This invention relates to improvements in a mechanism for filling in trenches and tamping dirt, blocks or similar materials. I have shown my invention in its preferred form, namely, a machine particularly adapted for filling in a trench and tamping or making solid the material which has just been filled in. However it is evident that the mechanism may be used for various other purposes such as breaking up hard surfaces and dragging such broken particles out of the path of the machine.

The general object of my invention is to provide an improved machine wherein the tamping and backfilling mechanisms may be moved about pivots on the machine and thereby provide a machine of great flexibility and which may be operated with ease and at a comparatively high rate of speed.

A more specific object of my invention is to provide a mechanism for filling an open trench with material lying on the surface adjacent the trench and which filling mechanism is pivotally mounted on the machine to enable material to be brought to the adjacent trench from various angles and thereby enable the operator to readily even up the surface during the backfilling operation, and in the same machine I provide a mechanism whereby the filled in material may be tampered or made solid.

Other objects of my invention will become apparent from the following description which refers to a preferred embodiment of the invention which is illustrated in the accompanying drawings. The essential and novel features of the invention will be set forth in the claims.

In the drawings Figure 1 is a side elevation of my improved tamper and back-filling machine; Figure 2 is a rear elevation of the machine; Figure 3 is a plan of my improved tamper and back-filler, with parts broken away down to the horizontal plane of the line 3-3 of Fig. 1. Referring again to the drawings my improved tamper and back-filler is mounted on a carriage 10 having a frame 11, carried by a supplemental frame comprising upper and lower rails 12 and 14 connected together by suitable cross frame members 15. This supplemental frame carries, adjacent its front and rear ends, suitable sprocket wheels 16 which together with the rails 12 and 14 support caterpillar tread members 17.

The caterpillar treads 17 are driven by an internal combustion motor 18 which is mounted on the forward end of the frame 11. The motor drives a propeller shaft 19 through the usual speed-changing transmission 20. The propeller shaft 19 in turn drives the usual differential mechanism 21 which drives sprockets 22 on the shafts 23. Mounted on the shafts 23, one of which extends to each side of the frame 11, are brake drums 24 which are controlled by brake bands 25 adapted to be operated by levers 26 which are connected to the brakes by links 27. Hence the brake band 25 on either side of the machine may be tightened to cause the shaft 23 on that side to rotate at a slower speed than the shaft 23 on the other side of the machine. The sprockets 22 are connected by driving chains 28 to sprockets 29 which drive the caterpillar treads 17 on their respective side of the machine. Hence the machine is readily steered by the operation of the levers 26.

The arrangement of the frame is such that the mechanism may be driven under its own power to a position parallel with, and adjacent to the ditch or trench which is to be filled. Such trenches are generally dug by a trench digging mechanism which throws the material from the trench and to one side thereof. The tamper is therefore driven along the trench on the side opposite the piled dirt or other material.

The machine is provided with a back-filling mechanism which draws or drags the dirt or material from the surface piles A (Fig. 2) and discharges it into the trench. To accomplish this I provide a shovel or scraper 30 which is so arranged, that the operator of the machine, causes it to be raised from the ground and carried or thrown outwardly beyond the material A and then lowered to the ground and drawn towards the trench carrying or drawing with it material from the pile A, and discharge such material into the trench B. This operation is repeated until the trench is filled.

The backfiller mechanism comprises, as mentioned, a shovel or scraper 30 which, as shown in the drawings, comprises a back plate 31 rigidly secured to a vertical frame 32. Pivoted secured to the frame 32 is a substantially horizontal frame 33 which may be provided with a bottom plate 34 and used as a shovel or the bottom 34 may be omitted and the unit used as a scraper. The angle between the frame members 32 and 33 is controlled by suitable braces 35 which are pivotally connected to the horizontal frame 33, and is adjusted to secure the frame 32.

