(12) **United States Patent**
Willard

(10) **Patent No.: X9816**
(45) **Date of Patent: Jun. 30, 1836**

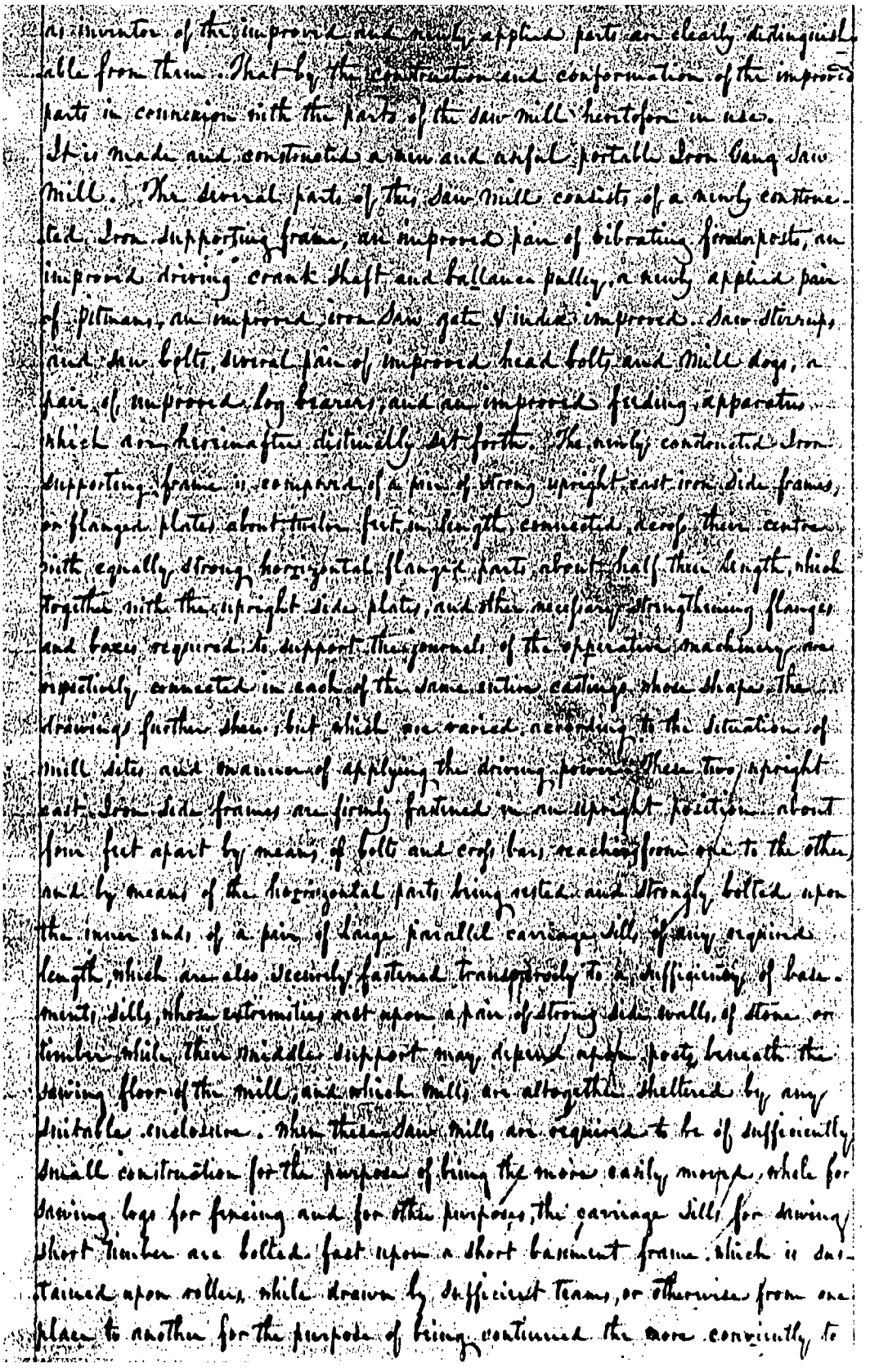
(54) **SAW MILLS**

(76) Inventor: **Simon Willard**

Simon Willard, of New-York.
Letters Patent

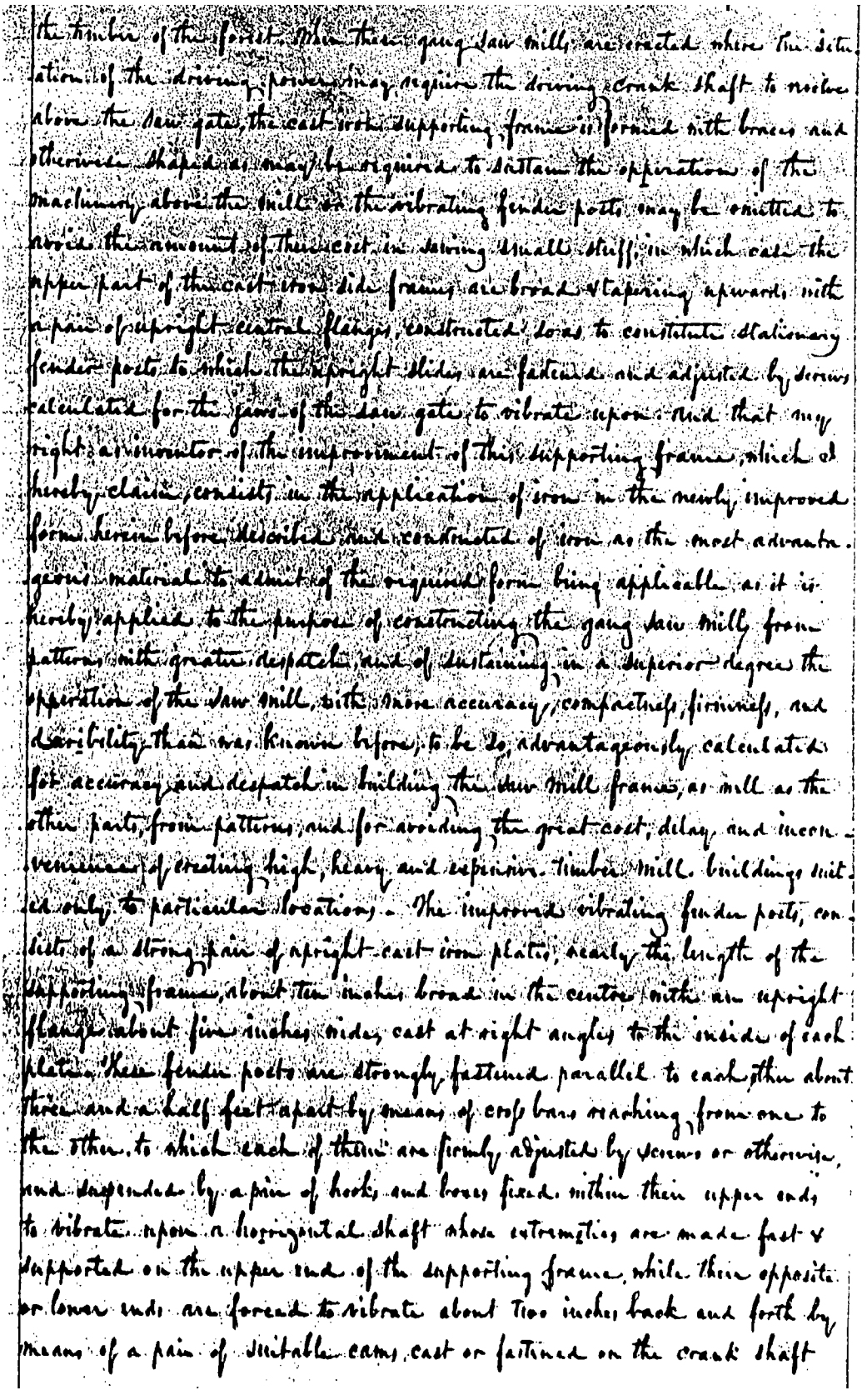
The Schedule referred to in these Letters Patent, and making a part of the same, containing a description in the words of the said Simon Willard himself, of his improvement in the Portable Iron Gang Saw Mill.

To all to whom these presents shall come: Be it known that I Simon Willard of the City and State of New-York have invented or discovered a new and useful improvement in the construction of a portable Iron Gang Saw-mill; or that I have invented several new and useful improvements in Saw Mill machinery, by which the saw-mill is easily convertable from the Gang Mill to a single Saw-mill, & from the single mill to a gang with any required number of saws; and adjustable with great accuracy and despatch, and by which improvements the Saw-Mill is also rendered portable in regular parts, or whole when made small by means of the several improved forms of Iron newly applied to this purpose, which being bolted together make and constitute the entire Saw-Mill with more accuracy, compactness, firmness, durability & despatch than was known before. And when a pair of these mills are constructed for operation in the same building, they are calculated that with sufficient power to drive one at a time, while the log is being prepared upon the carriage of the other mill is all that is wanted for the use of both mills, by sawing an entire log one way at once, passing through one gang and then sawing it the other way by passing it through the other gang to which the motive power is readily shifted for that purpose, and while the former mill is stopped to remove the sawed Timber, and to fix another log upon the carriage thus by driving first one mill and then the other by the same propelling power, will be a saving of expense in the engine and fuel ordinarily used. And that this specification may contain a full and clear description of the construction, mode of operation and advantages of this Iron Gang Saw Mill, also includes for a more clear understanding of the said improvements, certain motions and parts of the Saw Mill heretofore known, but which I have designated so that my claim



as invention of the improved and newly applied parts are clearly distinguishable from them. That by the construction and conformation of the improved parts in connexion with the parts of the saw mill hereto for in use.

