Sept. 1, 1959 T. THOMAS 2,901,843

SUBGRADE PLANER

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Fig. 1

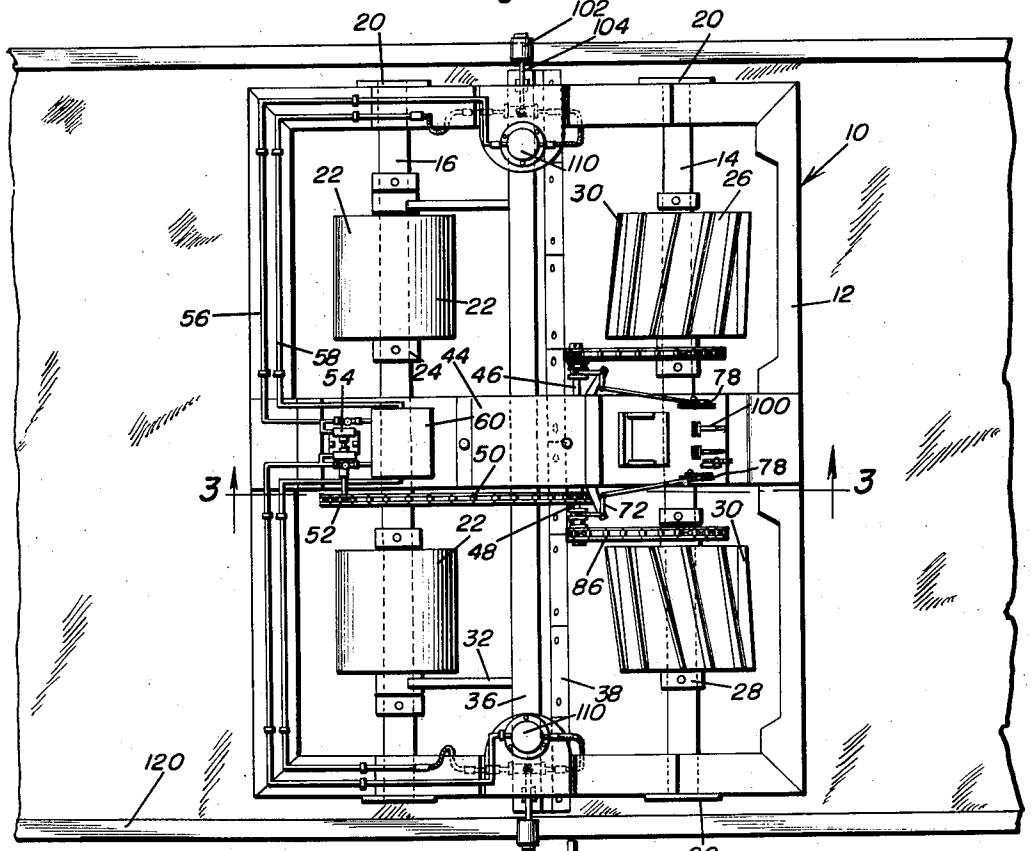

Fig. 2

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Fig. 3

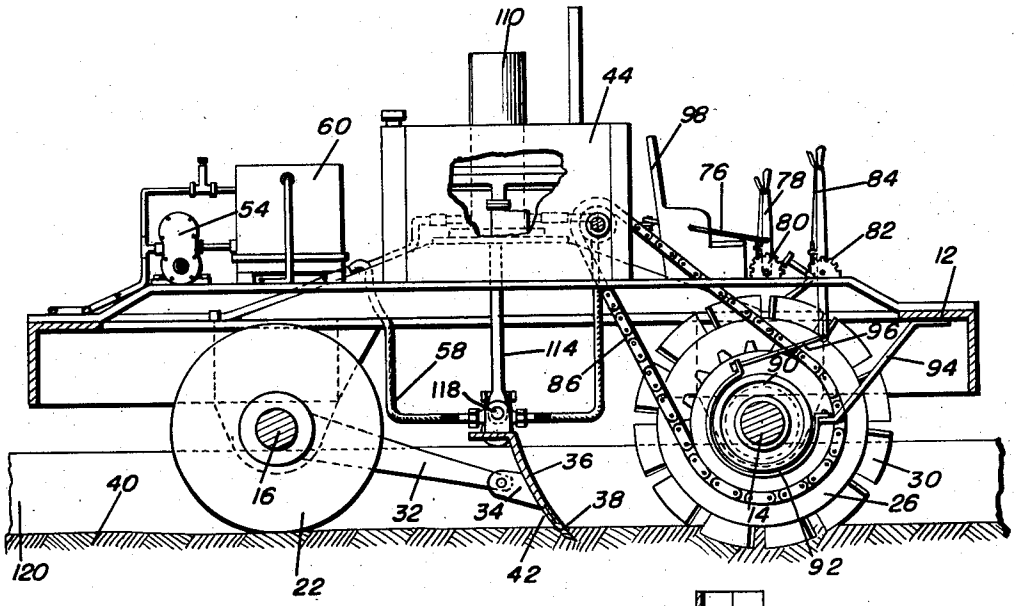

Fig. 8

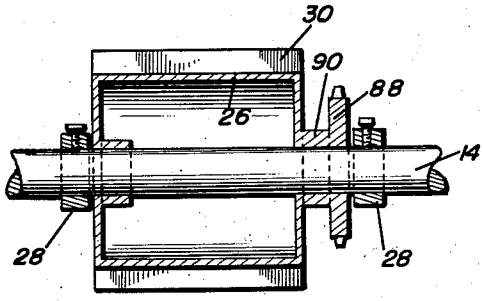

Fig. 9

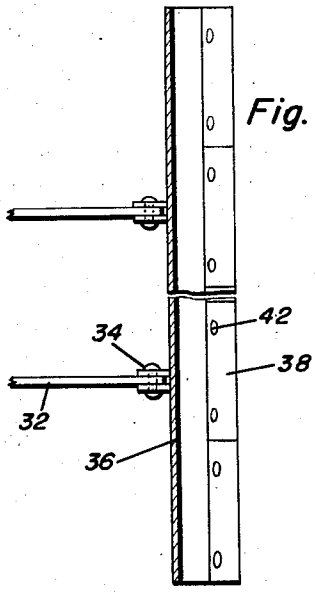

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Fig. 4

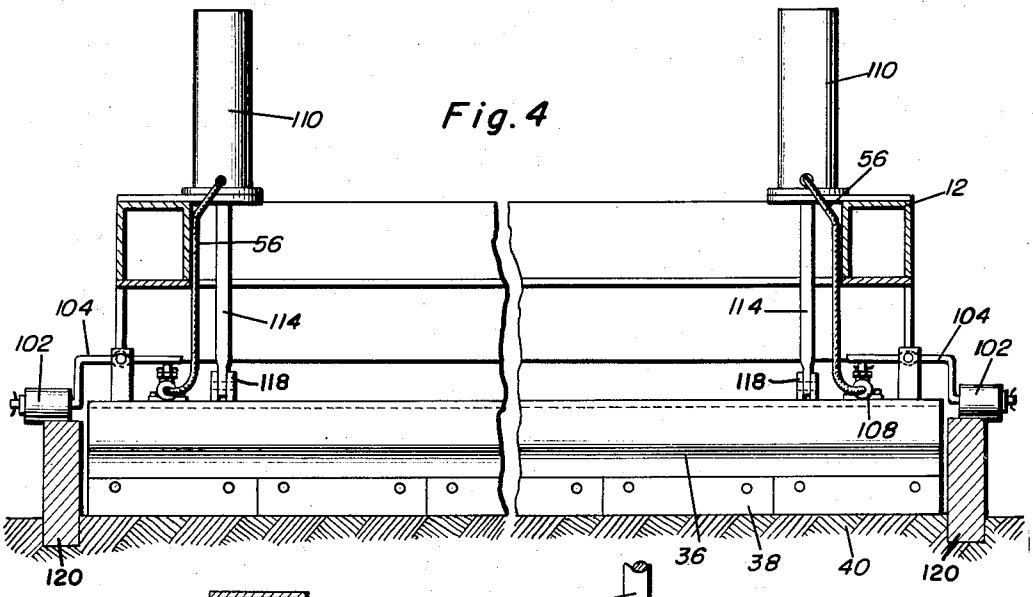


Fig. 5

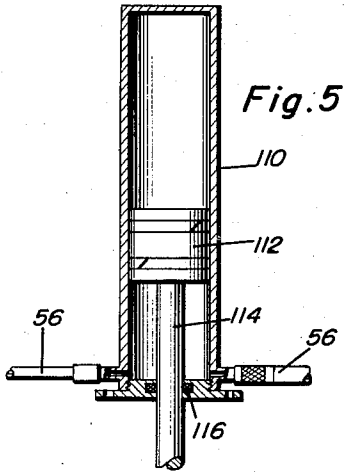


Fig. 10

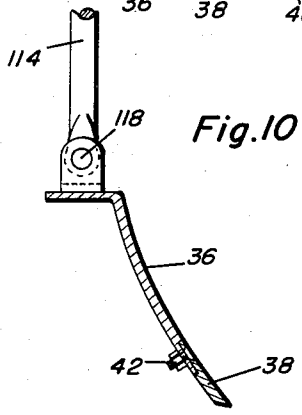


Fig. 7

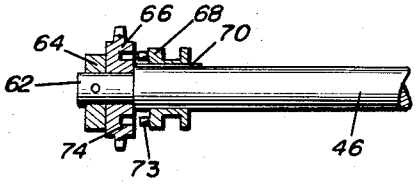
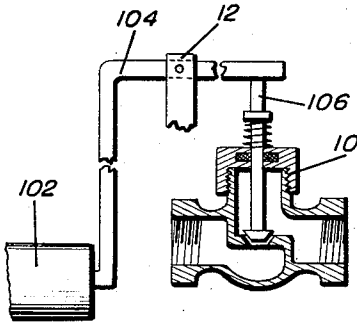


Fig. 6



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SUBGRADE PLANER

Tom Thomas, Houston, Tex.

Application December 10, 1953, Serial No. 397,429

3 Claims. (Cl. 37—108)

This invention relates to a subgrade planer and more specifically provides a machine for accurately planing the subgrade of a road bed.

An object of this invention is to provide a subgrade planer for use in conjunction with roadway forms and having a portion engaging the upper surface of such forms and being interconnected with the form engaging member for accurately and rapidly vertically adjusting the planer blade wherein a smooth and accurate grade may be planed.