The scraper or shovel 30 is operated by a pair of cables 36 and 37 and requires no manual handling. The cable 36 is used to lift and swing the scraper away from the trench, to a position beyond the pile of material A. This position is shown in dotted lines in Fig. 2. The cable 36 is secured to the middle of a chain 38, the opposite ends of which are secured to the upper and outermost ends of the vertical frame 32 in the form of a bail. The cable 36 is supported above the machine and over-
hanging the side thereof by a boom 39 which carries at its upper end a sheave 40. The cable 36 passes upwardly from the shovvel 30 over the sheave 40 and thence downwardly to a winding drum 41 rotatably mounted on a shaft 42 which is supported by bearings 43 secured to frame members 44 and 45. The cable 37 serves to drag or draw the scraper 30 towards the trench B carrying with it material from the pile A. This cable 37 is secured to the middle of a chain or ball 46, the opposite ends of which are secured to the outermost ends of a U-shaped brace, or bracket 47 which braces the forward ends of the horizontal frame 33 of the scraper 30. The cable 37 passes directly from the scraper 30 to a winding drum 48, and is wound around and secured to such drum 48 which is rotatably mounted on the shaft 42 heretofore described.

The drums 41 and 48 are arranged to be driven simultaneously or individually as desired by the operator. The drums 41 and 48 are rotatably mounted on the shaft 42 which is driven through a gear unit mounted in a housing 49 which is secured to the frame 11. The gear unit 49 is driven by a driving chain 50 from a shaft 51 which is drivingly connected to the transmission 20 by a clutch and gear unit mounted in a housing 52 secured to the side of the transmission 20 and operated by a clutch control lever 53. The rotation of the shaft 42 is transmitted to the drums 41 and 48 by a pair of clutch members 54 and 55 which are drivingly connected to the shaft 42 and adapted to be clutched to their respective drums 41 and 48 by bell cranks 56 and 57. The bell crank 56 is connected to a link 59 to a lever 60, rigidly carried by a rod 61 mounted in bearings 62 located at the opposite side of the machine. The rod 61 is manually rotated by a suitable crank or lever 63 to engage or disengage the clutch 54 from the drum 41. The bell crank 56 is connected by a link 65 to a crank 66 which is rotatably mounted on the rod 61 adjacent the crank 66. The crank 66 is manually rotated to cause the clutch 55 to engage or disengage the drum 48. The drums 41 and 48 are provided with brake mechanisms 68 and 69 respectively which are arranged to grip their respective drums and prevent their rotation when their respective clutches 54 and 55 are disengaged. However, further movement of either clutch 54 or 55, in a disengaging position, causes the associated brake 68 or 69 to be released. Hence each drum may be driven, stopped or released, independently of the other, as desired.

The operation of the back filler is as follows: the clutch 54 and brake 68 are released and the clutch 55 is engaged causing the cable 37 to be wound about the drum 48 and to draw the scraper 30 with its load into the trench. When the scraper 30 is in the trench, the clutch 48 and the brake 69 are released and the clutch 54 is put in engagement with the drum 41. It will be noted that the drum 41 is of a larger diameter than the drum 48. This causes the cable 36 to be reeled at a higher rate of speed than the cable 37. Hence the scraper 30 is drawn upwardly and outwardly towards the end 30 of the boom 39 at a comparatively high rate of speed. When the scraper 30 has been raised the desired height, the clutch 54 and brake 68 are released permitting the scraper 30 to drop to the surface, beyond the pile of material A. Shortly after the scraper 30 strikes the ground the clutch 54 is operated causing the brake 68 to engage the drum 41 and prevent further un-reeling of the cable 36. When the drum 41 is brought to rest, the brake 68 is released and the cable 37 is reeled as heretofore described.

I have found that, due to the rapidity of the winding of the cable 36, the operator can, by proper operation of the clutch 54 and brake 68, throw the scraper some distance beyond the end of the boom. This is highly advantageous when the pile A has inadvertently been moved away from the trench or when the trench has caved in on the side the backfilling machine is on, thereby necessitating the moving of the machine to a greater distance from the trench than usual.

