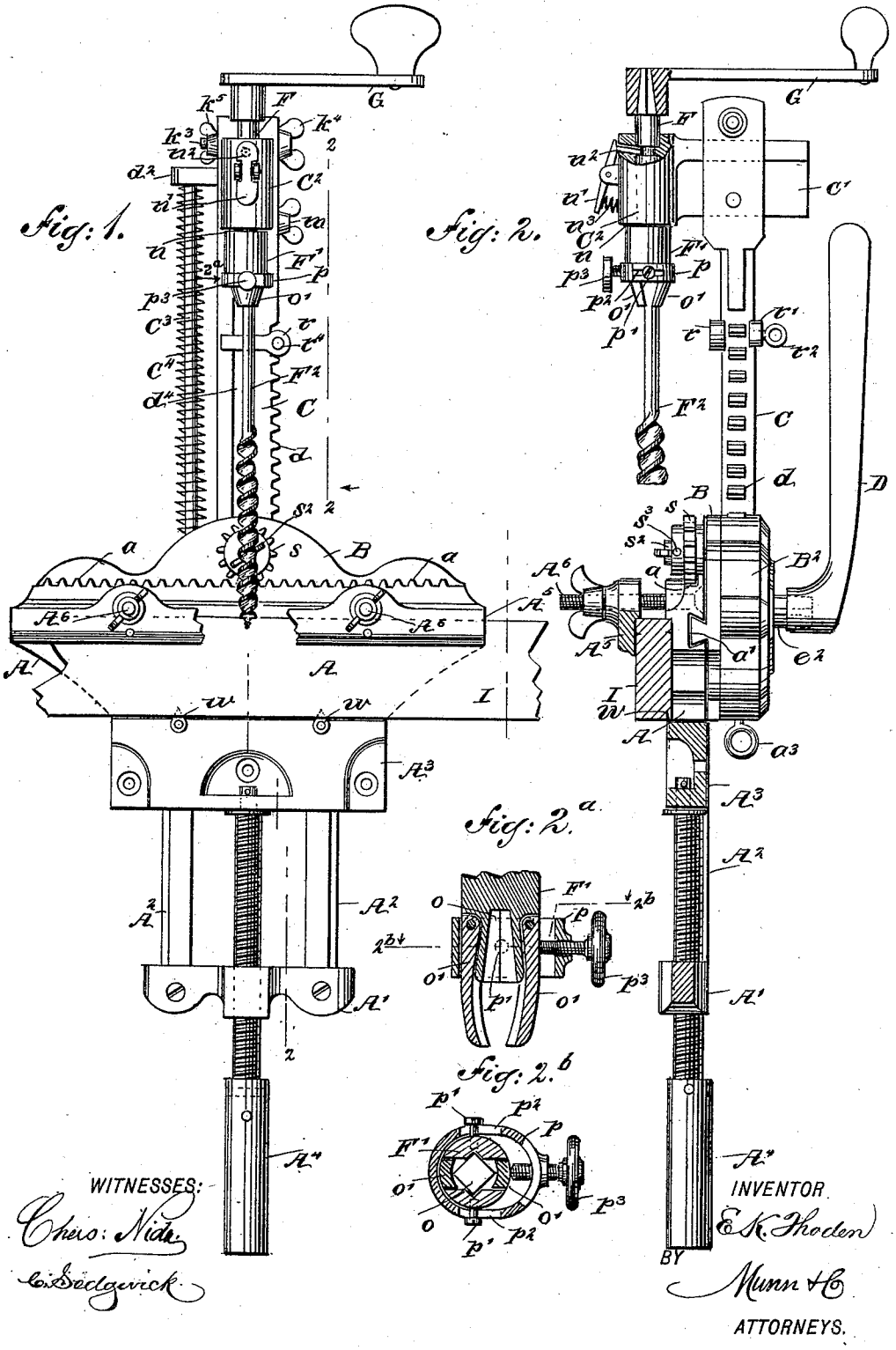
(No Model.) 4 Sheets—Sheet 1.

# E. K. THODEN.

## PORTABLE BORING AND MORTISING MACHINE.

No. 513,348. Patented Jan. 23, 1894.

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# E. K. THODEN.

