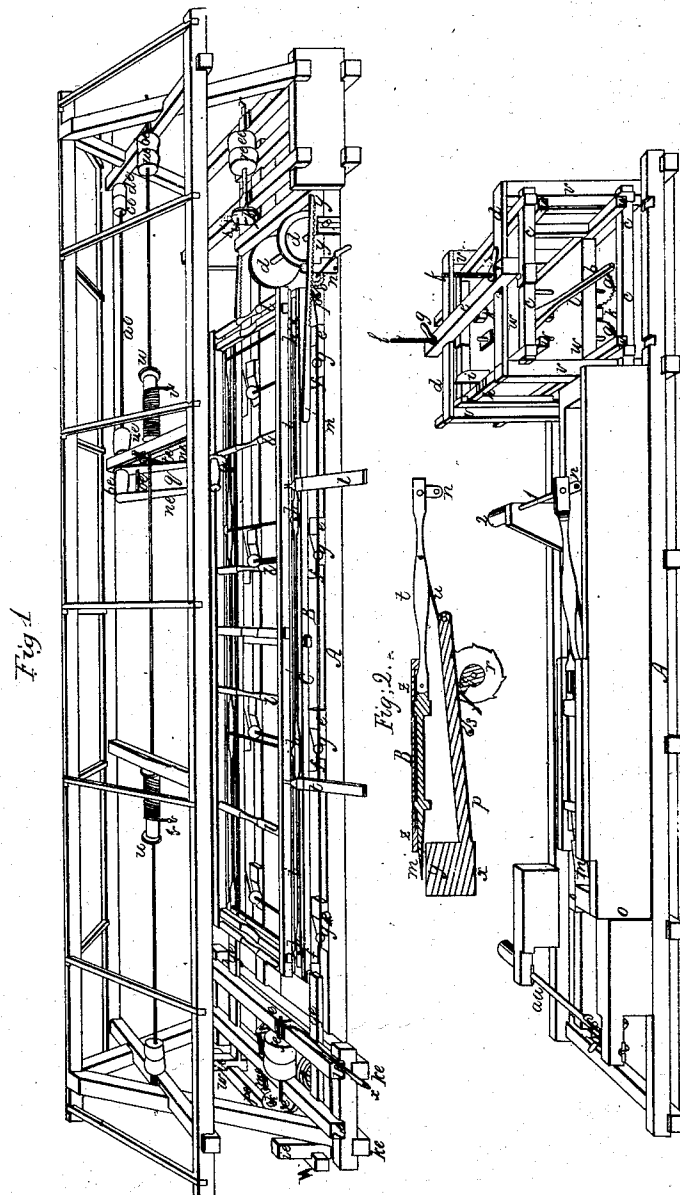


J. Stimpson.

Railroad Track-Layer.

N^o 879.

Patented Aug. 13, 1838.



UNITED STATES PATENT OFFICE.

JAMES STIMPSON, OF BALTIMORE, MARYLAND.

MACHINERY FOR CONSTRUCTING TIMBER-RAILROADS.

Specification of Letters Patent No. 879, dated August 13, 1838.

To all whom it may concern:

Be it known that I, JAMES STIMPSON, of the city of Baltimore and State of Maryland, have invented a new and Improved
5 Mode of Executing the Necessary or Usual Mechanical Labor of Constructing Timber-Railroads by Power Machinery; and I do hereby declare that the following is a full and exact description.

10 The general labor of constructing roads on this plan consists chiefly in jointing the lower ends of the piles, squaring the upper ends, driving them, sawing off and tenoning said piles, after they are driven; in
15 splitting, or squaring up the transverse sleepers, sawing them into lengths, mortising, draw-boring said mortises and tenons, cutting out the gains in the said transverse sleepers for the reception of the longitudinal rails; in sawing the longitudinal rails
20 out of logs, squaring their ends, forming the keys and pins, and in general, performing all the necessary mechanical labors required in constructing different kinds of timber
25 rail roads.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation, viz:

30 *Section 1st.*—For the preparation of the piles of one kind of rail road, for which I obtained a patent under date of the third of June, 1830, constructed upon a double set of piles, I make a triple set of carriages, consisting of a bottom, middle and upper
35 carriage, (see drawing No. 1, A, B, and C,) all of the same width, but the under one longer than the others and also stronger. The bottom carriage rests upon small wheels (*d d d d*) fitted close laterally to the rail
40 road, whereby to move it along upon it, and is about thirty feet in length, consisting of two strong side pieces, connected by three or more transverse timbers framed into said side pieces and held together by joint-bolts
45 and nearly as wide as the rail road. Upon the tops of each of these side pieces, I make, say four short incline planes (*e e e e*) all of the same angle of inclination and height and are placed equi-distant apart.