The boom 39 is arranged to permit the angle of approach of the scraper 30 to be varied so that the trench B may be leveled by drawing the material A, either in a path normal to the machine or at an angle thereto. The latter is often advantageous, especially when the trench B has been manually excavated. Likewise, the boom 39 which, in operation extends some distance to the side of and above the machine, may be moved to a comparatively low position close to the machine and projecting towards the front thereof.

As shown in the drawings the boom 39 is pivotally connected to a horizontal pin 70, carried by a knuckle member 71, thereby permitting the boom 39 to be raised and lowered as desired. The knuckle member 71 is in turn pivoted to a substantially vertically extending pin 72 carried by a bracket 73, which is rigidly secured to the upright frame member 44, thereby permitting the swinging of the boom 39 about a substantially vertical axis. The compound swinging movement of the boom 39 about the pivot pins 71 and 72 results in a universal movement and permits the boom 39 to be swung to practically any desired position on the left hand side of the machine.

The boom 39 is normally retained in an adjusted position, relative to its movement about the pin 71, by a chain 77, one end of which is secured to the upper or outer end of the boom 39 as at 78 and the other end of which is adjustedly secured to the upper end of the frame members 45 as at 79.

The boom 39 is secured in position, relative to its swinging movement about the pin 72, by a bar or pole 80, one end of which is secured to the front end of the frame 11 by a universal joint 81. The pole 80 is slidable mounted in a yoke 82, which is pivotally secured to a yoke 83. The yoke 83, in turn, is slidably mounted on the boom 39. Suitable bolts 84 are provided to rigidly secure the yokes 82 and 83 in adjusted positions on the pole 80 and boom 39 respectively, the arrangement being, in effect, a universal joint.

The tamping mechanism is pivotally mounted at the rear of the frame 11 and is so constructed, that it may be swung about to bring the tamper to the side of the machine and into a position to tamp the material, which, as heretofore described, has been drawn into the trench B. This position of the tamper mechanism is shown by the dotted lines in Figures 2 and 3.

The tamper mechanism is mounted on a pair of horizontally extending beams 90, secured to a frame 91 which is pivotally secured, by pivot pins 92 and 93, to the frame 11 and an upper frame member 94 respectively. The frame 94...
is carried by the upstanding frame member 45 and is braced by struts 95.

The tamping mechanism comprises a tamper 100, carried by a reciprocating bar 102 actuated by mechanism carried by the frame beams 90. Upon the outer ends of the parallel beams 90 are mounted spaced cross shafts 104 and 105, rotatably connected by sprocket gears 106 and 107 and sprocket chains 108 and 109 to sprockets 110 rigidly secured to drive shafts 111. Each shaft 111 carries a bevel gear 112 which meshes with bevel gear 113 carried by a vertical shaft 114, the axis of which lies along the axes of the pins 92 and 93. The shaft 114 carries on its lower end a bevel gear 115, which meshes with a bevel gear 116 carried by a shaft 117, rotatably mounted in a stationary housing 118.

The shaft 117 is driven by a sprocket chain 118a, which drivingly connects the shaft 117 with a gear 119 carried by a shaft 120 which is mounted in suitable bearings on the frame 11. The shaft 120 is adapted to be drivingly connected and disconnected to a drive shaft 122 by a clutch mechanism 123 adapted to be manually operated by a lever 124.

Each of the shafts 104 and 105 has rigidly secured to it a gripping pulley 140, the face of which contacts with opposite faces of the tamper bar 102. The outermost shaft 104 is mounted on a pivoted arm 141, and the pulley 140 on the shaft 104 is resiliently held in contact with the bar 102 by springs 142 which are secured to the arm 141 and a fixed member 143, the inward movement of the shaft 104 being limited by the contacting of a shoulder 144 of a plunger 145 with the edge 146 of a cylinder 147 which is pivotally connected to a stationary member 143.