## PORTABLE BORING AND MORTISING MACHINE.

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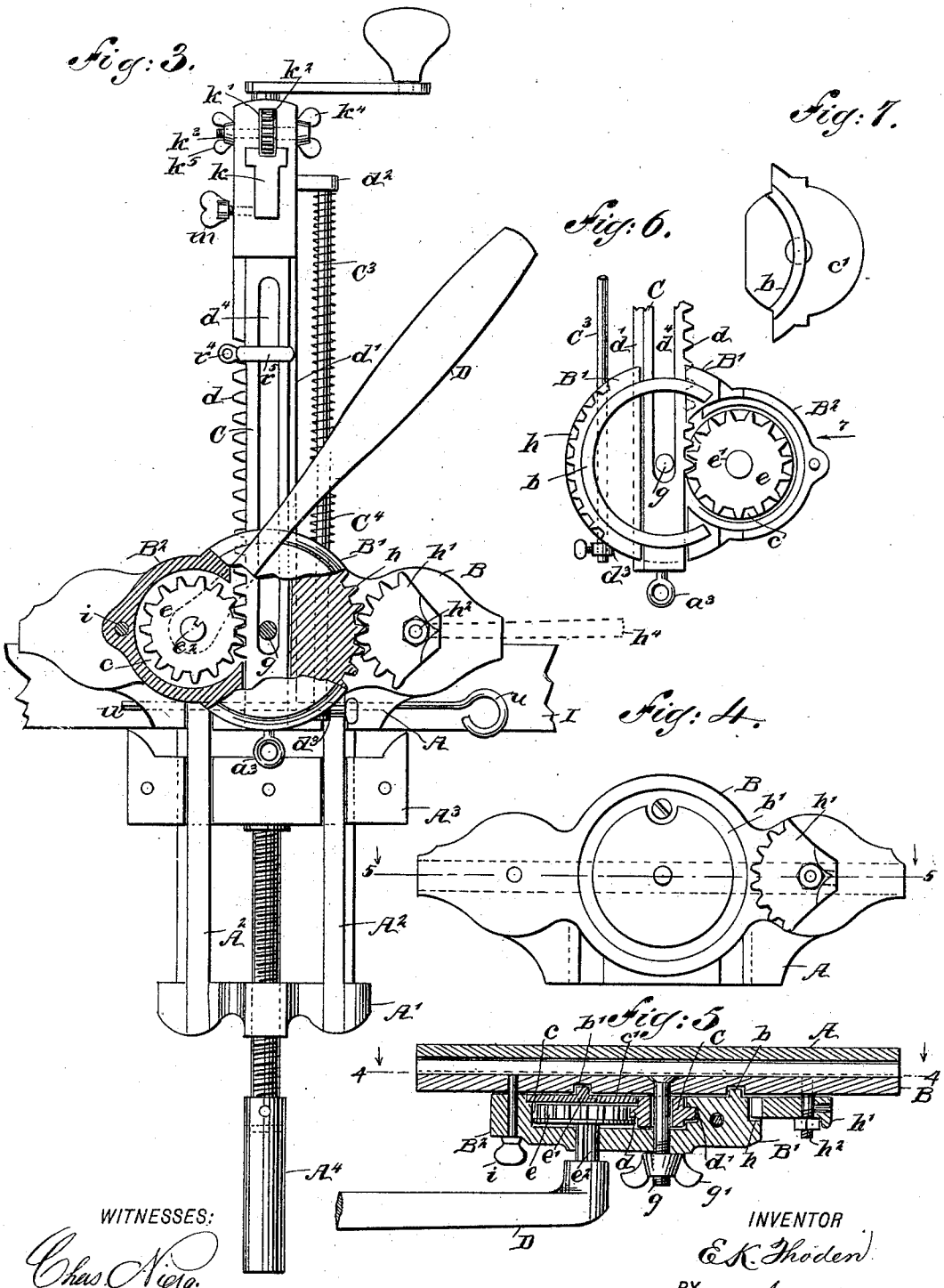


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# E. K. THODEN.

## PORTABLE BORING AND MORTISING MACHINE.

No. 513,348. Patented Jan. 23, 1894.

Fig: 8.