Another object of this invention is to provide a self-propelled subgrade planer which is easily operated by a single operator and which automatically retains the grade within a very small tolerance or which may be a portable attachment to a bulldozer, motor grader or the like.

A further object of this invention is to provide a subgrade planer for use in setting grades to close tolerances wherein light weight wooden forms may be employed.

Still another object of this invention is to provide a subgrade planer wherein the ground surface supports the weight of the machine wherein light weight wood forms may be employed as the forms do not support the weight of the planer but only the weight of a guide roller.

A still further object of this invention is to provide a subgrade planer which is rugged and relatively simple in construction, efficient and accurate in operation and well adapted for the purposes for which the same is intended.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a top plan view of the subgrade planer of this invention;

Figure 2 is a side elevational view of this invention;

Figure 3 is a longitudinal, vertical section taken substantially along section line 3—3 of Figure 1 showing the details of construction of the subgrade planer;

Figure 4 is a transverse, vertical section taken substantially along the center line of the machine of this invention showing various details of construction of the actuating rollers and the planer blade;

Figure 5 is a detail section of one of the planer blade actuating pistons;

Figure 6 is a detail section of one of the throttling valves and the relationship of the actuating roller to the throttling valve;

Figure 7 is a detail section showing the clutch means for actuation of the ground engaging wheels;

Figure 8 is a detail section taken substantially along the center line of one of the ground engaging driving wheels;

Figure 9 is a transverse, top plan section taken substantially along section line 9—9 of Figure 2 showing the details of construction of the planer blade; and

Figure 10 is a detail section showing the planer blade and the planer blade actuating means.