50 I then make the second carriage B, of the same width and in the same manner, but lighter and not so long as the bottom one: upon the under side of this second frame, I also make the same number of inclines
55 (*f f f f*) of the same angle and height, but facing opposite to those upon the under

one: between these inclines I place rollers, (*g g g g*), connected in a slight frame, of a diameter a little more than the perpendicular height of said inclines, so that when at
60 the bottoms of said inclines, one carriage shall not touch the other. I then make a rail way upon the top of this second frame, consisting merely of bars of iron, one upon each side piece, say one inch wide and about
65 three-eighths thick; these are fastened upon the side pieces by spikes, in a perfectly parallel position with each other and near the outer edge of said side pieces. I then make the upper or third carriage C, of considerable strength, of the same width and
70 nearly the same length as the second, with iron rails underneath exactly corresponding in width, thickness, and position with the first. I then place between these frames, or
75 iron rails, small rollers (*h h h h*) say one inch in diameter, with flanches upon each end, one and a half inches diameter and just as far apart, as the width of the iron rails; these rollers have small gudgeons and
80 are put into slight frames (*i i*) about four feet apart, which frames are merely of a firmness sufficient to keep the rollers in their places; and upon these rollers, the upper carriage C, or frame, with the log upon it,
85 is moved up to the cutters and auger (*k*), mandril (*r*) which is connected to and upon the end of the under carriage, in a manner to be hereafter described. In this upper carriage, I place transverse rollers (*l l l l l l*)
90 with iron gudgeons: a groove is cut into each of these rollers, the sides of which grooves each way diverge upon rather an obtuse angle, so that the log when rolled upon them, will, by its gravity, concentrate directly
95 into the middle of said grooves, and can be easily moved endwise upon the rollers, without moving the carriage.

It will now be seen, that the log when rolled upon said rollers, will incline to the
100 center of the grooves horizontally, and by means of the middle, or second described frame B, the inclines (and rollers between said inclines, they being moved endwise by means of a rack (*m*) and pinion (*n*) the
105 pinion shaft being attached to the under frame and the rack upon the other next above it) it will of course raise the two upper frames with the log, in a perfectly horizontal manner and equal in height to twice
110 the diameter of the rollers, or in other words to twice the elevation of either of the in-

clines; and by means of a ratchet wheel (*o*) upon the pinion shaft, with a pall (*p*) it can be held in any position upon the planes desired, and thus in an instant, can the centers of the logs, large or small, be brought to the cutters and augers, to be pointed, squared, tenoned with round tenons, or reduced by proper cutters to any size desired; while the logs lying upon transverse rollers, upon the upper frame and this frame resting upon the rail ways and small rollers, the frame and log can be moved up to the cutters and auger, etc., by hand, or a regular feed, put in motion by the same power that moves the cutters, etc. And it will also be seen, that the log lying directly upon the transverse rollers in the upper frame, can be moved endwise, independently of or without moving the frame, to be sawed off in any part of it by means of the saw (*q*) in a frame set at right angles to the log for that purpose and connected to the roof. To the side of the upper frame, I place skids (*t t*) to roll up the logs upon, connected by hooks to eye-bolts, so that the skids may trail, or be elevated in any direction; this operation of rolling up the logs is performed by a windlass (*u u*) in the center of the roof of the carriage upon which is a loose and tight pulley (*v e w e*) and put in motion by the power; to said windlass are made fast two ropes (*v v*) with hooks upon their outer ends; these ropes are passed over the logs, brought back and hooked to eye-bolts in the upper edge of the frame, so that when the windlass winds up the ropes, the log is rolled up before them in their bites, or the doublings of the ropes; and can thus be placed in the grooves of the rollers (*l l*) upon the upper carriage C: and the instant the log is in its place, the belt is shifted on to the loose pulley, and the windlass stopped.

Upon one end of the bottom carriage, I place a mandrel (*r*) like a lathe mandrel, or arbor, and upon it, I place a chuck plate (*s*) faced up true; in which plate, I make slots, or openings, ranging from the center outward; upon this plate, and through these openings, I place or fasten the cutters by screw-nuts, &c., which reduce and true the tops of the upper set of piles. These cutters are formed and fitted to the chuck-plate as follows viz:—Projecting from a large shoulder into the plate, each cutter has a broad shank to fit into the slot-holes in the chuck, so that it cannot be turned round, but will when loosened, by turning the nut behind the plate, slide out toward the circumference, or in toward the center, that it may be adjusted to the size desired; this broad flat sided shank reaches nearly through the thickness of the plate, and there is made round and a screw-thread cut upon it, for the screw-nut, whereby to fasten it im-

movably to the plate when in use: and the shoulder of the shank resting upon the face of the plate, supports the cutting part of the cutter very firm. All the different cutters hereafter mentioned, are connected to the plates in the same manner as above described, so that the description of this one, will explain the manner of the construction of the connecting parts of all the rest. These cutters projecting out from the plate, are formed in shape and size, according to the work they are intended to perform viz:—The longest cutter shown upon the face of chuck-plate (*s*) and mandrel (*r*) is say fifteen inches long and bent, so as to stand at an angle of about thirty six degrees from the range of the mandrel. This cutter is intended to act first upon the extreme outer edge of the log, and the length and flair of the point is intended to be so far from the center of the plate that it will always reach beyond the outside of the largest log that will ever be used: as the log is moved up to the cutter, it begins to cut its extreme outer edges first, and the chip becomes broader and broader as the log approaches; thus reducing its end upon rather an acute angle for some distance: the log then comes in contact with the second shorter cutter upon the opposite side of the center upon the same plate. The cutting part of this second cutter is nearly right out square from the face of the true horizontal plate, but it has but a very little wood to remove, being that only which the first has left and the cutting edge of the last flairs a grain outward from the shank, that the transverse sill may drive down on to its slight taper and make a fit as close as is possible to execute work.

It will now be seen that these two cutters will leave the end of the log round and for the length of the short cutter, nearly of a size as far as it cuts; beyond that, the long cutter will leave it with quite an acutely sloping shoulder from the cylindrical part out; which form is intended to shed water freely and also to prevent any interference with any uneven surface on the under side of the transverse sleeper.