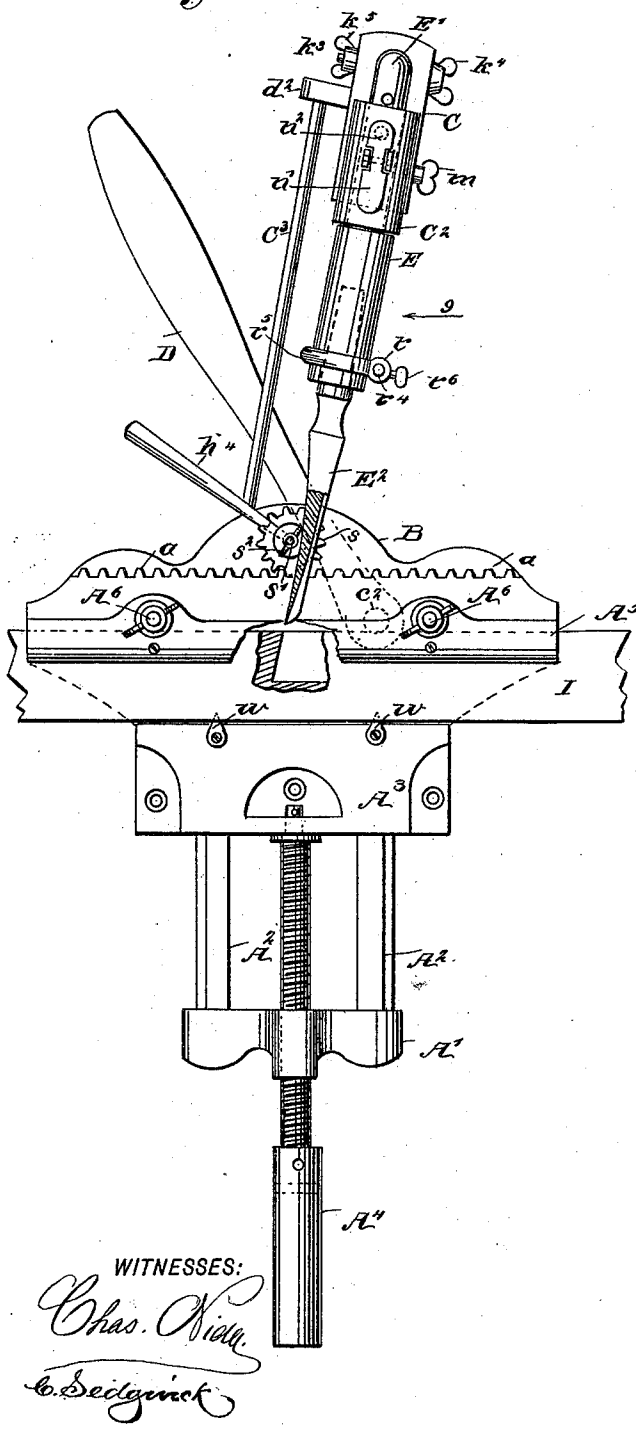
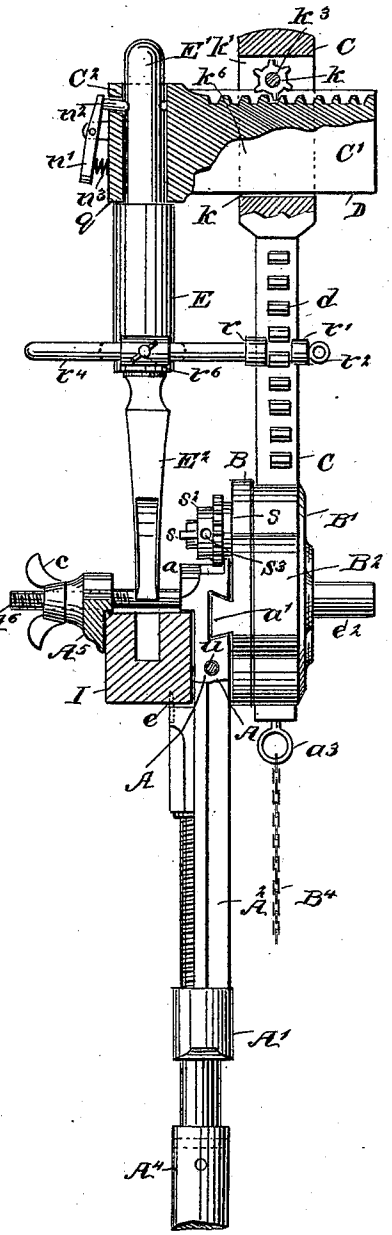


Fig: 9.



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# E. K. THODEN.

## PORTABLE BORING AND MORTISING MACHINE.

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Fig: 10.

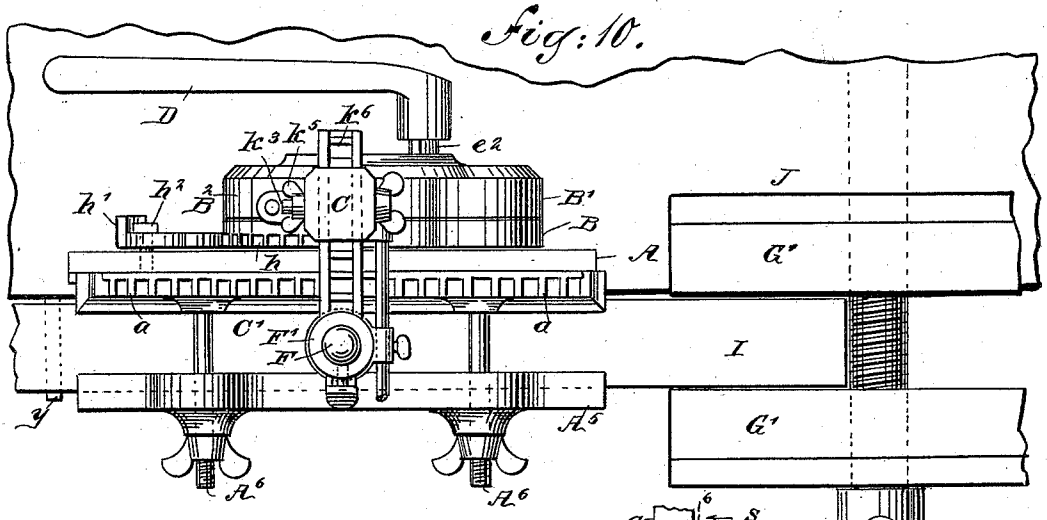
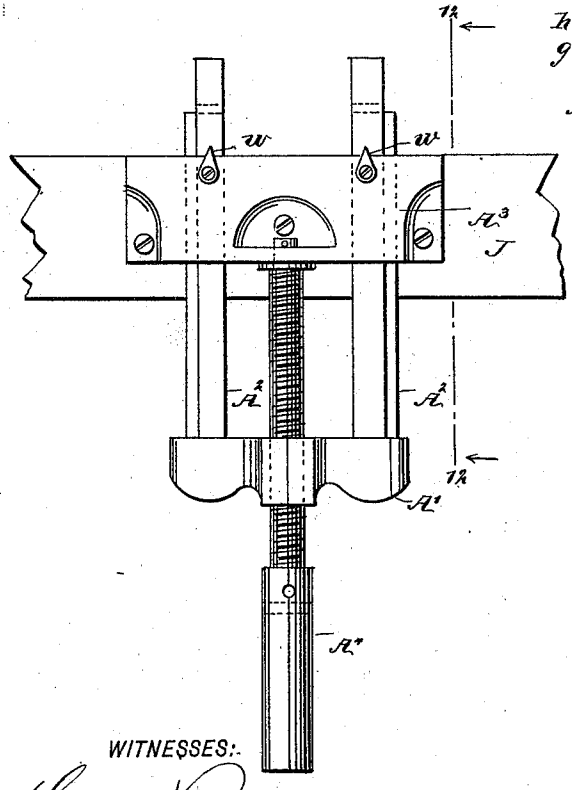