Referring now specifically to the drawings, it will be seen that the numeral **10** generally designates the subgrade planer of this invention including a generally rectangular frame member **12** having a pair of axles **14** and **16** thereon in longitudinal spaced relation and parallel to each other. The axle **14** is supported below the frame **12** by suitable brackets **18** and the axle **16** is supported by suitable depending brackets **20**. The axle **16** carries a pair of ground engaging wheels **22** thereon in transversely spaced relation and a pair of collars **24** orientate each wheel **22** on the axle **16**. It will be seen that the wheels **22** are generally smooth on their outer surface and act as supporting wheels. A pair of ground engaging wheels **26** are journaled on the axle **14** in transversely spaced relation and the wheels **26** are orientated by the spacer collars **28**. The outer surface of the ground engaging wheels **26** is provided with transverse lugs **30** which are generally spiral in nature forming a ground engaging member wherein the wheels **26** are the driving wheels for the subgrade planer **10**. A pair of links **32** are pivotally secured to the axle **16** adjacent the outer ends of the ground engaging wheels **22** and extend forwardly and are pivotally engaged with lugs **34** on each end of a planer blade **36** which has a replaceable sharpened edge member **38** for grading the road bed **40** to an accurate grade. The sharpened edge member **38** is secured to the planer blade **36** by suitable fastening means **42** wherein the sharpened edge **38** may be replaced as desired.

A prime mover **44** of any well known type is positioned centrally of the frame **12** and is provided with a transversely extending power take-off shaft **46** having a pulley **48** mounted rigidly thereon with a sprocket chain **50** engaging the sprocket pulley **48** with the sprocket chain **50** passing over the sprocket gear **52** which drives a hydraulic pump **54** having a discharge line **56** and an intake line **58** which is in communication with a reservoir tank **60**. As shown in Figure 7, each end of the shaft **46** is provided with a reduced portion **62** having a collar **64** thereon and a sprocket gear **66** journaled between the collar **64** and the enlarged portion of the shaft **46**. A clutch member **68** is longitudinally slidable on the shaft **42** and keyed thereto by a suitable longitudinal key **70** and a bellcrank member **72** has a U-shaped end positioned in a peripheral groove in the clutch member **68** for movement of the clutch member **68** into engagement with the sprocket **66**. The clutch member **68** is provided with a plurality of projecting pins **73** which are selectively engageable with a plurality of blind sockets **74** in the sprocket gear **66**. The other end of the bellcrank **72** is connected by a connecting link **76** to an operating lever **78** pivotally mounted on a quadrant **80** having the usual notches **82** and the spring loaded dog **84** for selective positioning of the operating handle **78**. The sprocket gear **66** is engaged by a sprocket chain **86** which passes over a sprocket gear **88** rigidly secured to each of the ground engaging wheels **26** thereby driving the ground engaging wheels **26** and propelling the machine **10** along the ground surface **40**. As shown in Figure 3, a brake drum **90** is provided between the sprocket gear **88** and the drive wheel **26** and a brake band **92** is positioned thereabout and individually connected to a portion of the frame member **94** and a connecting link **96** which is secured to a brake pedal **100** in a conventional manner. It will be understood that a brake assembly is positioned adjacent each driving wheel **26** wherein the device may be directionally controlled by manipulation of the brake assemblies controlled by foot brake pedals **100**. As shown in Figure 3 an operator's seat **98** is positioned on the upper surface of the frame **12** wherein the operating handles **78** are in position for selective actuation by an