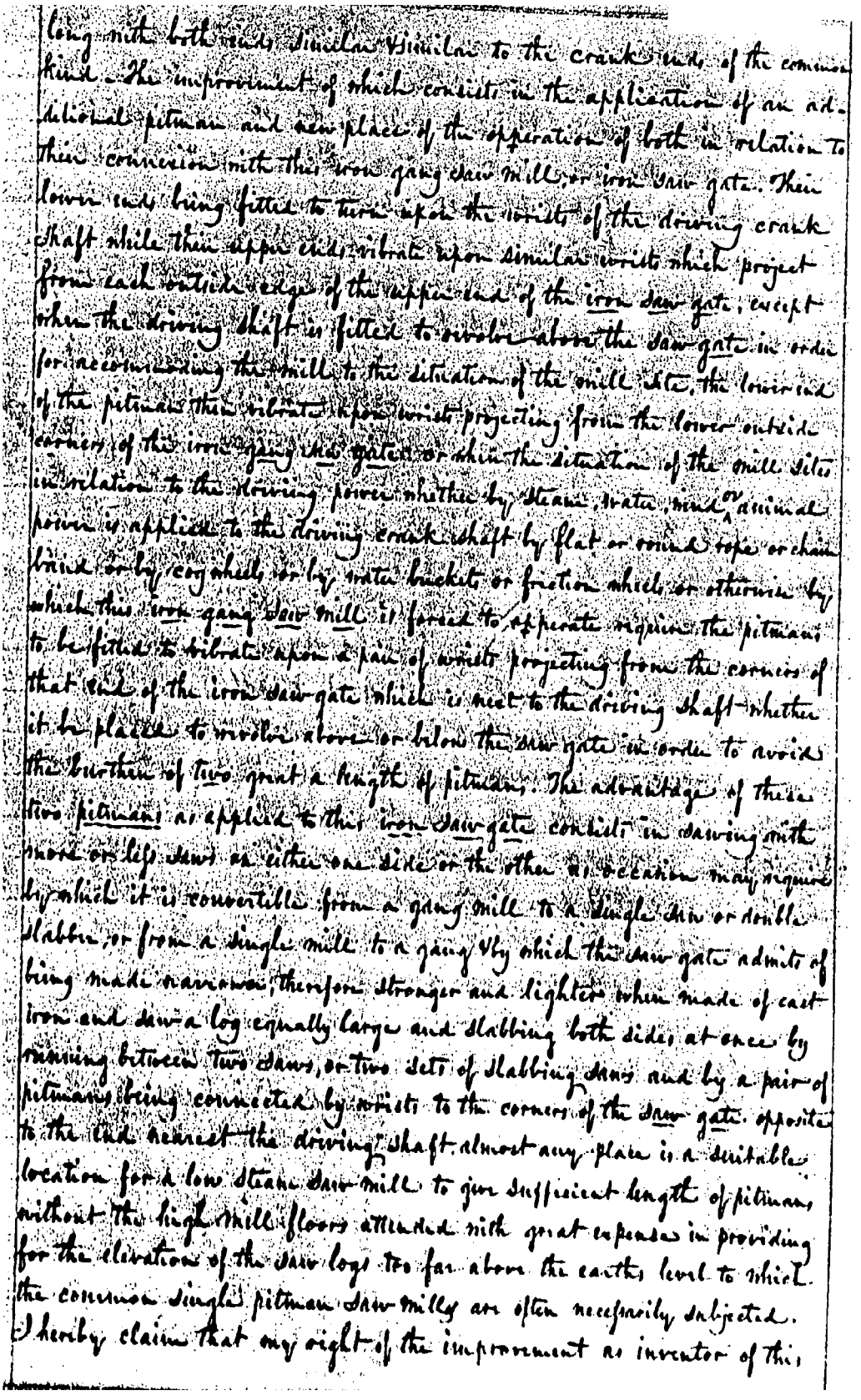
It is made and constructed a plain and useful portable Iron Gang Saw Mill. The several parts of this Saw Mill consists of a newly constructed Iron supporting frame, an improved pair of vibrating frame posts, an improved driving crank shaft and ballance pulley, a newly applied pair of pitmans, an improved iron Saw gate & index improved Saw stirrups and saw bolts, several pair of improved head bolts and Mill dogs, a pair of improved log bearers, and an improved folding apparatus which are hereinafter distinctly set forth. The newly constructed Iron supporting frame is composed of a pair of strong upright cast iron side frames, or flanged plates about twelve feet in length, connected deep, their centre with equally strong horizontal flanged parts about half their length, which together with the upright side plates, and other necessary strengthening flanges and bases required to support the journals of the operative machinery are respectively connected in each of the same sides castings, shown shape. The drawings further show, but which are varied according to the situation of mill sites and manner of applying the driving power. These two upright cast Iron side frames are firmly fastened in an upright position about four feet apart by means of bolts and cross bars reaching from one to the other and by means of the horizontal parts being rested and strongly bolted upon the inner ends of a pair of large parallel carriage sills of any required length, which are also securely fastened transversely to a sufficiency of basement sills, whose extremities rest upon a pair of strong side walls of stone or timber while their middles support may depend upon posts beneath the sawing floor of the mill, and which mill is altogether sheltered by any suitable enclosure. When these Saw Mills are required to be of sufficiently small construction for the purpose of being the more easily moved, whole for sawing logs for fencing and for other purposes, the carriage sills for sawing short timber are bolted fast upon a short basement frame which is sustained upon rollers, while drawn by sufficient teams, or otherwise from one place to another for the purpose of being continued the more conveniently to