Fig: 11.



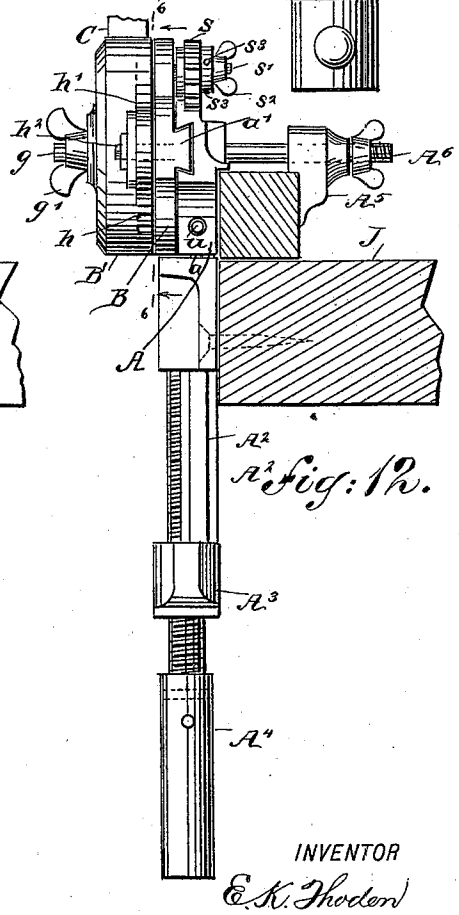




Fig: 12.

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# UNITED STATES PATENT OFFICE.

EDWARD K. THODEN, OF BROOKLYN, NEW YORK.

## PORTABLE BORING AND MORTISING MACHINE.

SPECIFICATION forming part of Letters Patent No. 513,348, dated January 23, 1894.

Application filed March 25, 1893. Serial No. 467,662. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD K. THODEN, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Portable Boring and Mortising Machines, of which the following is a full, clear, and exact description.

This invention relates to improvements in wood boring and mortising machines adapted for operation by hand power, and has for its object to provide a novel, simple and practical device of the character indicated, which will be efficient in service, be adapted for connection to any suitable firm support, and be detachable in its parts to facilitate close package and convenient transportation.

To these ends my invention consists in the construction and combination of parts, as is hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a front view of the device arranged as a wood boring machine. Fig. 2 is a partly sectional edge view on the line 2—2 in Fig. 1, looking in the direction of the arrow 2. Fig. $2^a$ is an enlarged longitudinal sectional view taken opposite the arrow $2^a$ in Fig. 1. Fig. $2^b$ is a sectional plan view on the line $2^b$—$2^b$ in Fig. $2^a$. Fig. 3 is a rear view partly in section of the improved mechanism, showing some of the interior details of construction. Fig. 4 is a detached rear view of a gear case that is a part of the improvement, taken on the line 4—4 in Fig. 5. Fig. 5 is a transverse sectional view on the line 5—5 in Fig. 4. Fig. 6 is a detached side view of the gear case with a wall piece removed, the view being taken on the line 6—6 in Fig. 12. Fig. 7 is a side view of the portion of the case wall that fits upon the gear case shown in Fig. 6, opposite the arrow 7 in said figure. Fig. 8 is a front view in part of the improved device, arranged as a mortising machine. Fig. 9 is a partly sectional side view opposite the arrow 9 in Fig. 8. Fig. 10 is a plan view of the machine arranged to cut mortises, and in position on a piece of wood to be operated upon. Fig. 11 is a detached front view of a supporting device that is part of the invention, and secured upon a stable support; and Fig. 12 is a partly sectional side view of the device broken away at the top and secured upon a portion of a bench, the latter being in section on the line 12—12 in Fig. 11.