The third cutter is fitted to the chuck-plate in like manner to the first and at about two inches from the face of the plate the hilt of the cutter is bent at right angles, so as to make its cutting edge parallel with the face of the plate, for the purpose of truing the top of the pile; the shank of this transverse cutter intersects the plate at about five inches from the center, or at a little greater distance than half the diameter of the top of the log; the inner point or end of the cutter reaches within the cutting edges of a three inch auger, which is inserted into the center of the mandrel, to bore the pin hole in the top of the top pile,

which pin confines the transverse sleeper to said pile. This auger reaches beyond the transverse cutter about one foot and has a taper shank to enter a similar hole in the mandrel as is usual in fitting these kinds of tools. Therefore this chuck-plate has fastened upon its face three cutters, and in the center an auger; and when the top pile approaches, which is to be prepared to fit into the under side of the sleeper, the side is tapered for some distance by the first cutter, the part above the taper is rounded upon a very slight taper for about three inches by the second cutter, the top made perfectly flat and true by the transverse cutter and a hole of three inches in diameter bored into the center of the pile one foot deep; and all performed in a few seconds at one operation. After the upper end of the log is thus fitted, it is sawed off to its exact length by being moved endwise upon the carriage C, and rollers (*l l*) under the circular saw (*g*) connected to the roof of the machine. This saw is placed in a saw frame, consisting of two side pieces (*n e n e*) connected together by two cross-bars (*o e*) and is to be so confined by joint-bolts and screw nuts, that it can be taken apart at pleasure.

The end of the frame, opposite the saw is centered upon the inner end of the main driving saw shaft (*a e*) which shaft is supported upon the cross timbers of the roof and reaches from one end of the roof to near the middle of it; between the side pieces of the saw frame, is a fast pulley (*b e*) on the said shaft, to drive the saw at the opposite end of the saw frame, and at the opposite end of the main shaft (*a e*) is a fast and loose pulley (*c e* and *d e*) and a leather, or other belt passing from the first moving power pulley (*r e*) round the above pulley (*c e*) puts this main saw shaft (*a e*) in motion and that the saw, and thus the main shaft answers for the fulcrum of the saw frame. The saw frame is made to descend and rise as required, by means of a tooth rack and pinion (*t e*) one end of which tooth-rack is centered upon the saw frame and the other leading up through a cleat, which allows it to slide up and down and this movement is effected by means of a small pinion wheel made fast to a short iron shaft supported by the aforesaid inner cross-beam of the roof. This shaft has a large hand wheel (*u e*) upon the end opposite the pinion, which hand wheel, has turned pins made fast into the periphery of it to take hold of, and by means of the aforesaid rack and pinion, the saw is moved up and down at pleasure; and when not in use, the driving belt is passed on to the loose pulley (*d e*) on the first mentioned shaft (*a e*) by a slide guide as usual and the motion of the saw stopped; so that the log

resting upon the carriage C, which moves with the utmost ease upon iron rail-ways with the rollers (*h h*) between as before described and also upon the independent grooved rollers (*l l*) can be brought under the saw to be cut off exactly square at any length desired. Thus in the double pile system, after the first pile is driven below the surface of the earth sufficient to make it immovably solid for the use of the road and also its top sufficiently below the surface to prevent decay, then the distance from the top of said pile to the line of the road's grade, is measured by a slide upon a stick, and the top pile being first prepared by the cutters upon the chuck-plate (*s*) and mandril (*v*) and bored as before described, it is then moved under the saw as above set forth and sawed off to the exact length measured by the slide-stick. Now the cutter for pointing, or tapering the lower pile, will be precisely in form and position, like the first described, and the first one may be so used alternately, for both operations; or one may be provided on purpose for each, and placed side by side at the same, or opposite ends of the frame; and thus as the frame is sufficiently wide for two logs, both operations may proceed upon the same carriage and at the same time and sawed to lengths in the like way; but in the case of two logs, there should be a longitudinal rail in the middle of the frame C, to step the inner journals of two sets of grooved rollers like (*l l*) upon; but only half their length, so that each log may be moved endwise, independent of the other.

It may be proper to state that it is intended in all upland piling, where the ground is free from roots &c., not to reduce the log to a point, but to leave, say half of it, square across the center and the rest tapered upon so acute an angle as ten or fifteen degrees, which angle will open and compress the earth firmer about the sides of the pile than the natural earth; and the square center will drive the earth before it in a solid mass, upon which it will rest firmer than upon a point and save thereby the driving of some length of pile, and it being a true taper all around from the center, it will of course incline to be driven in a vertical manner. At the opposite end of the carriage A, from the first described mandrel (*r*) I place a mandrel (*f e*) and chuck plate (*s e*) facing out from the frame. Upon said chuck is placed a cutter which extends out about five inches from the face of the plate: the shank, nut and shoulder are all formed as were the first described, but the cutter is similar to the transverse one which trues the top of the pile, and is in form of a knee. This cutter is placed out from the center of the plate so as to cut just as wide a space in the under side of a