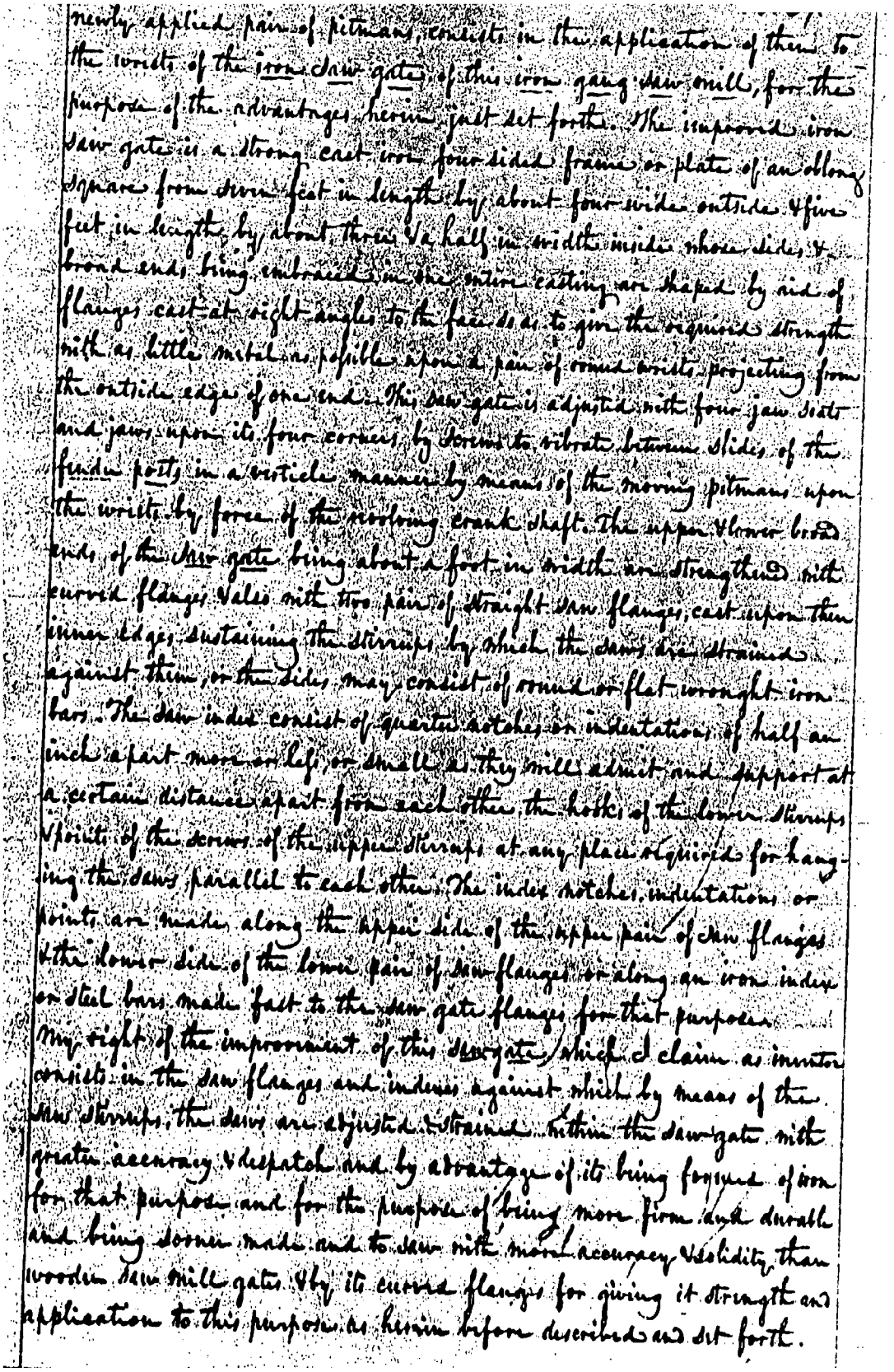
the timber of the forest. When these gang saw mills are erected where the situation of the driving power may require the driving crank shaft to revolve above the saw gate, the cast iron supporting frame is formed with braces and otherwise shaped as may be required to sustain the operation of the machinery above the mill: or the vibrating fender posts may be omitted to obviate the inconvenience of these cast iron braces when small stuff is to be sawed, in which case the upper part of the cast iron side frames are broad & tapering upwards with a pair of upright central flanges, constructed so as to constitute stationary fender posts to which the upright slides are fastened and adjusted by screws calculated for the jaws of the saw gate to vibrate upon. And that my right as inventor of the improvement of this supporting frame, which I hereby claim, consists in the application of iron in the newly improved form herein before described, and constructed of iron as the most advantageous material to admit of the required form being applicable as it is hereby applied to the purpose of constructing the gang saw mill frame patterns with greater despatch, and of sustaining in a superior degree the operation of the saw mill, with more accuracy, compactness, firmness, and durability than was known before, to be so advantageously calculated for accuracy and despatch in building the saw mill frames, as well as the other parts, from patterns, and for avoiding the great cost, delay, and inconveniences of erecting high, heavy and expensive timber mill buildings suited only to particular locations. The improved vibrating fender posts, consists of a strong pair of upright cast iron plates, nearly the length of the supporting frame, about two inches broad in the centre with an upright flange about five inches wider cast at right angles to the insides of each plate. These fender posts are strongly fastened parallel to each other about three and a half feet apart by means of cross bars reaching from one to the other, to which each of them are firmly adjusted by screws or otherwise, and suspended by a pair of hooks and bows fixed within their upper ends to vibrate upon a horizontal shaft whose extremities are made fast & supported on the upper end of the supporting frame, while their opposite or lower ends are forced to vibrate about Two inches back and forth by means of a pair of suitable cams cast or fastened on the crank shaft

neat to its main journal, which carry revolves within a pair of cam yokes fastened to the lower end of the finder posts, or they are fastened to the upper end when the driving power is applied above, so as to be opposite to the axis upon which they vibrate. The upright flanges of these finder posts projecting towards each other, constitute the vertical slides upon which the adjusted jaws of the saw gate slide up & down when the mill is in operation, or other slides are bolted to them for that purpose. The object of the vibration of these finder posts, as just described for which I claim my right as inventor, consists in the advantage of shoving down by withdrawing the saws, thereby clearing the inserted timber of saw dust &c.

