

Dec. 11, 1923.

1,476,949

F. E. CARDULLO

METAL PLANER

Filed Dec. 12, 1921

2 Sheets-Sheet 1

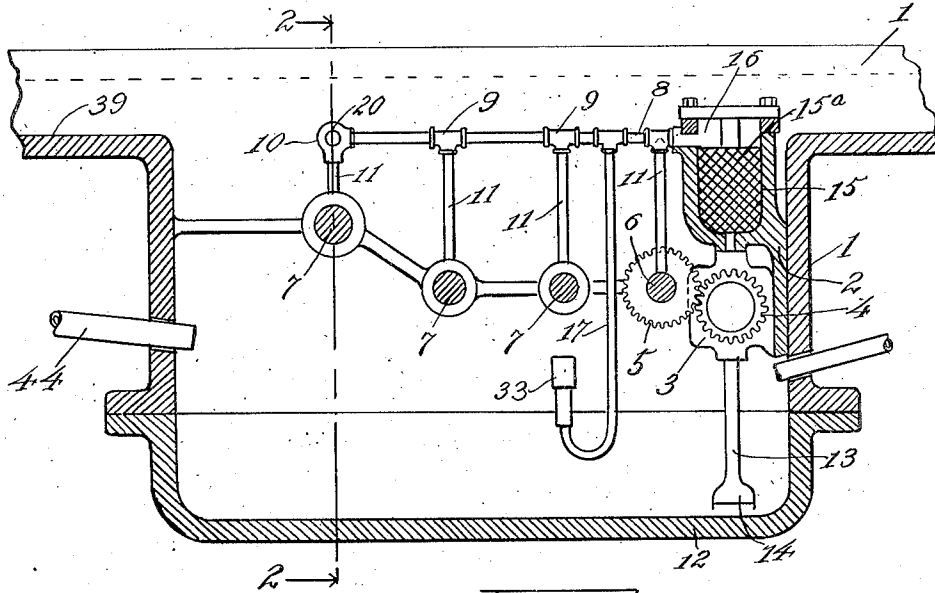


Fig. 1.

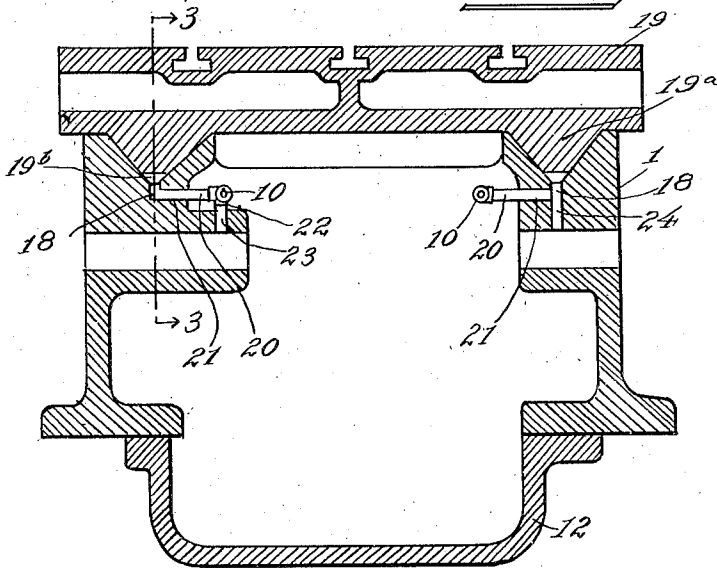


Fig. 2.

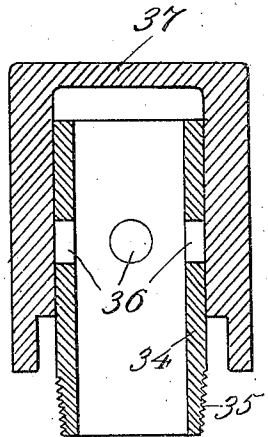


Fig. 4.