Each driving pulley 140 has a flattened face 150 (as shown in Figs. 1 and 2). The arrangement is such that the pulleys 140 are driven continuously in opposite directions to raise the tamper bar 102. However once in each revolution the flattened surfaces 150 of the pulleys come opposite the bar 102 and the plunger mechanism 145 and prevents the flattened faces 150 from contacting with the bar thereby permitting the bar 102 to fall and produce a tamping action. Further rotation of the pulleys 140 will again cause them to again engage the bar 102 and again drop it, thus causing the continuous reciprocating movement of the bar 102 and its tamper block 11, raising them by mechanical action and permitting them to fall by gravitation.

From the foregoing description it is apparent that I have provided a machine which will efficiently fill a trench with material, previously removed therefrom and piled at one side thereof, and which machine is provided with a tamping mechanism adapted to tamp down the surface of the filled trench, solid subsequent to filling. I have so constructed this machine that the tamper and backfilling mechanisms are independently pivoted to a frame and adapted to be operated simultaneously and while the machine is in movement, and wherein the machine may be operated from one side of the trench and readily controlled by a single operator. My improved machine is compact, comparatively simple to construct and operate together and positively from a single source of power, and so arranged that the tamper and backfilling mechanism may operate at various angles from the machine or may be positioned adjacent the machine to enable it to be moved readily from place to place under its own power through public thoroughfares without dismantling either mechanism.

My mechanism has a special merit from the fact that the single operator who controls the motor as to the power exerted and the speed desired, will also be able to control the backfilling mechanism from the same position occupied in controlling the tractor mechanism, but may also selectively control the steering mechanism for the vehicle and also control the tamper mechanism at the rear of the machine.

Having set forth the principles of my invention, and described and illustrated an embodiment thereof for practical use, what I claim and desire to secure by Letters Patent is:

1. A machine of the character described comprising a main frame, a driving mechanism supporting the frame, a tamper mechanism supported on said frame, a boom pivoted to said frame, and a scraping device supported by the boom, means to positively operate the scraping device towards and from the machine, and a motor carried by the frame and adapted to operate simultaneously or individually the tamping and scraping mechanisms.

2. A machine of the character described comprising a main frame, propelling mechanism supporting the frame, a tamper mechanism supported on said frame, a boom secured to said frame for a universal movement therewith, and a scraping device supported by the boom, a winding reel mounted on the frame and adapted to positively draw the scraping device towards and from the machine, and a motor carried by the frame and adapted to operate positively and simultaneously or individually the propelling, tamping, and scraping mechanisms.

3. In combination with a road vehicle, a motor carried by and adapted to propel said vehicle, steering mechanism to steer the vehicle, a tamper mechanism supported on the frame, a pair of winding reels mounted on the frame and having driving connection with said motor, a scraping device, flexible means secured to the scraping device and one of said reels whereby to be wound about said reel to propel the scraper towards the machine, and a second flexible means secured to the other of said reels and adapted to carry the scraper away from the machine.

4. In combination with a road vehicle, a motor carried by and adapted to propel said vehicle, steering mechanism to steer the vehicle, a tamper mechanism supported on the frame, a pair of winding reels mounted on the frame and having driving connection with said motor, a scraping device, a flexible means secured to the scraping device and to one of said reels whereby to be wound about said reel to propel the scraper towards the machine, and a second flexible means secured to the other of said reels and adapted to carry the scraper away from the machine.

5. In combination with a road vehicle, a motor carried by said vehicle and adapted to propel said vehicle, steering mechanism to steer the vehicle, tamper mechanism on one end of the vehicle frame, winding mechanism mounted on a side of said frame, a scraping device movable in a horizontal plane towards or away from said vehicle, an outwardly extending boom pivotally mounted at one end for swinging movement towards or away from said vehicle.
about a substantially vertical axis and having a sheave adjacent its outer end, flexible means secured to the 5 scraping device and the winding mechanism and carried by the sheave, a second flexible means secured to the scraper and the winding mechanism, wherein said flexible means comprises the sole connecting means between the scraper and the vehicle and are so arranged as to draw the scraper towards or away from the vehicle selectively, and separately controlled driving connections between said motor and the tamper means, the pivoted boom and the winding mechanisms.