There is a frame piece A, provided, which is a comparatively thin plate of metal, having a sufficient length for efficient service and made level on the upper edge that is toothed to form a rack *a*, the side edges at proper points below vertical parts thereof being sloped inwardly and downwardly joining a straight lower edge, to adapt the lower frame portion to slide into a mating open recess formed in a jack block A′ that will be further described.

On the front face of the frame piece A, a longitudinal and preferably dove-tailed or under-cut groove is formed, parallel with the rack *a*, for the loose engagement therewith of a mating tongue *a′*, which is a forward projection from the carrier plate B, that is designed to sustain main portions of the machine. The plate B, is laterally elongated, and undulated on its upper edge, the top edge portion at the center being curved upwardly to a sufficient extent and of a proper radius to conform said edge portion with the circular upper surface of the gear case B′, $B^2$, which case is secured upon the rear side of the carrier plate B, as represented in Fig. 2. The main portion B′ of the gear case B′, $B^2$, is circular peripherally, and nearly flat as well as parallel on the front and rear sides, there being a concentric rib *b*, formed upon the part B′, $B^2$, for engagement with a mating concentric groove *b′*, formed in the surface of the carrier plate B, engaged by the gear case when these parts are assembled in the erection of the machine. The part $B^2$ that is integrally formed on the main portion B′, is circular, of a reduced diameter and extends from the edge of the part B′, in the same plane, having an equal thickness therewith.

A circular recess *c*, see Figs. 5 and 6, is formed mainly in the portion $B^2$ and partly in B′ from the side of the gear case upon which the rib *b* is produced, and to cover this recess a plate *c′* of proper form is provided, the shape of which is indicated in Fig. 7. Said plate fitting upon the portion $B^2$ conforms edge-wise with its contour, and on the exposed

surface has a curved rib portion *b*, which completes this circular projection when placed to join the part of the rib that is formed on B′. The solid portion of the gear case B′, B², is vertically grooved on the face nearest the carrier plate B, which groove cuts into the adjacent side wall of the circular recess *c*, and is made of an equal depth therewith. In the groove mentioned a slide bar C, is located, fitting neatly so as to freely reciprocate, said bar having a longitudinally extending tongue *d′* formed on one side edge at the center of thickness, and on the opposite side edge a similarly located series of rack teeth *d*, these projections from the bar being adapted to slide in smaller grooves laterally produced in the opposite walls of the main groove in the part B′, the tongue *d′* serving to stiffen the slide bar and prevent it from twisting in the main groove of the portion B′ of the gear case.

On the slide bar C, at one edge, a spring guide bar C⁸, is sustained parallel therewith, by the attachment of its upper end to a bracket lug *d*², the lower portion sliding through a vertical perforation in the part B′ of the gear case, as shown by dotted lines in Figs. 3 and 6, a collar *d*³, being removably attached to its lower end to prevent the accidental displacement of the guide bar; and on the latter a spiral spring C⁴, is located, which presses upon the lug and the portion B′ of the case, thereby normally retaining the slide bar C in elevated adjustment, free to be depressed by force applied to the rack teeth *d*, as will be further explained.

Within the circular recess *c*, a spur gear wheel *e*, is rotatably supported, said wheel having proper dimensions and a correct tooth pitch to adapt it to mesh with the rack teeth *d*. The pivotal support of the gear wheel *e*, is effected by a trunnion pivot *e′*, centrally projected from the side of said wheel adjacent to the cover plate *c′*, when the parts are in position for use, there being a perforation formed in said plate at a proper point to permit the pivot to enter and receive rotatable support. The opposite pivot support for the wheel consists of a short shaft *e*², that projects from the center of the wheel opposite from the trunnion pivot *e′*, and passes through a suitable perforation in the wall of the portion B² of the gear case, as shown in Fig. 5, the outer end of the shaft being adapted to receive and lock fast to the socket end of a crank handle D, the use of which will be hereinafter explained.

The slide bar C, is longitudinally and centrally slotted at *d*⁴, between the tongue *d′* and rack teeth *d*, parallel therewith and of a length which will permit the free vertical reciprocation of the bar a proper degree, said slot being penetrated by a bolt *g* that passes through an axial hole in the portion B′ of the gear case, and into an aligning perforation in the carrier plate B, and is secured in the latter by its inner end, a winged nut *g′* that has a threaded engagement with the outer end of the bolt body, serving to bind the gear case upon the carrier plate at any desired point of adjustment for said gear case.

In the operation of the machine it is desirable that the gear case B′, B², be adapted for a rocking adjustment on its pivot bolt *g*, to effect which a toothed, circular rack *h*, is formed on the periphery of the portion B′ of the case at a point opposite from the recessed portion B², and near said curved rack a toothed sector plate *h′*, is pivoted by a bolt *h*² that passes loosely through the plate and is fastened in the carrier plate B, as shown in Fig. 5.