The improved driving crank shaft is a strong horizontal iron shaft about five inches in diameter four feet long more or less with a crank on each end ten or twelve inches in length more or less with a round wrist on each one driving within the brass of a pair of pitmans, the journals of this crank shaft are next to the cranks and adjusted to revolve within a pair of strong iron cast or firmly adjusted in the lower ends of the supporting frames a large square thick supporter is cast upon the crank shaft upon which the balance pulley is fastened, a neat of addized pullies are also fastened or cast upon the crank shaft around which a running band is forced to drive the feeding apparatus. The cams fitted to revolve within their respective cam yokes are also cast upon the crank shaft, by which the finder posts are forced to vibrate at every vibration of the vertical saws. The improved balance pulley, four and a half feet in diameter more or less, is a broad rim cast iron wheel weighing about one thousand pounds, whose eye of the hub being sufficiently large is passed over the crank, and keyed fast to the hub supporter, and which is forced to revolve between one & two hundred times per minute by means of a broad flat band in width equal to its rim being about eighteen inches upon which it runs connecting with it the motion of the power drum of any sufficient power by which the saw mill is forced into operation. A weight is cast or bolted upon that side of the balance pulley which is opposite to the crank, sufficient to balance the saw gate and other appendages vibrating by their connection with the motion of the pitmans. The newly applied pair of pitmans are about ten feet



long with both ends similar similar to the crank ends of the common kind. The improvement of which consists in the application of an additional pitman and new places of the operation of both in relation to their connection with the iron gang saw mill, or iron saw gate. Their lower ends being fitted to turn upon the wrists of the driving crank shaft while their upper ends vibrate upon similar wrists which project from each outside edge of the upper end of the iron saw gate, except when the driving shaft is fitted to revolve above the saw gate in order for accommodating the mill to the situation of the mill site. The lower end of the pitmans thus vibrate upon wrists projecting from the lower outside corners of this iron gang saw gate, or when the situation of the mill site in relation to the driving power whether by steam, water, wind or animal power is applied to the driving crank shaft by flat or round rope or chain band or by cog wheels or by water buckets or friction wheels or otherwise by which this iron gang saw mill is forced to operate requires the pitmans to be fitted to vibrate upon a pair of wrists projecting from the corners of that end of the iron saw gate which is next to the driving shaft whether it be placed to revolve above or below the saw gate in order to avoid the burthen of two great a length of pitmans. The advantage of these two pitmans as applied to this iron saw gate consists in sawing with more or less saws on either one side or the other as occasion may require by which it is convertible from a gang mill to a single saw or double slabber, or from a single mill to a gang by which the saw gate admits of being made narrower, therefore stronger and lighter when made of cast iron and saw a log equally large and slabbing both sides at once by running between two saws, or two sets of slabbing saws and by a pair of pitmans being connected by wrists to the corners of the saw gate opposite to the end nearest the driving shaft almost any place is a suitable location for a low steam saw mill to give sufficient length of pitmans without the high mill floors attended with great expenses in providing for the elevation of the saw logs too far above the earths level to which the common single pitman saw mills are often necessarily subjected. I hereby claim that my right of the improvement as inventor of this



newly applied pair of pitmans, consists in the application of them to the wrists of the iron saw gates of this iron gang saw mill, for the purpose of the advantages herein fully set forth. The improved iron saw gate is a strong cast iron four sided frame or plate of an oblong square form seven feet in length by about four wide outside & five feet in length by about three & a half in width inside whose sides & broad ends being embraced in the mould cast, are shaped by aid of flanges cast at right angles to the face of it so as to give the required strength with as little metal as possible upon a pair of round wrists projecting from the outside edges of one end. This saw gate is adjusted with four jaw slides and jaws upon its four corners by screws to vibrate between slides of the frame post in a vertical manner by means of the moving pitmans upon the wrists by force of the revolving crank shaft. The upper & lower broad ends of the saw gate being about a foot in width are strengthened with curved flanges & also with two pair of straight saw flanges cast upon their inner edges sustaining the stirrups by which the saws are strained against them, or the sides may consist of round or flat wrought iron bars. The saw index consist of quarter notches or indentations of half an inch apart more or less, or small as they will admit and support at a certain distance apart from each other the hooks of the lower stirrups & points of the corners of the upper stirrups at any place required for hanging the saws parallel to each other. The index notches, indentations or points are made along the upper side of the upper pair of saw flanges & the lower side of the lower pair of saw flanges or along an iron index or steel bars made fast to the saw gate flanges for that purpose. My right of the improvement of this saw gate which I claim as inventor consists in the saw flanges and indexes against which by means of the saw stirrups, the saws are adjusted & strained within the saw gate with greater accuracy & despatch and by advantage of its being forged of iron for that purpose and for the purpose of being more firm, & more durable and being sooner made and to saw with more accuracy & solidity than wooden saw mill gates & by its curved flanges for giving it strength and application to this purpose as herein before described and set forth.