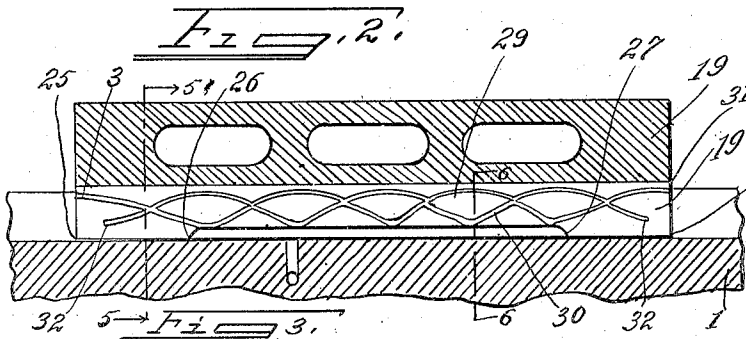


Fig. 3.

INVENTOR:

F. E. Cardullo

BY

Attorneys.

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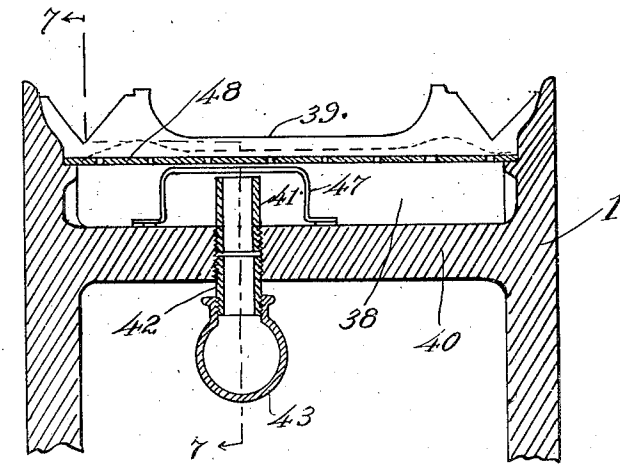
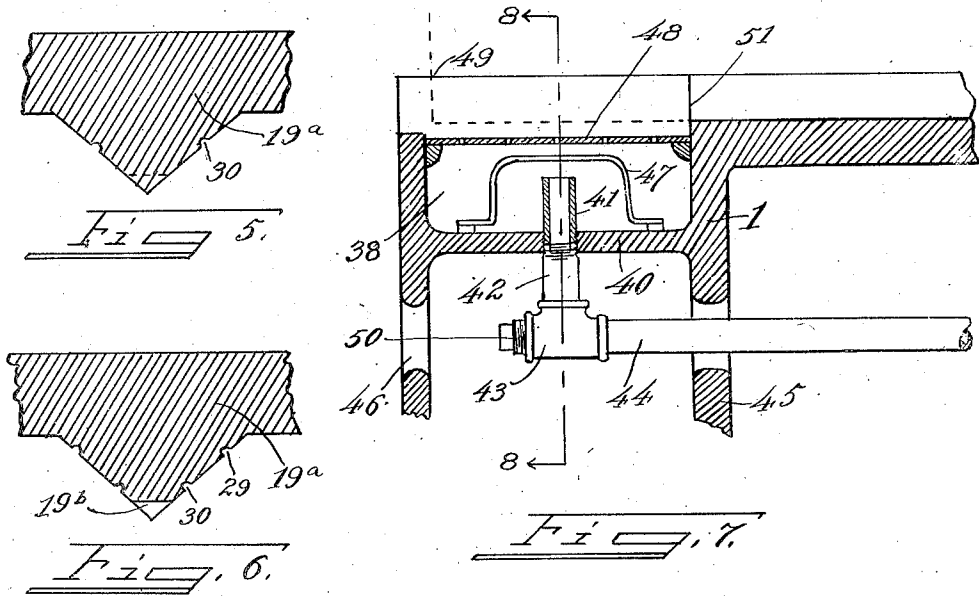


Fig. 8.