A radial perforation is formed in the plate *h′*, to receive the end of a pin lever *h*⁴, as indicated by dotted lines in Fig. 3, the vibration of the latter serving to incline the slide bar C from a perpendicular plane, or restore it to said plane, as may be required.

When the slide bar is vertically located a perforation in the carrier plate B and a similar perforation in the portion B² of the gear case, are caused to register with each other, so that the insertion of a locking pin *i*, will retain the case from rocking and hold the slide bar C vertical while the pin is in engagement with the parts mentioned.

The upper end or head piece of the slide bar C, is horizontally slotted from front to rear at the center of breadth in T-shape, as shown in Fig. 3 at *k*, and above the T-slot an intersecting narrow slot *k′* is formed therein in the same direction, a small spur pinion *k*², being rotatably supported in the small upper slot by its secured engagement with the transverse shaft *k*³, located in perforations oppositely formed in the parallel walls of the head piece of the slide bar produced by the slot *k′*, at such points as will permit the teeth of the pinion to project into the lower slot *k*, the shaft having a winged head *k*⁴ on one threaded projecting end, and a winged nut *k*⁵ on its other end, to permit the shaft and attached pinion to be locked from rotation by a clamping adjustment of the nut and bolt.

In the slot *k* an adjustable arm C′, is fitted to slide, its body being T-shaped in cross section and loosely engaging with the T-slot *k*.

On the front end of the slidable arm C′, an integral cylindrical enlargement of head C², is formed, which head is of a suitable length vertically considered to adapt it to receive and sustain a rotatable bit-stock F, F′, and also a chisel holder or stock E, that is of a somewhat different construction.

Upon the upper edge of the arm C′, a toothed rack *k*⁶, is formed or secured, which is in toothed engagement with the pinion *k*², so that a rotatable movement of the latter will slide the arm in the slot it occupies, and adjust the head C² toward or from the head piece of the slide bar C, as may be desired, such an adjustment of parts being intended for the purpose of locating a boring bit or a chisel edge at a proper point on work that is to be operated upon, as will be further explained.

In the side wall of the head piece of the slide bar C, a set screw $m$, is inserted loosely, said screw being permitted to have a clamping bearing on the arm C′, and retain it at any point of sliding adjustment.

The boring bit stock is shown in Figs. 1, 2 and $2^a$, and consists of a cylindrical shank F, which fits rotatably in the vertical perforation of the head $C^2$ on the arm C′, a diametrically enlarged portion F′ of the stock producing a radial shoulder at $n$, which bears upwardly upon the lower end of the head $C^2$, when the device is in service.

The head $C^2$, is furnished with a dog $n'$ that comprises a plate pivoted edgewise near the longitudinal center, between two ears that are projections from said head, a locking toe $n^2$ in the form of an attached pin projecting from the body of the dog loosely into a perforation in the head which is opposite a peripheral groove in the shank F, the other end of the dog being pressed outwardly by a spring $n^3$, which causes the toe to enter the groove and retain the stock from longitudinal displacement and permit a free rotation of the same. The upper end of the shank F, is tapered and squared to fit a mating socket hole in the hub end of the crank handle G, that when in engagement therewith affords means for a rotatable movement of the stock by hand power applied to the handle.

On the lower end of the portion F′ of the stock a bit holder is formed, comprising parts that will be presently described, such ends of the said stock being axially apertured to produce an upwardly tapering square socket hole $o$, shown in Fig. $2^a$, the cylindrical body F′, being also slotted oppositely outside of the socket hole for the reception of the clamping jaws $o'$, that are pivoted by their upper ends therein, so that their longitudinally grooved adjacent inner surfaces may be caused to approach and grip the shank of a bit I, that has had its squared and tapered upper end inserted into the socket hole $o$, these parts of the jaws being bent toward each other to adapt them for effective service.

An oval band $p$ is a part of the clamping device of the boring bit, and as shown in Figs. $2^a$ and $2^b$, consists of an elliptical band $p$ that encircles the lower portion of the stock F′, and is thereto loosely secured by the set screws $p'$ which pass through the opposite slots $p^2$ longitudinally formed in the band, and enter the body of the stock, the looseness of the band permitting a sliding movement of the ring or band in the direction of its longest diameter.

There is a set screw $p^3$ inserted through a threaded hole in one bow end of the band $p$, which by its proper adjustment will clamp the jaws $o'$ toward each other, and upon an inserted bit shank $F^2$, the reverse movement of the said screw reversing the jaws which will spread apart equally, the sliding movement of the band facilitating such release.

In Fig. 9 the chisel stock E, is shown as engaged with the arm C′, said stock having the shank or upper part of its cylindrical body reduced in diameter so as to loosely fit within the head $C^2$ of said arm, the shoulder $q$ bearing on the lower surface of the cylindrical head portion $C^2$ of the arm C′ when the stock E is in position for service.