The improved saw stirrup, consists of one pair for straining each saw. The upper one being a screw stirrup and the lower a hooked stirrup. These stirrups are made of strong cast or wrought iron whose outside is about six by seven inches square with their interior openings about three by four inches square & about one inch and three eighths thick with openings between the screws and the hooks of the stirrups about three fourths of an inch wide, or just wide enough to admit the thickness of the broad ends of the saw gate and to slide along upon the saw flanges, also another nicely adjusted narrow opening is made just wide enough to admit the thickness of the saw & saw bolt so that when each saw is strained it is directed in the course of its saw, for the purpose of dispensing with the wedges ordinarily used in adjusting saw mill saws. A pair of strong three quarter upright screws pass through the upper parts of the screw stirrups with a square end to each by which they are turned by a socket wrench on each side of the saw gate above the flanges and terminating their nicely rounded steel points upon the wedges above while the hooks of the lower stirrup presses up against the lower wedge by which the saws are strained within the saw gate as required for use. The drawing and differences further explain the form of these stirrups. I hereby claim any right as inventor of these new and useful saw stirrups as constructed and applied to this purpose herein set forth, being of superior advantage in adjusting and straining one or more or all the saws along the wedges of the saw gate flanges with great accuracy and despatch. The improved saw bolts are of an ell form as the drawings show about three fourths of an inch in diameter, and the same in length three or more are riveted fast in each end of the saw with the elbow or other parts extending back to reach against the inside back part of the stirrups by which the saws are strung over as required. The advantage of these right angled bolts is in their form and application to this iron gang saw mill, so that the saws can be taken out and put in without taking the bolts out of the saws, by which the saws are adjusted with despatch. The improved head blocks consisting of two pair of different construction calculated for holding fast the mill dogs by which the logs or large timber are securely held while sawing into

various small dimensions. The head blocks are about two feet in width with length sufficient to extend horizontally across the carriage to which they are fastened when required. One pair is calculated for the mill dogs to be forced by screws into the round log so as to hold each intended small piece fast at each end while they are severally sawed from end to end by a gang of any number of saws required to saw the entire log at once, the outer parts into two slabs and more or less weighney planks into a flat shape or more or less flat parts ready to be sawed the other way into square timber or square edged plank. The pair of head blocks consist of an upper and lower cast iron flanged plate with half inch grooves cast transversely across their inside within which the shanks of the mill dogs are driven against their shoulders and held in by bolts passing through them or otherwise. These saw mill dogs are half inch iron plates three eighth inches wide by about two feet in length projecting between the saws about half their length while the mill dogs of the screw head block are about one foot in length the same thickness and nearly the same width. The moving part of the screw head blocks consisting of the two plates between which the short mill dogs are driven fast in grooves and is forced about six inches more or less back & forth by means of a large pair of horizontal screws which are turned within a pair of screw nuts fastened on the outer back edge of another similar horizontal cast iron flanged plate bolted fast & stationary upon the end of the carriage. While the moving part of this stationary or screw head blocks is forced forward by the large screws to drive the mill dogs into both ends of the log it is kept down beneath a pair of horizontal slides adjusted at each end of it above projections which extend from each outer lower corner. each end of these slides are screwed fast upon the upper end of four bolts which extend through the corners of the stationary part of this head block & through the carriage to hold all fast together, while the saw head blocks which is moveable along the carriage to suit the various lengths of the logs is also bolted or made fast to secure the log at both ends while sawing between the teeth of the mill dogs whose upper sides are flat & may constitute the horizontal bearings upon which the timber is sustained

while sawing. Another pair of these head blocks, which are also calculated for supporting the log while sawing by this gang mill are both constructed for the purpose of sawing the timber previously flattened upon the other mill, while the ends of the log rest upon the ends of hard seasoned wooden bearings projecting forward which form either square apertures or pigeon holes cast in them. They consist of two plates somewhat like those described in the first head blocks, cast with the partition by which they are connected in the same casting together with a pair of upright flanges with suitable holes made through them, through which horizontal mill dogs are drawn by the mill bar into the ends of the log by which it is held till sawed. These mill dogs are round with a sharp round hollow in the ends of sufficient size, or may be square. The other third pair of these head blocks being calculated to extend across the carriage and carry the log or timber to be sawed between two set of slabbing saws so that only one small slab from two or three inches plank may be sawed off each side of the log at once running it through between the two sets of said saws for this purpose the cast iron part of this pair of head blocks are thick horizontal plates about ten inches square & bolted stationarily upon the wood part of the head blocks. From two opposite edges of these plates a pair of upright sides about five inches with dove tails for broad sliding mill dogs to slide in back & forth when driven in the end of the log by the mill bar. By this form of these head blocks the timber is fastened upon the carriage which may or may not be sufficiently narrow to pass with the log between the two sets of saws for the purpose of squaring round timber. For the purpose of moving the log along the head blocks in sawing thin stuff with one or more saws. The horizontal plate of these head blocks terminate at their front and back edge with a little more than a half round hollow projecting from their inner edge sufficient to keep them down while forced by rack and pinion to slide along a pair of rounded edge slides bolted upon the timbers of the head blocks below for that purpose to which a rack is fixed & forced by a pinion fixed upon a transverse horizontal shaft beneath to which an index or ratchet wheel is attached by which by crank or lever. The log is forced to move along the head block and become accurately adjusted by the index to any required thickness of boards, or other size timber. These square stationary plates are secured fast by bolts passing downwards through them

and through thick pieces of plank let[illegible] with rabbited ends across upon the carriage and through similar pieces of plank which catch beneath the carriage or otherwise, these plates with the other upright and round mill dogs may be bolted upon the timber head blocks of common form. The great advantage of the first and second described pair of these new and useful head blocks & mill dogs, in which I hereby claim my right as inventor of the same, consist in being formed of iron and of a neat and useful form by which cast iron is applicable and hereby applied by me to the saw mill for the first time, for the purpose of holding fast the timber while it is divided into parts by a single saw or a gang of saws: and that otherwise it may be required to save the cost of making both kinds the horizontal plates described in the first pair of these head blocks may be cast connected by interior partitions as described in the second pair for forming the pigeon hole or apertures with grooves above and below to hold the shanks of the notched mill dogs by which means the wooden bearings of both kinds of mill dogs can be fixed in the same cast iron head blocks and the upright flanges with the holes for mill dogs to be driven through into the logs can be also cast upon the upper edges and do not claim in this specification any of the third described head block except its improved construction. New application and use in this iron gang saw mill, as herein before described. A pair of ratchet crotches with which the screws of the same head block are both turned back & forth at one time by one person consists each of a handle about twenty inches long with a pair of right and left ratchet wheels riveted together within a ring of the large end of the handle. The pair of right & left hands riveted on each end of a rivet passing through the handle when they are used for this purpose only one of each hand catches in the notches while the other is withheld in the hand of the operator, the construction of these more fully appears in the drawings.

