follow the course of the excavation and serve to keep the machine in a true course of travel. It extends from a point near the supporting wheels 25 to a point near the rear of the machine. The upper forward edge of this plate extends forwardly sufficiently so as to form a bearing for the supporting wheel arm shaft 27, as hereinbefore described.

The mold board 55 of my device is mounted under the frame 10 and extends obliquely from the side 11 of the frame at a point substantially opposite the supporting wheel toward the opposite side 12 of the frame. This mold board is concave, as is customary, so as to produce a plowing action upon the material being excavated. The forward edge of the molding board is preferably joined to the landside plate 34 by any suitable means. A brace or strut 56 is provided near the rear of the landside plate for keeping this plate and the mold board in definite spaced relation. The mold board is provided at its forward end with a cutting blade 57. This blade is provided with a cutting edge designed to produce the desired cross-section of excavation. As shown in the drawings, it is slightly inclined so as to provide an excavation having a slightly inclined bottom. The mold board extends out some distance beyond the cutting blade and this portion of the board carries a spreader blade 58. The spreader blade and the cutter blade are preferably secured to the mold board by means of bolts so that they may be easily detached from the mold board. The mold board is preferably provided with a tail section 59 which is secured to the main section of the board preferably through the medium of suitable angles 60 and bolts (not shown). In cases where it is desired to spread the excavated material some distance beyond that which is possible by means of equipment as shown in the drawings, the tail section 59 is detached from the mold board and a spreader blade extension 65 is placed between it and the mold board, thus lengthening the mold board and making it possible to carry the material farther away from the machine, as clearly shown in Fig. 9.

When the shoulder at the side of the road is being excavated for extension, it is desirable to excavate under the edge of the road for a distance of a number of inches back of such edge. In order to accomplish this, my device is provided with an undercutting tool 61. This tool is secured to the forward edge of the mold board and landside plate, as clearly shown in the section of Fig. 7. This tool is formed with a working face 62 and with a rearwardly extending flange 63. This flange is arranged at such an angle and so

shaped as to conform to the surfaces of the molding board at its forward end, to which it is secured by suitable bolts. The tool is provided with lugs 66 and 67 for engagement, respectively, with the face and the forwardly extending edge of the landside plate 34, whereby the tool is supported at these points, as clearly shown in Figs. 7, 10, and 11.

Arranged at the rear of the machine is an operating platform 70 from which the supporting wheels 25 may be manipulated.

The device is provided with a draw-bar 71. This draw-bar extends through a draw-bar support 75 and has its inner end pivotally mounted in a draw-bar bracket 76. This bracket is U-shape in cross-section, as shown in Fig. 8, and comprises side members 77 and a bottom member 78. The side members extend upwardly and are secured to a plate 79 through which is passed an upper swivel bolt 80. This bolt is carried by the cross brace 20 of the frame. A lower swivel bolt 81 is passed through the bottom member of the bracket and through a draw-bar wishbone 82, to be hereinafter described. By means of the upper and lower swivel bolts 80 and 81, respectively, the draw-bar bracket 76 may be oscillated in a horizontal plane. The inner end of the draw-bar is secured within the bracket 76 by means of a pivot bolt 83. This bolt passes through the side members 77 of the bracket and through the draw-bar which is preferably of I-beam cross-section. Side plates 84 are provided at the end of the draw-bar so that additional bearing for the bolt 83 is afforded.

The draw-bar support 75 is preferably U-shape in cross-section, as shown in Fig. 4, and it is securely fastened to the forward end of the frame by means of bolts 86. The side walls 87 of the support are interspaced sufficiently to accommodate the draw-bar 71. These side walls are provided with a plurality of apertures 88 arranged in an arc with the pivot bolt 83 as an axis, whereby the outer end of the draw-bar may be adjusted vertically to accommodate the height of the tractor or other device propelling the machine and held and fixed in such position. A bolt 89 is provided for this purpose which passes through any one of the openings 88 and through a suitable registering opening formed in the draw-bar. The draw-bar is preferably provided with side plates 90 at this point, so as to reinforce the bar.