Cupped depressions are oppositely formed in the shank portion E′ of the stock E, for the interlocking engagement of the toe $n^2$ therewith, as represented in Fig. 9, the spring enforced vibration of the dog $n'$ of which said toe is a part causing such a connection of parts to be produced automatically when the shank is inserted and rotatably moved until one or the other of the sockets is brought into position to receive the rounded end of the pin or toe $n^2$.

There is a suitable socket aperture axially formed in the lower portion of the chisel stock E, wherein the upper end of the chisel $E^2$, is inserted and removably held by frictional contact therewith, or by other means if preferred, this engagement of parts being shown by dotted lines in Fig. 8.

The lower portion of the mortising chisel $E^2$, is shaped as is usual for such tools, so as to be adapted to cut freely across as well as at each side of a mortise slot, and have a proper clearance to avoid clogging by the chips it cuts in the operation of mortising.

On the slide bar C a clamp consisting of two cross bars $r$, $r'$ is secured and receives vertical adjustment by the set screw bolt $r^2$, that passes loosely through the rear bar $r'$, and has a threaded engagement, (not shown,) with the front bar $r$.

From a lateral ear on the front cross bar $r$, a stay rod $r^4$, is forwardly projected and passes through an ear on the guide ring $r^5$, a set screw $r^6$, affording means to secure the ring upon the rod at any desired point, said ring encircling the portion E of the chisel stock E, E′, and affording a support therefor when in service.

On the carrier plate B a spur wheel $s$, is journaled on a stud $s'$ and is thereon loosely secured by a nut $s^2$, said wheel being meshed with the horizontal rack $a$ formed on the upper edge of the frame plate A, as before mentioned; and it will be seen that if the plate A, is held secured by any suitable means, a rotation of the spur wheel $s$ will cause the carrier plate B and parts that it sustains, to slide along on the frame plate, the direction of travel depending on the direction of rotation given to the wheels, a clamping adjustment of the nut $s^2$ retaining the carrier plate at any point desired. As shown the spur wheel $s$, is furnished with a hub projection on the outer side, which has a number of spaced perforations $s^3$, radially formed upon its periphery inward for the introduction of a pin lever such as $h^4$, previously mentioned, which may serve the purpose of adjusting the sector plate $h'$ and also the spur wheel, the latter being effected by an insertion of the

lever and its vibration in a proper direction, as will be further explained.

Below on the frame plate A, there is secured a depending jack frame, which is designed to sustain strips of wood, which are to be operated upon by the machine. The said jack frame is comprised of a base block A′, from which vertically project the spaced parallel guide bars $A^2$, affixed by their lower ends in the base block, and penetrating slots in the frame plate A, to which they are secured by the transverse key rod *u*, inserted through aligning perforations in the frame plate and bars, said holes being produced edgewise in the frame plate A, as shown by dotted lines in Figs. 3 and 9.

On the guide bars $A^2$ a jack block $A^3$, is located, and held free to slide by a tongue and grooved engagement of said bars with mating slots formed at proper points in the jack frame.

The base block A′, is centrally perforated and threaded to receive the jack screw $A^4$, which is loosely secured by its upper end to the jack block $A^3$, as shown in Fig. 8, thus affording means for a vertical sliding adjustment of the jack block toward or from the frame plate A, the block having two detent teeth *w*, projected from its upper surface, as shown in Fig. 11.

There is a clamping bar $A^5$ provided, which is supported opposite the front face of the frame plate A by the spaced stud bolts $A^6$, that project forwardly and horizontally from the frame plate, the bar being perforated at proper points to permit it to slide freely on the stud bolts, the latter being threaded on their outer ends and having winged nuts thereon, that by adjustment press the bar toward the frame plate.

The operation of the device is as follows: The jack block $A^3$, is secured upon a bench plank such as J in Fig. 11, at its edge, so as to permit the bars $A^2$ to lie in a vertical plane and cause the frame plate A and attached parts of the machine to project above the bench. A strip of wood such as I, is now clamped between the bar $A^5$ and the plate A by an adjustment of the nuts on the bolts $A^6$, and the jack block $A^3$, is elevated so as to embed its teeth *w* in the material I, while its upper face bears forcibly upon said material to support it in a horizontal position, and it will be seen that the provision of the supporting device mentioned affords means to sustain material of different widths as well as thickness. The boring chuck and an auger bit of proper dimensions are now secured to the head portion $C^2$ of the arm C′, and the latter is adjusted forwardly a proper degree to locate the bit point at a proper point for the formation of one hole of a series to be bored, as the initial step in the formation of a rectangular mortise in the piece I. If the mortise is to be produced in the stuff at a right angle to its upper edge and the upper and lower edges thereof are parallel, the gear case B′, $B^2$, is adjusted and secured as before explained, to retain the slide bar C in a vertical position. The auger is now rotated and the hole is bored that is at one end of the mortise, a series of similar perforations being subsequently formed at proper intervals as usual in the production of mortise holes. The chisel chuck piece or stock E, is now substituted for the boring device, and the chisel F, is made to engage with the material I for the completion of a mortise therein, the lever D being vibrated to cause a reciprocation of the slide bar C and the attached chisel with its support. Should the nature of the mortise to be formed require that the chisel be placed at an incline to the top surface of the material I that is being mortised, a rotatable adjustment of the gear case B′, $B^2$, will cause such an inclination, thereby carrying the slide bar out of a perpendicular position, as shown in Fig. 8, such an inclination being produced by an adjustment of the sector plate *h′* with the pin lever $h^4$ previously mentioned.