The log bearers consists of horizontal rollers about eight inches in diameter, and in length not exceeding the inside width of the carriage, each of which revolves on a horizontal shaft fixed in the upper ends of a pair of uprights rising from a horizontal plate with a socket in the under side; all of these parts being connected in one entire casting. These log bearers more or less are supported on the upper end of an upright broad flat timber driven fast within the socket of each casting which are united and lowered to sustain the timber as required by means of swindles,

each of which consist of rollers inch round iron fastened beneath the floor & crossings of the carriage with a three feet hand wheels on each by which the timber is raised or lowered by a rope attached to the shaft and to the lower end of the upright timber fastened in the socket of the log bearer.

The improved feeding apparatus consists of double worm feeding machinery calculated for the purpose of advancing the carriage with the log in contact with the moving saws when sawed through to be unshipped to run back the carriage it is composed of the driving crank shaft, two sets of pullies, a pair of cone drums two horizontal cone drum shaft, an upright worm shaft, two worms, two toothed wheels in carriage shaft, a long rack & pinion. One of the sets of pullies, is fixed upon the driving crank shaft to drive by means of a running band the other set of pulley which is fixed directly opposite upon the upper cone drum shaft, whose ends in the bearers to the lower cone drums are parallel and fitted to revolve in bearers in the intervening frame work of the worms is fixed on one end of the lower cones drum shaft which runs in the teeth and drives the toothed wheel fixed on the lower end of the upright worm shaft whose worm of the upper end of it runs in the teeth and drives the toothed wheel fixed on one end of the horizontal carriage shaft, whose pinion acts in the cogs of the rack fixed on the underside of the carriage by the operation of which when the saw mill is in motion, the carriage is advanced when sawing the log & run back by impulse of a large grooved wheel also fixed on the end of the carriage shaft when the worm of the upright shaft is withdrawn from the teeth of the toothed wheel for the same shaft by means of a chain running in the groove of the large grooved wheel, in the groove of the smaller grooved wheel or sheave below revolving loosely upon the end of the horizontal worm shaft aside of another larger pulley fastened to it upon which runs a continually running band connected with the motion of the power drum, or another driving pulley which runs back the carriage by tightening the chain bands, which is effected by a chain tightening pulley forced by a lever or otherwise fixed for that purpose —

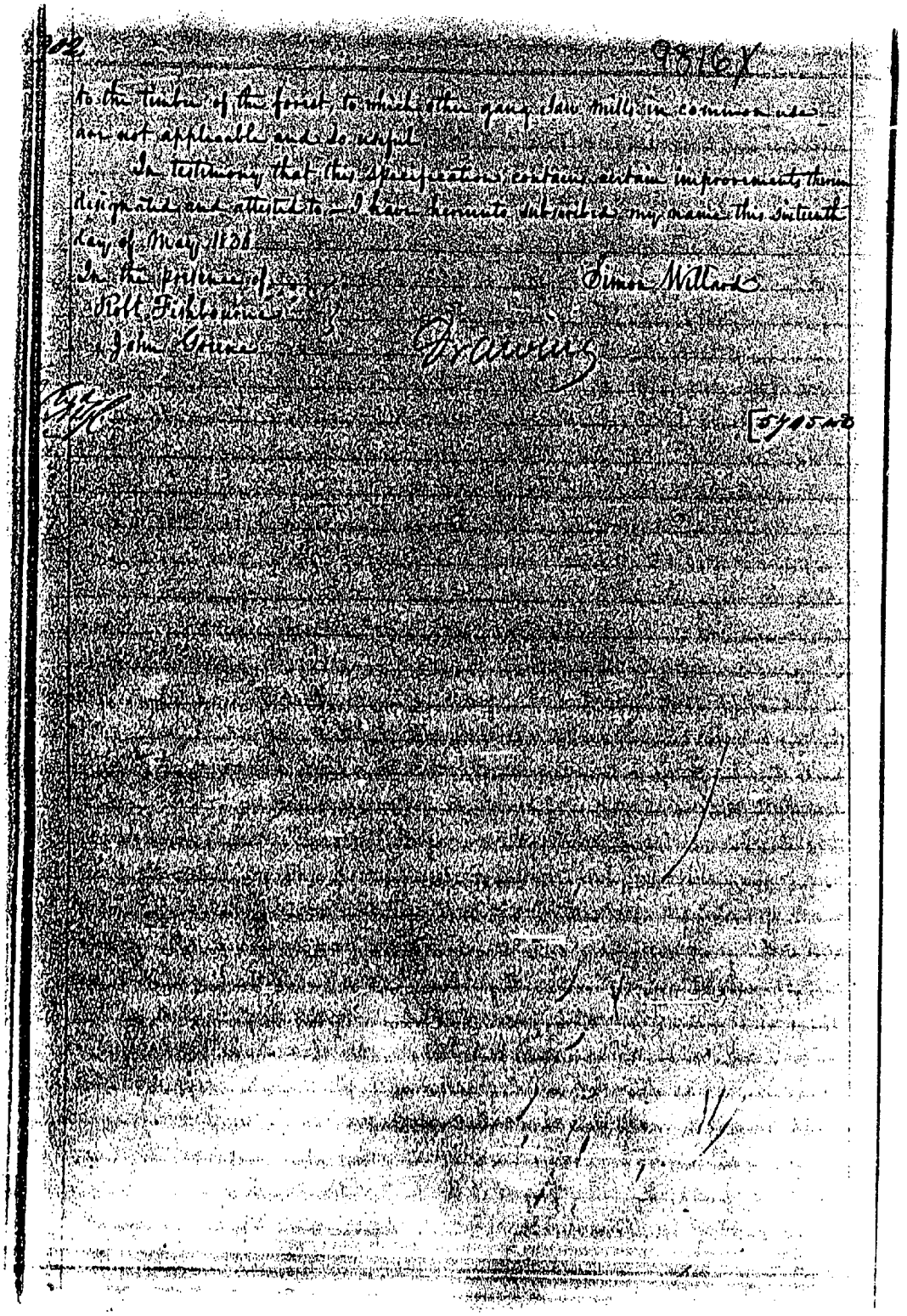
For the purpose when sawing green timber for giving time for the offal wood of the saw mill to dry sufficiently for the fuel required for driving the engine a few spacious hand cars are required to run on rails around a circular corner, so that the wood loaded upon them can be run out from the mill