INVENTOR:

James E. Cardullo

BY

Allen & Helen

ATTORNEYS.

UNITED STATES PATENT OFFICE.

FORREST E. CARDULLO, OF CINCINNATI, OHIO, ASSIGNOR TO THE G. A. GRAY COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

METAL PLANER.

Application filed December 12, 1921. Serial No. 521,647.

To all whom it may concern:

Be it known that I, FORREST E. CARDULLO, a citizen of the United States, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Metal Planers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to the oiling system for metal planers, and more particularly to the supplying of oil to the ways or sliding bearings, the principal shaft bearings and other moving parts of metal planers.

The general object of the invention is to provide an abundant supply of filtered oil to all of the principal rubbing surfaces of a metal planer and to collect this oil, after use, and purify it for further use. In this connection I provide for a special construction of planer bed and table V, which permits the distribution of oil under controlled and practically uniform pressure to all parts of the sliding surfaces. I also provide an oil pressure system which is readily accessible for adjustment and assembly, and in which the filter parts may be quickly and effectively cleaned.

These objects and other advantages to be noted I accomplish by that certain construction and arrangement of parts to be hereinafter more specifically pointed out and claimed.

In the drawings,

Figure 1 is a detail longitudinal section taken through a portion of the planer bed, showing the oil reservoir and the oil pump and filter.

Figure 2 is a transverse section taken on the line 2—2 of Figure 1.

Figure 3 is a longitudinal section taken through the way of a planer bed, showing the V of the table lying in the way, said V being in elevation.

Figure 4 is a cross section through the relief valve in the oil pressure line on a larger scale than the views above identified.

Figure 5 is a detail section through a table V on the line 5—5 of Figure 3.

Figure 6 is a section through the V on the line 6—6 of Figure 3.

Figure 7 is a longitudinal section through the end of the planer bed, taken on the line 7—7 of Figure 8 and showing the oil receiving trough and screen.

Figure 8 is a cross section taken at the end of the bed on the line 8—8 of Figure 7, showing the same parts as in Figure 7.

The bed of the planer is indicated in the various views as 1. Bolted or otherwise fastened to this bed or frame (Figure 1) is a casting 2, which forms a support for pump 3. Pump 3 may be of any suitable type, but I prefer to use a gear pump provided with check valves, so that the gears may be caused to revolve in either direction without changing the direction of flow of the fluid. Pump 3 is provided with gear 4 which meshes with gear 5 fastened to shaft 6, or, if preferred, may be driven directly from shaft 6, or by an independent source of power. Shaft 6 is the pulley or motor shaft which drives the planer. The planer is provided with two or more other shafts 7—7—7 carrying gears which serve to drive the table.

Underneath the bed 1 is a large pan or reservoir 12 containing lubricating oil. From pump 3, suction pipe 13 extends into this lubricating oil, and may be provided at its lower end with a foot valve and strainer 14. Pump 3 discharges into a closed reservoir 15, preferably cylindrical in form, formed in casting 2, or in some suitable part of the planer bed or housings. This reservoir is filled with cloth, wool or other suitable filtering material 15^a. This reservoir is closed by cap 16 which is held down by two or more suitable screws.

From this reservoir extend pipes 8 provided with T's or other suitable fittings 9 from which extend pipes 11—11—11 and 17.

Pipe 17 is provided with a suitable relief valve to be described later. Pipes 11—11—11 lead to the different bearings for shafts 6 and 7—7—7, supplying them with oil. Pipes 8 also discharge into connections 10, which communicate with drilled holes 18 drilled into the bed.

Referring now to Figure 2, 20 is a nipple joining connection 10 with hole 21 drilled into the bed. This hole is drilled in such a way that it communicates with hole 18 drilled into the ways of the bed, so that oil

can flow from the filter through pipes and connections 8, 9, 10 and 20, and holes 21 and 18 into the bottom of the way at the center of length of the bed.

5 Sliding in the ways of the bed is table 19 provided on its under side with V's 19^a which accurately fit the ways in the bed.