transverse sleeper as in the diameter of the top of a trued pile upon which the sleeper is to rest, say 10 inches; hence the cutter is three inches in diameter fixed in the center straight out from the plate and from thence it is bent at right angles inward and cuts to near the center, the inner end reaching within the cutting parts of an auger which is three inches in diameter fixed in the center of the mandrel like the one at mandrel (*r*) before described. The auger bores a hole nearly through the sleeper of a size exactly corresponding with the one in the top of the pile before mentioned and the cutter cuts a round space of as great a diameter as the top of the trued pile, and if for a single track there must be another mandrel with auger and cutter, exactly like those just described, and placed on a line horizontally with each other, at the same distance apart as the piles are to be placed transversely of the road. Now the transverse sill is placed upon the slide frame (*W, W*), and moved up by the lever (*x*) until the cutters have cut a whole chip all over the interior spaces, while the augers project so far beyond the cutters as to bore nearly through the stick; but the gains for the reception of the track rails having to be cut out thereafter on the opposite side of the sleeper it is not necessary to bore through. If the sleeper was for a double track, then there would be required four mandrels side by side to bore four spaces at the same time and all like the one (*f e*) before described. In this operation the under side of the sleeper is not required to be level, as it only touches within the bored space and the cutters being all upon a straight line, so will be the bottoms of the spaces. In this way I prepare the undersides of the transverse sleepers for one kind of my patented rail road viz:—double pile road with round tenons.

The side frame (*W, W*), above mentioned, consists of two slide pieces (*g e, g e*) of same length, connected to each other by a cross timber (*h e*) notched in and on to the outsides of two uprights (*i e, i e*) which posts are tenoned into the slide pieces (*g e, g e*) first mentioned. These two slide pieces, slide upon the tops of two cross rails (*k e, k e*) and under two others (*l e, l e*): slight gains are cut into the undersides of the top rails (*l e, l e*) which guide the slides transversely. These cross-rails (*k e, l e, &c.*) are a part of the main frame of the carriage.

Near the inner cross rail (*k e*) I place an iron shaft across the main frame and attach the journals of it to the said cross rail (*k e*) in boxes. To the middle of this iron shaft I make fast an arm projecting from the shaft say eight inches; to the outer end of the arm, I center a connecting rod (*m e*) and the other end of said rod I connect to the center of the cross timber (*h e*) of the

slide; there may be if preferred two of these arms and rods, one at each extremity of the slide, to keep it evenly balanced against unequal pressure on the cutters and augers and to the outer end of this iron shaft I fasten a hand lever (*x*) whereby to move said slide out and in. Upon this slide I place the transverse sleepers to be bored upon their under sides as before described; that is, the sleeper is laid upon the slide pieces (*g e, g e*) out against the upright posts (*i e, i e*) and there made fast by a lever, and in that position it is calculated to be central before the cutters and is drawn in to the cutters by means of the lever (*x*).

Section 2nd.—I make a strong carriage, see drawing No. 2 A, which is also to be upon wheels like those at (*d d d d*) No. 1, to fit the road. Upon the left hand end as you look at the drawing at (*a, a*) I fit a strong shaft, to revolve upon its journals in boxes, which boxes are attached to the main frame. Upon this shaft (*a, a*) I make fast metal plates, or they may be hollow drums (*b a*) in positions so as to cut the gains in the sleepers, and to these drums, I fix my cutters whereby to cut out said gains. If there are to be two gains cut upon the same sleeper, then there must be two gangs of cutters like (*b a*) upon the same shaft placed at the exact distance apart that the gains are to be; and if four gains, then four drums as herein set forth at (*b a*). Two cutters cut out the bottom or sole of the notch, and two others cut down the shoulders: the cutting parts of the shoulder cutters are at the outsides, or at the sides next the shoulders, and cut merely at their points. The cross cutters are bent at right angles, one from right to left, the other from left to right and each cutter is long enough transversely, to reach from the shoulder to past the center of the notch, so as to be sure to clear out all the wood in the center. These cutters are placed upon opposite sides of the drum, so that in passing through the wood there is but half the width of the gain cut out at the same instant, and but one shoulder; the points of which shoulder cutters extend from the center a little farther out than the cross cutters, so that the grain of the wood is always cut off before the cross cutters clear the wood or chip between the shoulders; hence it will be seen that the shoulder cutters and cross cutters are alternately, each at opposite sides, so that but one cuts at a time: thus lessening the resistance to action, whereby the shaft may be driven with greater velocity by the same power.

Now upon a slide frame, constructed the same as at (*W, W*) No. 1, and attached at the end of frame A, No. 2, I place the aforesaid transverse sleeper, after the round spaces before described have been bored into

their under sides; but upon the tops of the slide pieces I fasten round plates just of a size to fit close into the spaces so bored out, and upon the tops of these plates the bored spaces rest, touching in no other place: the sleeper is then made fast upon these plates by a lever or other convenient means, and made to pass under the before described cutters on the drum (*b a*) which cut out the gains in the top of the transverse sleeper, and is made to pass by means of a lever &c. the same as at (*x* No. 1): or any regular feed operated by the power may be substituted if preferred. Now it will be seen, when the sleeper has thus passed the cutters, that just according as the space may be between the periphery of the cutters and the top of the round plates upon the slide pieces, upon which the sleeper rests, so will in all instances be the thickness of the wood between the bottom of the gains and the bored spaces. After the sleeper has passed the cutters, then the inner shoulders are to be cut upon a proper bevel by chisels, so that the keys may hold the longitudinal rails fast in said gains, and said chisels may be attached to a crank shaft revolving upon the side timbers of frame A No. 2, just back of the cutters upon drum (*b a*) and driven by a belt, the same as at (*m* and *n* No. 2) or any other mode desired. And the three inch trunnel or pin, which is to be driven in through the sleeper about one foot into the hole in the pile is to serve as the tenon: and for this reason is the top of the pile left so large. Machine No. 2 is also partly for shouldering the tenons upon the tops of the piles after the pile driving machine has graded the tops of the tenons.