In the operation of cutting the mortise by hand in the material I successive chips are cut by a downward sliding movement of the chisel $E^2$, and after each cut a forward movement of the cutting mechanism upon the frame plate A, which is readily effected by the manipulation of the pin lever $h^4$ and spur gear wheel *s*, as before mentioned. When the mortise is to be completed by squaring its end toward which the cutting has been effected, this is readily accomplished by semi-rotating the chisel so as to dispose its cutting edge in an opposite position, the locking dog *n′*, being manipulated to release the shank E′ and permit a partial rotation of the shank until the opposite socket hole is engaged by the pin of said dog.

When the operator desires to support a long piece of material and form a number of mortises in it, the material may be held by one end in a bench vise G′, and the stuff supported at proper points by a pin *y* that projects from the side of the bench J, as shown in Fig. 10, the improved hand power machine being secured by its clamping piece at any point where it may be desirable to produce a mortise. If it should be desired to operate the machine by foot power as well as hand power for the mortising of the material, a chain $B^4$ may be attached to a ring or loop $a^3$ that projects from the lower end of the slide bar C, the chain being downwardly extended to engage with a common treadle piece (not shown).

In Fig. 12 a means is shown for using the improved machine on material that is laid upon the bench J; in this case the key rod *u*, is withdrawn and the guide bars $A^2$ are made to engage the frame plate A in reversed order, and the pin restored to place so as to secure the parts together, the plate being thus turned so as to project the gear case B′, $B^2$ and slide bar C, with the other parts sup-

ported thereby, over the top of the bench and the work placed thereon which has been clamped by the bar $A^5$ and nuts on the bolts $A^6$, so as to retain the material in connection with the boring and mortising mechanism that are manipulated as has been before explained.

One of the important features of advantage claimed for this device is that its parts are all separable and capable of packing into a small box for transportation; and as the entire machine is of comparatively small dimensions it will be seen that a wood worker can carry the entire device along with him in his general tool chest, and thus be provided with a means by which to rapidly and perfectly cut mortises in material where such stuff cannot be had at mills that make a specialty of its production.

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

1. In a portable wood boring machine, the combination with a frame plate, an attachable and adjustable support for material, a slidable carrier plate and means to move said plate and lock it, of an upright reciprocating and inclinable slide bar, a securable rocking support therefor, and a rotatable wood boring device thereon, substantially as described.

2. In a portable boring machine, the combination with a frame plate, an attachable and adjustable support for material, a slidable carrier plate, means to move said plate and means to lock it, of an upright reciprocating and inclinable slide bar, a spring support adapted to elevate said bar, connected gearing and a handle lever to depress the bar, a horizontally adjustable arm on the upper end of the slide bar and a rotatable wood boring device on the arm, substantially as described.

3. The combination with a frame plate, spaced depending guide bars, a slidable jack block, a base block, and a screw in the block, of a carrier plate adapted to slide longitudinally, and a device to slide the carrier plate and a means to secure said plate, a slotted rocking and securable gear case, a slide-bar engaging the slot in the gear case, a toothed rack on said bar, a horizontal adjustable arm on the upper end of the slide bar, a spring support therefor, and a rotatable wood boring device on said arm, substantially as shown and described.

4. The combination with a frame plate, a securable jack block loosely engaging guide bars which are detachably affixed by their upper ends to the frame plate, a base block on the lower end of the guide bars, a jack screw, a laterally slidable carrier plate, means to slide said plate and means to secure said plate, of a rocking transversely slotted gear case, a longitudinally slotted slide bar therein, an adjustable arm on the upper end of the slide bar, a securable bolt passing through the carrier plate, slide bar and gear case, a gear wheel pivoted in the gear case and meshing with a toothed rack on the slide bar, and a manually rotatable boring device depending from the arm of the slide bar, substantially as described.

5. The combination with a frame plate, a securable jack block loosely engaging guide bars which are detachably affixed by their upper ends to the frame plate, a base-block centrally perforated and threaded, fast on the lower ends of the guide bars, a jack screw in the block, a laterally slidable carrier plate, means to slide this plate, and means to secure said plate, of a transversely slotted rocking and securable gear case, a longitudinally slotted slide bar therein, an adjustable arm on the upper end of the slide bar, a spring support therefor, rack teeth on the slide bar, a pivoted gear-wheel in the case, adapted to mesh with said rack teeth, a handle lever for said wheel, an adjustable chisel stock on the arm of the slide bar, and an adjustable guiding device therefor projected from the slide bar, substantially as described.

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Witnesses:
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