The plates 16 and 17, as well as the channel-iron end member 13 and side members 11 and 12, are provided with two groups of apertures 91 in addition to those already occupied by the bolts 86. By means of these apertures, the draw-bar bracket 75 may be adjusted to project the draw-bar either to the right or to the left of the position shown in Fig. 2, in oblique manner so that the machine may be drawn in a position either to the left or right of the tractor or other power means. By this construction, the tractor may be propelled on the existing roadway while my machine is excavating at one side or the other of the road. A draw-bar link 94 is provided at the forward end of the draw-bar and it is connected to the draw-bar proper by means of straps 95, one arranged on the top and the other on the bottom of the draw-bar end and link 94. The straps are secured permanently at their forward ends to the link 94 by means of bolts or rivets, and the rear ends thereof are secured to the forward end of the bar by means of bolts 96. These bolts are of such diameter and material that under a given pull they will be sheared off.

This provision is made so that should the machine, while being operated, strike some obstacle which requires greater power to dislodge than that for which the machine is designed, the machine will be brought to a stop by the shearing of these bolts and thus prevent it from being injured or wrecked.

My machine is provided with means for breaking up or loosening the material to be excavated. This means is in the form of scarifier teeth 100. These teeth are carried at the rear ends of the scarifier arms 101. These arms are pivoted at their forward ends to a bearing plate 102. One of these bearing plates is arranged at each side of the frame and is preferably secured to the inside surface of the side member and is reinforced by means of an angle-iron 103 secured to the outside of the plate and to the under side of the side member. The scarifier arms are arranged in two groups, two of them being provided at each side of the longitudinal center line of the machine. As shown in Figs. 2 and 5, the forward ends of these arms are equally spaced across the width of the machine and their rear ends are offset and lie in such planes as to bring them on opposite sides of the bearing plates 102. A pivot bolt 104, carried by each bearing plate, is provided for supporting the ends of the scarifier arms.

As shown in Fig. 5, a scarifier plate 105 is arranged at each side of the rearward end of each scarifier arm 101. These plates extend rearwardly beyond the end of the arm and a spacer plate 106 is secured between the plates and in interspaced relation with the end of the arm 101. This arrangement leaves an opening 107 between each pair of plates 105 and between the end of the arm 101 and the spacer plate 106 for the reception of the scarifier tooth 100. In one of the side plates 105 is provided a set screw 108 and suitable lock nuts 109 whereby the scarifier blade can be set in its correct position. Arranged between the outer ends of each pair of scarifier plates 105 is a spacer sleeve 110 whereby the scarifier teeth are held in interspaced relation. A bolt 111 passes through these sleeves, through the scarifier plates, and through the spacer plates 106, whereby the entire structure is suitably held together.

Arranged between the two arms 101 at the center of the frame is a cross bar 112 which serves to tie these arms together and to act as a support for the scarifier swivel block 113. This block is provided with trunnions 114 which are pivotally supported in angle-iron brackets 115, secured to the cross bar 112. The swivel block 113 is provided with a central aperture in which is slidably mounted the lower end of an adjusting screw 116. This adjusting screw extends upwardly and passes through an adjusting nut 117. This adjusting nut is also provided with trunnions 118 which are pivotally mounted in suitable brackets 119 carried by the cross member 20 of the frame. A hand wheel 120 is provided at the upper end of the screw whereby the screw may be rotated to adjust the position of the scarifier teeth. The lower end of the adjusting screw 116 is provided with shock-absorbing means which comprises a spring 121 having one end bearing against the top surface of the swivel block 113 and its other end bearing against a collar 122 rigidly carried by the screw. A nut or collar 123 is arranged at the lower end of the screw whereby the collar 122 is held in position against the spring. When the scarifier teeth strike any hard objects, they will be forced up-

wardly against the tension of the spring, thus absorbing the shock, the swivel block 113 sliding over the lower end of the screw during this movement.

The draw-bar wishbone 82, hereinbefore referred to, has its legs extending forwardly and pivoted at their forward ends to the scarifier arm pivot bolts 104. This wishbone is preferably of angle-iron cross-section and is bent as shown in the form of a V having the lower pivotal bolt 81 of the draw-bar bracket 76 located at its apex.

When my machine is to be put into use, it will be obvious that the supporting wheels 25 may be independently adjusted by means of the wheel adjusting means 31 so as to bring the cutter blade 57 at such elevation as to excavate the shoulder to the desired depth. If the machine is to travel over an inclined surface, then, obviously, one wheel would be adjusted so as to keep the machine in a substantially level position. The depth of cut of the scarifier teeth 100 is, as hereinbefore inferred, adjusted by means of the hand wheel 120 operating the adjusting screw 116. If the machine is to travel in offset relation to the power means drawing it, then the draw-bar will be set obliquely to the longitudinal axis of the machine, in either of the positions indicated by the dotted lines in Fig. 2, by positioning the draw-bar support in either of the groups of apertures 91 so as to cause the bar to be obliquely arranged either to the right or to the left, also as hereinbefore described.

