P. L. BILLINGSLEY.

FLEXIBLE OPERATING MECHANISM.

APPLICATION FILED MAY 17, 1921.

1,424,148.

Patented Aug. 1, 1922.

2 SHEETS—SHEET 1.

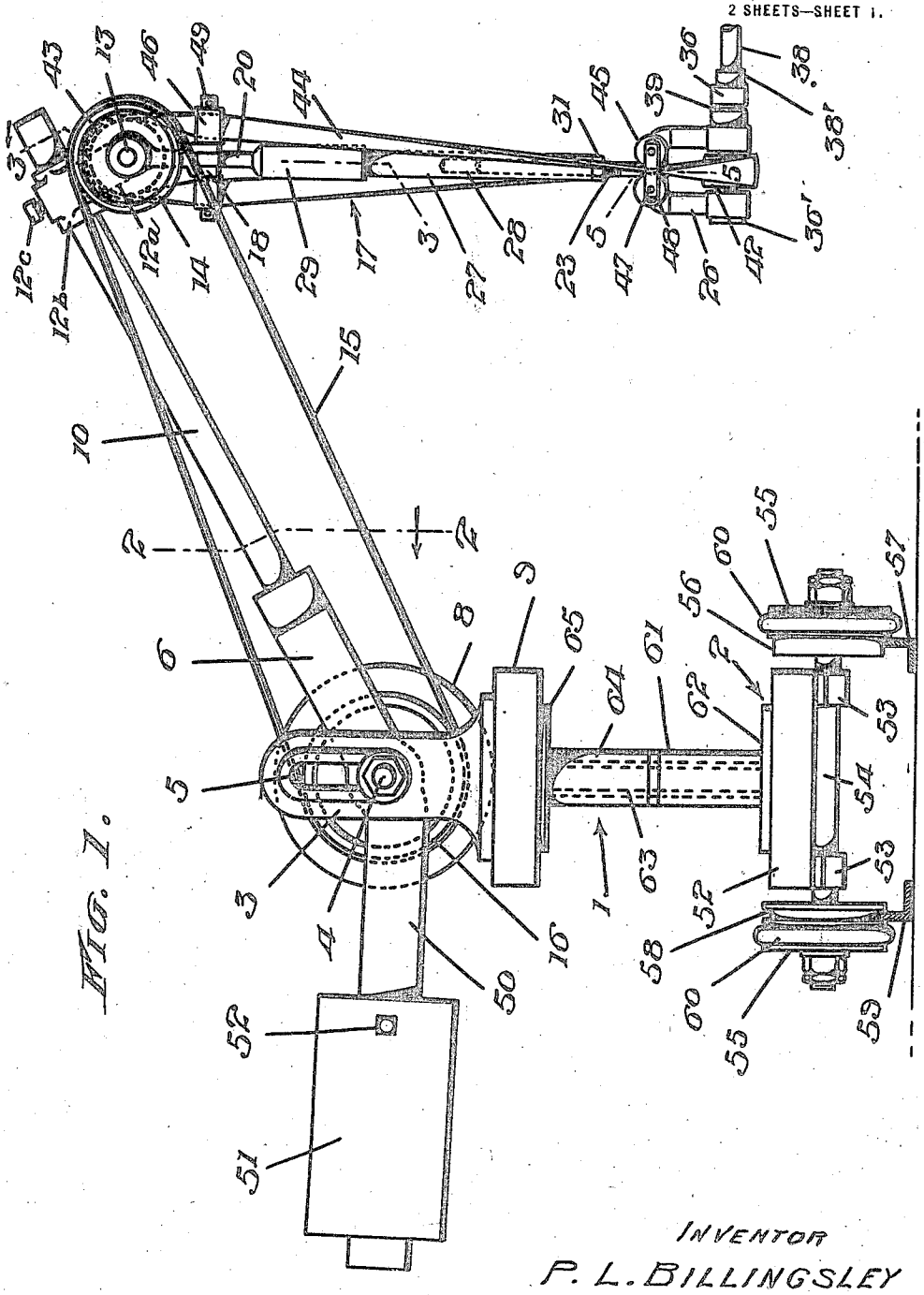


FIG. 1.