The tenoning machine is placed at the right hand end of the frame and consists first, of a strong upright frame about six feet high, consisting of four corner posts (*v v v v*): Upon the tops of the two side ones lengthwise of the carriage, rails (*d, d*) are secured, and a strong rail (*e*) is then notched on to the middle of these two rails. Between these four corner posts, inside of the frame, I make a second light one (*c c c c*) but just to fit close inside of the first. This frame can rise up and down, but cannot move in any other direction independent of the outside one, hence will always conform to the position of the first described; this second frame is suspended by two long screws (*f, f*) and lever-nuts (*g, g*). These screws (*f f*) are made fast to the second and movable frame (*c c c c*) passing up through the center beam (*e*) which is notched down upon the top rails (*d, d*) of the permanent frame (*v v v v*) and the lever nuts (*g g*) turn above washers, whereby to elevate the inside frame (*c c c c*) to any exact grade that may be wanted.

Now within this second frame, I place a third, (*w w w w*) which can slide in the other transversely of the road a distance more than the diameter of the largest piles. In and to this frame I attach two circular saws (*a a*) or there may be four to cut two piles transversely of the road at the same time, stepped at the upper end of the saw shaft, and below near to the saws, in movable boxes, which, by means of set screws we can adjust to any gage desired.

The saw shafts stand in a vertical position and the saws are fastened between screw-nuts and shoulders or collars as usual, being driven by pulleys attached to said saw shafts. The peripheries of these saws are set as wide apart, to cut transversely of the road, as is intended to have the thickness of the tenons; and as the saws wear by use, the set-screws can move them toward each other at pleasure. Immediately in the center between these two saws (*a a*) I place a hollow slide chisel (*k, k*) which cuts all around upon the four sides of the bottom of it, just the size of the tenons and this chisel is centered, by a pin's passing through it and a lever (*l*) near the middle of said chisel: the bottom and top, slides through a fixture which keeps the chisel always in the same vertical position in the slide frame; hence to shoulder the piles, the second described frame (*c c c c*) is raised to the height we wish to bring the shoulder saws, by the screws (*f f*) and nuts (*g g*); then the third or inside frame (*w w w w*) is slipped transversely of the road, until the saws have passed entirely through the pile, drawn back to the gage pointed out by the point (*i*) which is attached to the third frame, to that part of the index (*h*) on the second frame desired, and with the hand, the lever (*l*) is thrust down, which will stamp the chisel (*k*) on to the top of the pile and mark it at least, if not fully form the tenon. This chisel may be formed, with the two sides which split down the two broad sides of the tenons transversely of the road, so wide as to extend beyond the pile both ways, and their bottom or cutting edges may be, say two inches, below the edges that cut or describe the width of the tenons; so that the wood which the shoulder cuttings saws have cut upon two sides of the tenons shall be all removed or loosened. The edges of the chisel which cut longitudinally of the road and which describe the width of the tenon, being two inches shorter than the others, will reach the tenon after the first and thus give the width of the tenon in its exact position; but as the tenons will never be so wide transversely of the road, as the piles, it will be necessary to use a hand tenon saw, to saw up to the mark, or split, made by the lever chisel across them, upon both sides of

the tenon, whereby to remove the surplus wood or width; unless we provide another machine to do this trifling finishing part of them; but it being so slight a work, it will hardly pay for the trouble of providing it, when the tenons are so nearly completed without.

Now it will be seen that the index (*h*) being upon the second frame (*c c c c*) which never moves transversely of the road and the pointer (*i*) being fixed into the third or slide frame (*w w w w*); and allowing that the flanches of the wheels upon which the whole machine moves are close to the inside of the rails, then the whole body of the machine will mark out and decide its own proper course for a straight road; hence by moving the pointer (*i*) to the middle of the index and forcing down the chisel, the whole works and objects of the machines will be accomplished. But if it be desired to turn a curve (the index (*h*) representing degrees and minutes,) the engineer will instruct the workmen how many degrees to move the slide frame before striking the tenon and the operation of turning a curve will be effected as easily as the straight part and with as great expedition; to this end I should apply set-screws to the boxes of the road wheel axles to throw them into the plane of the radii of the circle intended to be run, which would allow in all parts of the road a closer fit of the flanches to the rails than otherwise. But when constructing a road upon permanent piles, each is but one piece and it is desired to form round tops with pin tenons as in the double pile system; then after the pile grading saws have sawed off said piles at their proper heights two mandrils in a vertical position with cutters and augers (as at mandrel (*r*), plate (*s*), Drawing No. 1) may be placed at their proper distance apart transversely of the road, in the above slide frame (*w w w w*) No. 2, in lieu of the shoulder saws and thus form round tenons or tops for the bored sleepers to rest upon to be fastened down by the round three inch pins as in that case described.