When my tool is being used to excavate where roots of trees are present, it is very desirable that means be provided for shearing such roots. The undercutting tool may be provided with any suitably formed and positioned sharpened edges for accomplishing this purpose and, as an illustration, I have shown one form in Fig. 12. As here shown, a substantially flat cutter blade 68 is secured, by any suitable means such as, for instance, the bolts 69, to the bottom face of the undercutting tool 61. This blade preferably has a cutting edge 64 and the width of the blade is such as to bring this cutting edge slightly in advance of the working surface 62 of the tool so that the roots will be severed before the undercutting tool is brought into action.

While I have shown and described the supporting wheels as mounted upon arms movable through an arc, it is obvious that these wheels may be mounted so as to slide vertically. Moreover, the number of supporting wheels may be increased if desired or found necessary. Furthermore, the mold board may be rigidly secured in place as shown and described, or it may be hinged; and, if desired, the spreader blade may be supported separately from the mold board.

These and other modifications of the details herein shown and described may be made without departing from the spirit of my invention or the scope of the appended claims, and I do not, therefore, wish to be limited to the exact embodiment herein shown and described, the form shown being merely a preferred embodiment thereof.

Having thus described my invention what I claim is:

1. An excavating machine comprising a frame, supporting wheels for the frame, means for adjusting the supporting wheels independently of each other, a draw-bar, means for pivotally mounting the bar in a horizontal plane, comprising a bracket carried by the frame and so pivoted as to be swingable about a vertical axis, and sup-

porting means for holding the bar in any pre-determined adjusted position.

2. An excavating machine comprising a frame, supporting wheels for the frame, means for ad-
5 justing the supporting wheels independently of each other, a draw-bar, means for pivotally mounting the bar in a horizontal plane, comprising a bracket carried by the frame, an upper swivel bolt connecting the upper end of the bracket to
10 the frame, a wishbone pivotally carried by the frame and having its apex under the bracket, a lower swivel bolt connecting the bracket with the wishbone, and supporting means for holding the bar in any pre-determined position.
- 15 3. An excavating machine comprising a frame, supporting wheels for the frame, means for adjusting the supporting wheels independently of each other, a draw-bar, a pivot pin for the draw-
20 bar carried by the frame at a suitable distance behind the forward edge of the frame, said pin being arranged in a horizontal plane, a draw-bar support at the forward edge of the frame, said support being formed with a plurality of aper-
25 tures, and a pin carried by the support and engageable with any one of the apertures thereof and with an aperture formed in the draw-bar, whereby the draw-bar may be held in its vertically adjusted position.
- 30 4. An excavating machine comprising a frame, supporting wheels for the frame, means for adjusting the supporting wheels independently of each other, a draw-bar, means for pivotally mounting the bar in a horizontal plane, said means being located a suitable distance behind the

forward edge of the frame and comprising a bracket carried by the frame and so pivoted as to be swingable about a vertical axis, a pivot pin for the draw-bar, said pin being carried by the bracket and being arranged in a horizontal plane, a
5 draw-bar support at the forward edge of the frame, said support being formed with a plurality of apertures, and a pin carried by the support and engageable with any one of the apertures there-
10 of and with an aperture formed in the draw-bar, whereby the draw-bar may be held in its adjusted position.

5. An excavating machine comprising a frame, supporting wheels for the frame, means for ad-
15 justing the supporting wheels independently of each other, a landside plate carried by the frame, a mold board carried by the plate, and a pivotally mounted draw-bar adjustable about vertical and horizontal axes.

6. An excavating machine comprising a frame, 20 supporting wheels for the frame, means for adjusting the supporting wheels independently of each other, a landside plate carried by the frame, a mold board carried by the plate, a draw-bar bracket carried by the frame and so pivotally
25 mounted as to be swingable about a vertical axis, a draw-bar pivotally attached to the bracket and movable in a vertical plane, and a draw-bar support carried at the forward end of the frame and
30 formed with a series of apertures, and a bolt arranged in one of the apertures and passing through the draw-bar.

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