6. A machine of the character described comprising a main frame, a tractor belt drive mechanism supporting said frame, a tamper mechanism pivotally mounted on said frame about a vertical axis to swing about the base of the machine, a movable scraper device, a support for the scraper pivotally mounted at one end of said frame, a tamper mechanism pivotally mounted on said frame, and a carriage pivotally mounted on said frame for movement in a vertical plane, flexible means secured to the scraper and said support, mechanism including said flexible means to positively draw the scraper toward or away from the base of the machine, and a motor carried by said frame and having separate driving connections manually controlled to selectively operate simultaneously or individually, the said supporting drive mechanism, the tamper mechanism and scraper drawing mechanism.

7. A machine of the character described comprising a main frame, a drive mechanism supporting said frame, a tamper mechanism pivotally mounted on said frame, a carriage pivotally mounted on said frame, a scraper mounted adjacent one end of said frame, and a carriage pivotally mounted on said frame for movement in a horizontal plane about said shaft, a tamper mechanism mounted on the outer end of the carriage and operatively connected with said shaft, a motor on the frame, a driving connection between the motor and said shaft, and a driving connection between the motor and said scraper shaft, a boom pivotally connected to one side of said frame, means connected to the frame to adjustably support the boom in its inclined position, a movable scraper device, a winding mechanism including winding drums mounted on the same side of the frame as said boom, a sheave carried by the boom, flexible means secured to the scraper and passing over the sheave to the winding drums whereby their rotation will cause the scraper to be drawn towards or away from the machine, and a selective driving connection between the said winding drums and the motor, whereby the tamper mechanism, the scraper device and the winding means are controllable by a single operative.

9. A machine of the class described comprising a frame mounted on tractors, a vertical shaft mounted on the frame, a carriage pivotally mounted for arcuate movement about the axis of said shaft including a position of said carriage in a plane reverse of said frame, a tamper mechanism on the carriage and operatively connected to said shaft in all positions of said arcuate movement, a motor to drive the tractors and said shaft, a boom connected to the frame for universal movement thereon about a vertical axis, means universally connected to the frame to support the boon in an adjusted position relative to its movement in a horizontal plane, a movable scraper device supported by the boom, and means for operatively connecting said motor with said scraper device, the tractors and said vertical shaft, selectively, the several connections being capable of manual control by a single operator.

10. A machine of the class described comprising a frame mounted on tractors, a tamper mechanism supported on said frame, a motor on the frame, a driving connection between the motor and the tractors, a second driving connection between the motor and the tamper mechanism, a movable scraper device, a winding mechanism including winding drums mounted on the frame, a boom pivotally connected to the frame for movement in a vertical plane, flexible means secured to the scraper and supported adjacent the outer end of the boom and secured to said winding drums whereby rotation of such drums will cause the scraper to be drawn selectively, away from or towards the machine, a driving connection between said winding drums, the tamper mechanism, or the tractor and the motor, and wherein all of said driving connections may be operatively connected manually to the motor by a single operator, to operate their respective mechanisms simultaneously or separately as desired.

11. A machine of the class described comprising an elongated frame mounted on tractors, a motor mounted on one end of said frame and having driving connections with said tractors, a tamper mechanism pivotally mounted on said frame at the end thereof opposite said motor and operatively connected with the latter, said operative connection including a shaft mounted between the tamper mechanism and motor for rotation in a horizontal plane and having driving connection with said motor, a boom pivotally connected to the side of said elongated frame, means for universal movement thereon, a scraper device movable toward or away from the side of the frame the boom is mounted, a winding mechanism including a pair of rotating drums mounted in axial alignment on said horizontal shaft, flexible means secured to the scraper and supported intermediate its ends near the outer end of the boom, one end of the flexible means being secured to one of said rotating drums whereby rotation of such drum will draw the scraper laterally away from the machine, and the other end of said flexible means being secured to the other drum to move the scraper towards the machine, a selective driving connection between each of said drums and the motor, and wherein all of said driving connections may be operatively effective and manually controlled to actuate their respective mechanisms simultaneously or independently as desired.