On the same ground floor frame with the above described machine No. 2 is a pin splitting machine operated by power and made in the following manner, viz, upon the frame A are fastened two strong planks, standing edgewise; these planks are bolted on to transverse pieces, the ends of which should be let into said planks a short distance for their better security against being moved out of place by the power to be applied. At the end (*o o*) is formed a strong box to contain the blocks of pin wood; the length of which box is just about that of the pins and into which the blocks are placed, to be split in clefts as thick as are to be the pins in their

finish. There is a movable bottom (*x*) in this box (see B, No. 2, where it is shown in section) upon which the pin block (*y*) rests, and this bottom is supported upon an upright, centered upon the long lever (*p*) the opposite end of which lever is the fulcrum of its motion, and there fixed upon a center shaft. Between this fulcrum and the other end and but a short distance from the fulcrum, is placed a cam-shaft to which is made fast a cam (*q*) and ratchet wheel (*r*). The rise upon the cam is equal in the same distance of revolution from its commencement to its termination and the periphery of the ratchet wheel is divided off into notches or teeth equi distant from each other; and upon this ratchet wheel rides a hand-catch (*u*) which hand-catch is attached to the shackle-bar or crank rod (*t*) so that as often as the crank (*n*) makes a revolution the hand-catch (*u*) moves forward and takes a notch and returns; which moves the cam the distance of one notch and that elevates the lever (*p*) just the thickness of the pin and raises the pin block (*y*) that much above the top of the box, and the pawl (*s*) holding it, the chisel (*m*) on its return splits off the cleft. The hand (*u*) moves considerable farther than the actual distance between the notches upon the ratchet wheel (*r*) hence the chisel is withdrawn from over the block before it rises. Now this chisel (*m*) is fitted into a sliding rod (*z z*) like that which governs the common steam piston rods. It moves in parallel guides and with as much power as desired. Nearly all these movements last described, when in place, are out of sight between the planks below (*m, n*) the crank shaft (1) and the pulley (2) by which the crank shaft is driven. When the block is split into clefts they are put into the box again with their widths up and down and then the chisel splits them into squares by the same operation as at first.

The next operation is, after a quantity is thus prepared; to remove the wide chisel (*m*) and put in its place a round steel pin, with a square end in front, having two starts, projecting from the end of the pin, say half an inch. These two starts are to be placed near the circumference of the rod or pin parallel to each other, and to reach across the pin parallel with the diameter, at the place where they are inserted or attached. These starts will have rather blunt edges and be of considerable thickness at the face of the pin, the object of which is to split the wooden pin in two places for the reception of the wedges; as after these pins are driven through the sleepers into the piles, they are to be made more secure by the two wedges. Now upon the top of the box (*o o*) may be fitted an iron plate, lying horizontally so attached to the box, that it can

be removed with ease, and yet very secure when there. Projecting upward say three inches and diverging from the plate a little, are two iron guides, between which the square pin is to lie: they are to range fore and aft, directly before the sides of the piston pin; and to the plate may be attached a strong round steel tube, connected to the said plate by nearly the whole length of the under side: and the end of the tube next the piston-pin may be tolerable sharp all around but thick and blunt at the edge, the bevel from the cutting part being all outward; the inside of this tube should be the exact size of the pins and a very little the smallest at the cutting end. Now when the pins are laid between the two diverging guides above mentioned, the piston-pin will force the pin through the tube, which will remove the corners and round it; and it is then prepared to be driven into the sleeper and pile, with the splits in the pins all ready for the reception of the wedges, thus making it a complete operation; or if preferred it may be done in any other way.

When the road is made upon piles in one piece, and the tenons made upon the tops of the piles, the ratchet wheel (*r*) upon the cam shaft will be replaced by another with the teeth or notches nearer together, to reduce their size to that of the draw-bore pins for said sleepers and tenons.

Section 3rd.—I use pile drivers for driving piles, for the foundation of the different kinds of rail roads that I have patented and others, connected to which pile driver are circular saws for sawing off the tops of the piles after they are driven, upon an exact horizontal line transversely with each other and upon the line of the grade of the road. To effect this object, I first make a strong frame, the joinings of which are to be held together by joint bolts. This frame is mounted upon small, but strong wheels (*m m m m* Drawing No. 3) and the pile driver is to keep in advance of all the other machines; these wheels running upon temporary shifting rails. Said frame is made sufficiently long to contain the boiler and engine and four rams when desired and in the after part of the frame of said pile driver I place the boiler and engine to do the work. The general outline of the frame, is constructed upon the usual principles; except being longer, stronger and having more timbers and braces &c. The ram (*g*) and mode of catching and dropping it from the follower (*k*) are not new, nor is it necessary to describe these parts, as every interested person is familiar with them; but in several respects I have made improvements, by combining movements, which I deem new and useful for my present application and use and these additions and improvements are

as follows viz: To the frame of each ram there is, first a drum (*e*) to wind the rope (*f*) upon, which raises the ram (*g*). On one end of this drum (*e*) is a spur wheel (*d*) say about twice the diameter of the drum: Second, there is a pinion shaft (*c*) with a pinion (*c*) upon it, which meshes into the large wheel (*d*) upon the drum (*e*) and a fast pulley (*n*) upon the other end of the shaft, and this pulley (*n*) is in lieu of the usual hand cranks; but the pinion (*c*) and large wheel (*d*) are common. At the end of the pinion shaft opposite to the pulley is a turned handle (*b*) loose upon the shaft, so that the shaft may revolve inside the handle, while it is stationary in the hand. This handle projects say six inches outside the frame and is intended to put the pinion (*c*) in and out of gear with the wheel (*d*) at pleasure. When in gear it will raise the ram, but when out, the ram will fall, for the drum (*e*) on which the rope is wound, revolves with perfect freedom on its own journals. Now these two shafts, that is drum and pinion shafts are formed as usual, with this exception.