Referring now to Figure 3. It will be seen that the V of the table is of two different sections as illustrated in Figure 5 and 10 Figure 6. From point 25 to point 26, the table V has the sections shown in Figure 5, and fits very closely the way of the planer. From point 26 to point 27, the table V has the section shown in Figure 6; the point of the V 15 being cut away at 19°. From point 27 to point 28, the V is again of the section which fits the way. From point 26 to point 27 there therefore extends a trough of triangular section, bounded on two sides by portions 20 of the way and on the third side by the V, and closed at either end. This trough is connected with the oil supply by drilled hole 18 and is capable of carrying oil to points 23 26 and 27.

On the surface of the planer V are cut oil grooves 29 and 30 which can be of any suitable form, but which I prefer to make of the zigzag form shown. The groove near the 20 top of the V at the end is cut through to the end of the table, as at point 31, but the groove at the bottom near the end is not cut through, as at point 32.

The cross section of the grooves 29 and 30 25 is only a very small fraction of the cross section of the triangular trough, consequently while oil will flow out through the grooves to the end of the table, the pressure of the oil between point 26 and point 27 will be 40 practically uniform even though the table be in such a position that opening 18 is near point 26 or 27. Because of the relatively small area and hydraulic radius of the oil grooves, the loss in pressure in flowing from 45 point 26 to point 31 is much greater than the loss in pressure of the oil flowing from point 27 to point 26. The flow of oil through the grooves at either end of the table is therefore substantially equal, whatever the position of 50 the table with reference to hole 18.

In order to maintain the oil at the proper pressure, I affix to pipe 17 a pressure relief valve 33 shown in section in Figure 4. This consists of a pipe or tube 34 threaded at one 55 end at 35 and having drilled in it a number of holes 36. Over it is slipped the hollow cap 37 which slides easily upon tube 34. The pressure of the oil in tube 34 raises the cap 37 so that the oil escapes through holes 60 36, and drains back into reservoir 12. Any increase in pressure over that required to lift the cap 37 above the holes results in a greater flow of oil which relieves this pressure so that the pressure is main- 65 tained at an amount which depends

upon the internal cross sectional area of cap 37 and the weight of this cap. When, however, the discharge from the pump becomes less than the flow of oil to the bearings, cap 37 will descend for a short distance 70 by its own weight, driving the oil ahead of it and maintaining the pressure constant, since, in the position shown, the oil cannot escape through hole 36. The pressure regulating valve 33 thus acts also as an accumulator, which sends a quantity of oil 75 into the system and maintains the oil pressure constant during the reversal of the planer when the discharge of the pump ceases for an instant. 80

Instead of providing separate pipes, as 11, leading from pipe 8 to the different bearings in order to lubricate the different shafts, holes can be drilled from the bottom of the ways into the bearings; such a hole being 85 shown as 23 and 24 in Figure 2. In this case, the nipple 22 supplies oil to the hole 23 in exactly the same manner as nipple 20 supplies oil to hole 18. Hole 23, however, is extended by the lower section 24 into the bearing 90 for shaft 7, so as to supply it with oil.

It is usual to permit the table in a planer to extend three or four feet beyond the end of the bed when it is in either extreme position. This is objectionable for the reason 95 that the overhanging weight of the table causes it to spring slightly which in turn causes the table to bear heavily at the end of the bed. This wears the ways at the end of the bed and wears the table V's at a point 100 from two and one-half to three and one-half feet back from the end. In order to avoid this injurious action and to provide satisfactory oiling when the table is at the extreme end of its stroke, I extend the bed so that the table does not at any time overhang the end 105 of the bed.