to remain several days under shelter & to dry without unloading, except when mounted under the boilers. This iron gang Saw Mill is put into operation by any suitable power in any manner that it may be appliable to the driving crank shaft by band & pow. drum or by mutual cog wheels by which wind rotary steam or animal power may be applied with these suitable additional agents, by which the pitman connecting the revolving crank with the vibrating saw gate of more or less saws, the timber fastened upon the carriage while advanced by running bands, connecting its motion with that of the driving crank shaft.

And for the purpose of using two of these gang mills by the advantage of steam or other power only sufficient to drive one at a time is required on that account. For this purpose a line of three shafts are constructed with four crank catches one of each of them four inches with the middle shaft to which the driving power is firstly applied having its journals sufficiently long to slide in its boxes when forced back & forth by means of a forked lever for the crank catches to catch in the crank catch of first one end & then the other of the two outer shafts, whose drums are of suitable size to give the required motion, and are directly opposite the balance pulley, in the connecting or disconnecting of these shafts for shifting the power at pleasure, from one saw mill to the other as they may be wanted to run or stop first one mill & then the other, is effected by friction connecting bows of the kind in common use.

I have described in this specification the several parts of an entire saw mill and have designated from them what I claim as inventor of the improved parts consisting of a newly constructed iron supporting frame, an improved pair of vibrating feeder posts, a newly applied pair of pitmans, an improved iron saw gate and saw index improved saw stirrups, and two pair of improved head blocks and mill dogs for which I ask Patent for the whole, or a part of them to be used in distinct mills, according to the manner of sawing, for which I have contemplated their several uses, and that I do not ask a patent for those other parts described in distinct paragraphs to the foot of the party to which I annexed no claim, I therefore claim not any part of them in this specification, except as before Hereinafter described, neither do I claim any improvement in the saws themselves, or their up & down motion, nor the horizontal movement of the carriage, except its regular advance by a double grooved

worm feed called the improved feeding apparatus, which I also claim as invention, and have set forth further improvements that I have made for the sake of explaining those parts, which I have herein before claimed, as well as to enable persons skilled in mill building to construct and put an entire saw mill of this new construction into useful operation, & in order that the further advantages of these improvements may be fully understood, altho' I may have in this specification and accompanying drawings & description referring to them been particular in the explanation of the said improvements I have nevertheless calculated and do set forth that I have in view that the improved parts of this saw mill may be of larger or smaller dimensions and the proportions be varied to advantage from the foregoing description without materially varying the general plan of this new and useful portable iron gang saw mill, together with the iron saw mill frame having the advantage of being for the first time constructed of cast iron from patterns, and fitted up as a complete machine by which the gang saw mill can now be made in a more uniform and expeditious manner than before, and hereby claiming that by the said improvements, the gang saw mill is rendered more useful and durable by these several improved forms of iron which being the only material that would admit of the most advantageous construction & dispatch, by patterns of so many regular parts thus for the first time put together that would constitute an entire gang saw mill with more accuracy, compactness, firmness, durability and dispatch, than was known before. The application of these improved iron parts to this useful purpose of being not only removable from place to place, but being made of iron cast after patterns with such great dispatch an accuracy; as will avoid the great cost, delay and inconveniences of tedious and various mill wright calculations, in erecting high, heavy and expensive timber mill buildings and gearing for steam power, and which by this improved construction renders water power in numerous places applicable that would otherwise be useless for this purpose, thus making water mill privileges more plenty: and which renders the gang saw mill when constructed small upon this plan capable of the most advantageous use in countries where water privileges are not to be found, by being propelled by small steam engines, wind or animal power and of being removable at little expense to be continued convenient



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to the timber of the first, to which the gang saw mills in common use are not applicable and do not infringe.

In testimony that the specification contains certain improvements thereon described and claimed to I have hereunto subscribed my name this fifteenth day of May 1838

In the presence of
Robt Fitzhugh
& John Grieve

Simon Willard

Grieve

[5,905 acres]