The pinion shaft (*c*) is turned, the whole length of it between the journals on which it revolves and finished up smooth, upon this I place a wooden cylinder (*a*) of say six inches diameter, turned straight its whole length with flanches upon the ends to prevent the rope from running off of it. This cylinder revolves entirely free upon the pinion shaft and is intended for the rope (*f*) to travel over, without injury to itself, whereby to hold the pinion (*c*) in gear with the large wheel (*d*) while the ram is suspended upon the rope. This pinion shaft (*c*) and cylinder (*a*) lie back of the drum (*e*) and a little above it, say thirty degrees; now the rope (*f*) passing over or back of the loose cylinder (*a*) upon the pinion shaft (*c*) and winding up upon the drum (*e*) by means of the pinion wheel (*c*) gearing into the large wheel (*d*) which is connected to the drum (*e*) the weight of the ram (*g*) upon said rope (*f*) pressing against the cylinder (*a*) holds said pinion wheel (*c*) in gear; but the instant the ram drops and the weight is taken off of the rope, the pinion (*c*) is thrust back out of gear, by means of a spring (*i*) which presses against the end of the slide-box (*h*) in which the pinion journal revolves and with sufficient force to ungear it. This slide-box (*h*) will slide just far enough to put the pinion in and out of gear; the box being placed between iron plates for that purpose it slides easy, the opposite box being made to yield to it; and the person tending the machine, when he is desirous of raising the ram, will take hold of the handle (*b*) and throw the pinion into gear, holding it so, until the ram is suspended-

ed upon the rope; then he can let go and as soon as the ram drops, the pinion is by means of the spring (*i*) thrown out of gear, which leaves the drum (*e*) to revolve freely upon its own journals, while the weight of the follower (*h*) will cause the rope to unwind and the follower to descend, to again catch the ram and so on. The pinion shaft is centered, or placed above the level of the other, to reduce the force of action the rope would have upon the cylinder (*a*) were they both upon the same level, deeming the weight at that angle sufficient to hold the pinion in gear. The band which drives the pulley (*n*) should run vertically, as then it would not hinder the play of the slide box.

The journals of the wheels upon which the pile driver moves, are placed under iron boxes, which can move for a certain distance up and down in the frame. Iron straps, as at (*y y* No. 1) are bolted on to the side timbers to which the journals are attached; these straps reach a little above the top of the side timber and connecting across, are bolted on to the inside of the same timber. Between the iron strap above the timber, and the timber itself, I fit a wooden wedge, or key, to fill the space, or in lieu of the wedge, it may be a lever attached to the frame. Now when the key is in place, the top of the journal box will be thrust down, even with the top of the timber and of course the under periphery of the wheel as much below the rails as nearly all the movement made by the thickness of the key, all things being so adjusted for that purpose. When the key is out, the box and axle in it rise, and the frame falls upon the road; hence by placing a lever over the road-rail and under the frame to raise it up, the wedge can be put in to keep the box down and by doing so all around at the same time, the machine will rest only upon the wheels to be moved at pleasure. Thus it can be resting upon its wheels, or upon the whole length of the frame upon the road to keep it steady as desired. Upon all inclining grades of the road, this or some other similar contrivance may be useful to prevent the pile driver's moving while at work.

I make the guides (*l l* No. 3) which govern the movement of the ram, somewhat longer than the whole hoist of the ram and so constructed that they can be moved up and down between the two outside jaws or strips of timber which secure the guides (*l l*) in position, so as to protect, or keep the ram in place, when it is necessary to drop below the bottom of the frame, but which operation may only be necessary when driving the lower piles in constructing the double pile road.

I place an independent frame (A No. 3) (also shown in its place colored blue) in the

center of the front end of the pile driver 65 and in the middle between the four rams. This small light frame is so placed in the main frame, that it can be moved up and down by means of an upright screw shaft (*d*) fastened in and to the center of said 70 movable frame (A); which screw passes up through a bridge tree or beam (*e h*) which beam rests upon and is attached to the upper permanent longitudinal rails of the frame of the pile driver; a washer is placed 75 under the lever nut (*f*) which lever nut being turned around will raise or depress the frame (A) and all attached to it in a perpendicular manner to any exact gage desired, and upon whatever inclination the 80 road is, so will be that of this slide frame A. To this frame I attach the circular saws (*o, o*) for sawing off the piles after they are driven. These saws (*o, o*) are placed at the extremities of a beam (*g*) wide, but thin— 85 wide, that it may have strength laterally and horizontally;—and to secure proper strength vertically, I bolt two wide pieces (*h, h*) reaching from near the center, to near the extremities, leaving room only for 90 pulleys and saws (*o, o*) beyond their ends. Upon the tops of these upright center pieces (*h, h*) I place flat thin pieces (*i i*) parallel with the first (*g*) and extend their ends out as far as the bottom piece. Between the 95 ends of these two pieces (*g* and *i*) one being directly above the other, the boxes for the journals of the circular saws are attached. I step a strong upright shaft (*m*) in the center of this frame (A), the lower end of 100 which shaft is turned a little smaller than above, leaving a shoulder: this smaller end passes down through the center of the under and first described saw beam or lever (*g*), with a strong screw nut underneath to con- 105 fine the saw beam or lever firmly between it and the shoulder: I also put in a feather, or key, to prevent the shafts turning in the saw lever. At about four and a half feet above these saws I make fast to this shaft 110 (*m*) a large, but light bevel-gear wheel (*n*) or a segment of one. I then make a crank shaft (*p*) and attach a small bevel-pinion (*q*) to one end, so as to gear into the wheel (*n*). To the opposite end I attach the hand 115 crank (*r*) with a pretty long shank, and range the shank-shaft (*p*) fore and aft with the pile driver. The crank being a little flush of the front of the frame, a man standing upon the platform, can govern the feed 120 of the saws at pleasure. If four piles are driven, then by putting the saw upon one end of the saw beam, up to one pile, the opposite end and saw will also be in contact with the other, at the diagonal corner of the 125 track, and when sawed off, change the saw-beam (*g*) and they will cut off the two at the opposite diagonal corners, the four piles