Referring to Figure 7, I form in each end of the bed a reservoir 38 into which the oil drains from the V's and into which also 110 flows any oil that may drip from the rack and fall upon the horizontal web 39 which joins the two ways. Into the bottom 40 of this reservoir is screwed a short nipple 41 projecting upward so that the oil which 115 drains into the reservoir must reach the top of the nipple before it can drain out. Into the bottom 40 is also screwed a second nipple 42, to which is attached a T 43, from which extends a pipe 44 passing through 120 holes cored into the cross girts 45 of the bed, and returning the oil to the center of the bed where it drains into reservoir 12. Into the end of T 43 is screwed plug 50, which may be removed through hand hole 125 46 formed in the end of the bed in order to clean out drain pipe 44. Over the nipple 41 is placed an inverted pan 47 which prevents any floating material from flowing into nipple 41 and back into reservoir 12. 130

Grit and other heavy material contained in the oil will settle to the bottom of reservoir 38, whence it may readily be removed. The horizontal area of reservoir 38 is such that the velocity of flow of the oil through the reservoir is very low, permitting complete sedimentation of grit, chips and so on. In addition, the top of this reservoir is covered by steel plate 48 through which a number of small holes are drilled so that the oil can descend into reservoir 38 without carrying with it large particles.

When the table is in its extreme position, its end coincides with dotted line 49 so that any oil which drips from the V's, the rack, or the under side of the table, will fall upon the plate 48 or the web 39, and drain thence into reservoir 38, to be returned by pipe 44 to reservoir 12. The distance between points 25 and 26, and points 27 and 28, is made such that as soon as the end of the table reaches point 51, point 27 slides over and covers oil passage 18, so that trough 25 is no longer connected with the source of oil pressure. Consequently when the table projects over the end of the V's in the position shown in Figure 7, oil is not forced through the oil grooving, although during this time the grooves remain filled with the oil and lubricate the surfaces over which they slide.

By reference to but one set of specific mechanisms in the above specification I do not wish to limit myself to the details described, but desire to include within the range of my invention all the usual equivalent structures in the art involved.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a metal planer, in combination, means for forming permanently closed passages of relatively large area contained between the ways of the planer bed and the V's of the planer table, means for supplying them with oil under pressure, and oil grooving cut in the surface of the table V's of relatively smaller area, leading from the said closed passages.

2. In combination, in the lubricating mechanism of a planer, an oil reservoir, an oil pump, an oil filter, oil conduits leading from the reservoir through the pump and filter to the ways of the planer, means forming passages permanently closed at either end lying between the ways of the planer and the V's of the table, and oil grooving of relatively smaller area leading from the said passages.

3. In combination, in the lubricating mechanism of a planer, means forming permanently closed passages of relatively large area contained between the ways of the planer bed and the V's of the planer table, means for supplying said passages with oil under pressure, oil grooving cut in the sur-

face of the table V's of relatively small area, leading from the said closed passages, a reservoir at either end of the bed into which excess oil drains, and piping returning from the said reservoirs through the bed to a third reservoir.

4. In a metal planer, in combination, an oil reservoir, an oil pump, an oil filter, oil conduits leading from the said reservoir through the pump and filter to the ways of the planer, means forming passages permanently closed at either end and lying between the ways of the planer and the table, oil grooving of relatively small area leading from said passages, other reservoirs at either end of the planer bed, and piping from the said other reservoirs to return oil therefrom to the first reservoir.

5. In a metal planer, in combination, an oil reservoir, an oil pump, oil conduits leading from the reservoir through the pump to the ways of the planer, means forming passages permanently closed at either end and lying between the ways of the planer and V's of the table, and oil passages leading from the aforesaid passages to the bearings of the planer shafts.

6. In a metal planer, in combination, an oil reservoir, an oil pump, oil conduits leading from the reservoir through the pump to the ways of the planer, and a pressure relief valve adapted to limit the pressure of the oil, said valve being also adapted to act as an accumulator.

7. In a metal planer, the combination of a bed, and a table; a way in the bed, and a V on the table to ride in said way, with the metal at the apex of the contact surfaces of the V and way removed to form a channel of substantial width, and closed at the ends by means of projections from the V, means for supplying oil under pressure to said channel, said bed and table being so proportioned that the position of the table with relation to the bed can at no time expose the channels to escape of oil directly therefrom.