operator and by suitable manipulation the handle **78** and the foot pedal **100**, the operator may propel the device along the ground **40**. Along the transverse center line of the machine and projecting from each side thereof is mounted a roller **102** pivotally secured to the blade **36** by a crank-member **104**. The innermost end of the crank member **104** supported by brackets **105** engages a valve stem **106** for throttling the flow of pressurized liquid through a throttling valve **108**. It will be seen that the throttling valve **108** is positioned in the hydraulic line **56**. It will be understood that by raising and lowering of the roller **102** the throttling valve **108** will be actuated in the following manner. As the roller **102** is raised the throttling valve is restricted or urged towards the closed position, and as the roller **102** lowers the throttling valve is opened or becomes less restricted. As will be seen a hydraulic cylinder **110** is provided and has a piston **112** slidably mounted therein with the piston having a rod **114** extending downwardly through a sealing member **116** in the lower end of the cylinder **110** and pivotally connected to the upper end of the planer blade **36** by a suitable pivotal connection **118**. It will be seen that the pressure line **56** passes through the underside of the piston **112** wherein pressure will raise the piston **112** along with the piston rod **114** and the planer blade **36** in an obvious manner.

It will be seen that the cylinder **110** is positioned in the pressure line **56** and the pressure line then proceeds to the inlet side of the throttling valve **108** and thence through a return line to the receiver or reservoir **60**. It will be understood that each end of the planer blade **36** is connected to a piston rod **114** and each end of the blade is individually controlled by the control rollers **102** wherein the controls for the individual ends of the planer blade are independent of each other and separately activated by the rollers **102** which engage the upper surface of the forms **120** which are of light weight wood or other material rather than the usual heavy forms used in roadway work.

From the foregoing construction, the operation of the device will be easily understood. With the rollers **102** in engagement with the upper surface of the forms **120** and the grade set, the machine **10** is propelled along the ground surface **40** and upon hitting a low spot, the frame actually will lower itself thereby raising the roller **102** wherein the throttling valve **108** will be restricted or moved towards its closed position thereby building a pressure up in the lower end of the cylinder **110** and moving the piston **112** upwardly thereby raising the planer blade **36** and accurately grading the desired grade to a very close tolerance. Obviously, upon the ground engaging wheels **26** moving over a high spot, the roller **102** will be relatively lowered thereby opening the throttling valve **108** permitting the pressure to return to the tank **60** thereby permitting the gravity of the planer blade **36** to move the blade **36** to a lower position towards the desired grade. It will be noted that the planer blade **36** is necessarily relatively heavy wherein gravity actuated lowering will be effected. Obviously, suitable control valves may be placed on the pump **54** and all the various rotating elements may be equipped with suitable grease fittings and the conduits **56** and **58** are equipped with suitable brackets for maintaining the conduits in their correct relationship.

In practical operation the subgrade planer of this invention will cut a desired grade within a tolerance of 1/16 of an inch and at the same time eliminate the use of the usual metal heavy forms as the only weight resting upon the forms is the weight of the rollers **102**. Any material meeting the desired specifications of the elements of this invention may be utilized as may be deemed necessary.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. A subgrade planer comprising a mobile frame having ground engaging supporting wheels, a transversely extending planer blade vertically adjustably mounted on said frame, a fluid pressure actuated piston and cylinder arrangement interconnecting each end of the blade and the frame, a fluid pressure system communicated with each arrangement, a control valve for each piston and cylinder arrangement for controlling communication of the system therewith whereby the elevation of the blade may be varied, and freely movable means supported from each end of the blade and connected with each of said control valves for actuating said valves, said movable means extending laterally outwardly of the frame for engaging a present guide surface for maintaining the blade in constant relationship to the guide surface without the guide surface supporting any of the weight of the blade, each of said movable means including a pivotally supported arm having a guide surface contact element on the outer end thereof, each of said control valves having an actuating stem connected with the inner end of an arm whereby changes in the elevational relationship between the blade and guide surface will automatically change the scope of valve opening.

2. The structure as defined in claim 1 wherein said guide surface contact element includes a roller journalled on the outer end of the arm, said arms projecting laterally outwardly of the blade whereby the rollers will be disposed out of the path of movement of the blade.

3. The structure as defined in claim 2 wherein said fluid pressure system includes a fluid pump mounted on said frame, a prime mover for driving said pump, said prime mover also supplying locomotive power for moving the planer in a path of movement between the preset guide surfaces.

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