forming the four corners of a square, or of a parallelogram; and as soon as all are cut, the saw will then be thrown to range in the center of the frame, by the crank turning the pinion which meshes into the wheel connected to the upright saw lever shaft:—and as the upright saw shaft (*m*) is stepped in the frame A, and said frame being supported under the bridge tree (*e k*) by the screw shaft (*d*) and lever-nut (*f*) the saws can be adjusted with the nicest accuracy. These saws grade the piles at the line of the tops of the tenons, but in the double pile system they are not used at all. At the bottom of the upright shaft to which the saws are attached, I put on a set of pulleys (*a, a, a*) all attached and move together as one: the upper one is driven by the main power with a strong wide belt: this turns the other two: a belt leads each way from each driving pulley (*a*) to each saw pulley (*b*) and drives them alike, and there may be tightening pulleys applied with ease if desired. Thus it will be seen, that this machine precedes all the others, and is moved forward upon temporary movable or shifting rails, so constructed, that the rails are of themselves the exact measurement for the distance of the piles apart longitudinally, and causes the machine to stop at the proper point without measuring the ground, and that after the piles have been driven by the pile driver, they will then be sawed off upon the exact line of the grade of the road.

All these machines are operated by steam, or other locomotive power placed upon the road; some of the carriages herein described, have the power within themselves, No. 3 in particular, to serve as a counter-balance to the rams &c. Cars with proper tools, smith's forges &c., &c., for repairs, and also for all hands to live, cook and sleep within, are also placed upon the road and kept up to the work, and all the machines are to be sheltered from the weather by slight roofs covered with india rubber cloth.

It should be understood that in changing the grade of the road from one inclination to another, that it is provided for in the movable axles in addition to the screw frame, that is by depressing the front axle an inch below the hind one, it would raise the frame and saws as much and in the exact inclination which that rise would produce, and vice versa. If the grade was to be changed from a level to a down grade the hind wheels would be depressed which would of course raise the hind end of the frame that much, and thereby throw the saws into an inclination as desired, upon the down grade, and thus it will be seen that after the whole machine has advanced upon the grade, its length, or for the distance the wheels are apart. That then the axles will be equalized

in their positions of elevation in the frame, by means of the before described wedges or levers, and then the whole frame and all attached to it, but especially alluding to the saws for grading the tops of the piles, will be ranged exactly upon the line of grade thus first set to. In the before described machines,

I claim as my invention and desire to secure by Letters Patent, the following viz.

1. In the machine described in section first, and represented in Drawing No. 1, I claim the combination of the three frames for receiving and regulating the position of the logs, and in combination therewith the skids and windlass for raising the logs on to the upper carriages.

2. I also claim in combination therewith the saw, for cutting off the logs or piles, and the mandrel and chuck-plate with its cutters augers &c, for rounding truing &c the tops of the piles.

3. And I also further claim the combined mandrel chuck plate and cutters for boring the under sides of the transverse sleepers, in combination with the sliding frame upon which the sleepers are placed to be bored, the whole being constructed in manner substantially as herein described.

4. In the machine described in section second, and represented in Drawing No. 2, I claim the combination of the three frames *v, v, v, v,—w, w, w, w,* and *c, c, c, c,* having screws (*f, f,*) and gage *h* and *i* and in combination therewith the tenon shoulder saws—and also in combination with the tenon shoulder saws, the chisel for marking or cutting the tenons.

5. I claim in combination with the combined frame above claimed, the combined mandrel (*r,*) chuck plate and cutters described in section 1st and represented in Drawing No. 1, to be placed in the slide frame *w, w, w, w,—*the arrangement of the cutters for cutting the gains in the transverse sleepers in combination with the slide frame for receiving the sleepers.

6. I lastly claim in the pin splitting machine the combination of the lever *p,* operating substantially as herein described with the chisel, the whole being constructed in manner substantially as herein described.

7. In the machine described in section third and represented in Drawing No. 3, I claim the combination of the pile drivers with the saws for cutting off the piles, the mode herein described of gaging the saws, so as to cut off the piles to the required grade, the movable boxes in which the journals of the road wheel axles work whereby the whole machine may be made to move, and rest upon the wheels, or upon the whole length of the frame, while at work, by means of the wedges or levers as herein described. The

slide jaws which govern the drop or hoist of the ram.

8. And lastly I claim the combination of the slide pinion shaft whereby to connect
5 the power to the drum to hoist or drop the ram, the loose pulley upon said shaft, the loose handle, the spring slide box which

throws the pinion out of gear—and the drum wheel, the whole being constructed substantially as herein described.

JAMES STIMPSON.

Witnesses:

CHS. M. KELLER,
D. A. DABOLL.