8. In a metal planer, the combination of a bed, and a table, a way in the bed, and a V on the table to ride in said way, with the metal at the apex of the contact surfaces of the V and way removed to form a channel of substantial width, and closed at the ends by means of projections from the V, means for supplying oil under pressure to said channel, said bed and table being so proportioned that the position of the table with relation to the bed can at no time expose the channels to escape of oil directly therefrom, said V having small grooves connecting with the channel space, said grooves forming the sole outlet of oil from said channels.

9. In a metal planer, in combination with the bed and table, ways and V's for the

same, and means for maintaining a supply of oil under pressure at the apices of the V's, said means including a relief valve to prevent lifting of the table by the oil pressure.

10 10. In a metal planer, in combination with the bed and table, ways in the bed and V's on the table to engage in said ways, means for maintaining a supply of oil under pressure at the apices of the V's, and throughout a greater part of the length of the said V's.

11. In a metal planer, in combination with the bed and table, ways in the bed and V's on the table to engage in said ways, means for maintaining a supply of oil under pressure at the apices of the V's, and throughout a greater part of the length of the said V's, and an oil escape element from said oil supply adapted to permit so small a quantity to escape as to maintain substantially constant pressure for the oil supply throughout the full extent thereof.

12. In a metal planer, in combination with the bed and table, ways in the bed and V's on the table to engage in said ways, means for maintaining a supply of oil under pressure at the apices of the V's, and throughout a greater part of the length of the said V's, and a relief valve device to prevent over-pressure of said oil.

13. In a metal planer, the combination with a table with V's and a bed and ways, of an oil reservoir, pump and conduits for leading oil from the reservoir to the points of contact of the bed and table, and a catch reservoir at the end of the ways of substantially larger size than enough to take care of the oil flow, and an outlet pipe from said catch reservoir to the reservoir first mentioned, whereby oil escaping into the catch reservoir will have chance to settle before being drained back to the reservoir first mentioned and a strainer interposed in the path of said oil to the reservoir.

14. In a metal planer, a bed, a table, V's and ways for the table and bed, respectively, with the apex of each V cut away between the ends thereof to form a closed passageway between the V and the way, an oil supply system, and a conduit therefrom to the said passageway, said bed and table being proportioned so that the cut-away portion of the

V will not overhang the bed at any position of the table.

15. In a metal planer, a bed, a table, V's and ways for the table and bed, respectively, with the apex of each V cut away between the ends thereof to form a closed passageway between the V and the way, an oil supply system, and a conduit therefrom to the said passageway, said bed and table being proportioned so that the cut-away portion of the V will not overhang the bed at any position of the table, and said conduit entering the way at a point centrally of the full movement of the table.

16. In a metal planer, a bed, a table, V's and ways for the table and bed, respectively, with the apex of each V cut away between the ends thereof to form a closed passageway between the base of the V and the way, and oil supply system, and a conduit therefrom to the base of the way, said bed and table being proportioned so that the cut-away portion of the V will not overhang the bed at any position of the table, said V having small grooves cut therein so as to carry oil from the passageway to the full surface of the V, and a restricted outlet from said grooves at the end of the V to provide a limited flow of oil therethrough sufficient to insure constant pressure within the passageway.

17. In a planer, the combination with a bed having a way, a table on the bed and having a V, means for supplying lubricant under pressure to the apex of the way, the V having oil passages, said passages having relatively large cross section intermediate the ends of the V, but at the ends having their cross section substantially reduced, for the purpose described.

18. In a planer, the combination with a bed having a way, a table on the bed and having a V, means for supplying lubricant under pressure to the apex of the way, the V having oil passages, said passages having relatively large cross section intermediate the ends of the V, but at the ends having their cross section substantially reduced, for the purpose described, said table and bed being of a length that the table at no time will move to a position to expose the large cross section passages.

FORREST E. CARDULLO.