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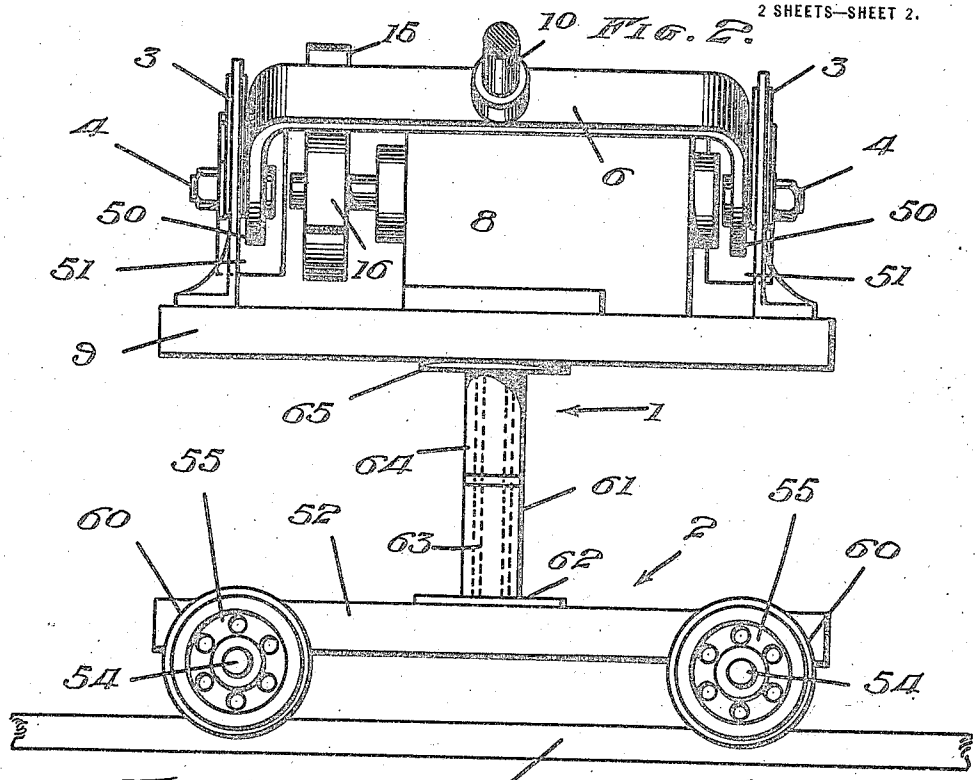


FIG. 2.

FIG. 5.

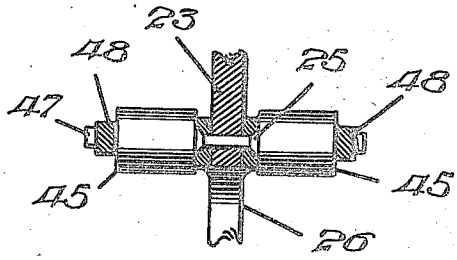


FIG. 3.

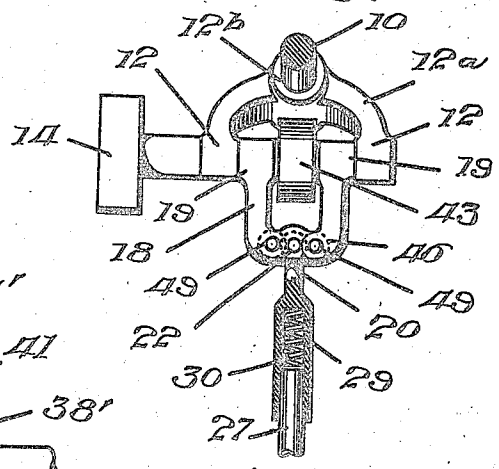
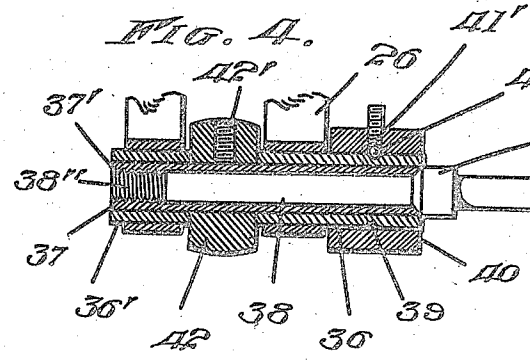


FIG. 4.



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FLEXIBLE OPERATING MECHANISM.

1,424,148. Specification of Letters Patent. Patented Aug. 1, 1922.

Application filed May 17, 1921. Serial No. 470,413.

To all whom it may concern:

Be it known that I, PERCY L. BILLINGSLEY, a citizen of the United States, residing at Orlando, in the county of Orange and State of Florida, have invented certain new and useful Improvements in Flexible Operating Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to a flexible operating mechanism of the kind disclosed in my co-pending application filed September 29, 1919, Serial No. 327,276, and aims to provide a novel and improved device of that kind, which is especially useful as a part of a carpentering machine or apparatus, although useful for driving various rotary tools or implements, and permitting same to be readily moved about and brought to different positions and angles for accomplishing the work at hand under practically all conditions and requirements.

Another object is the provision of a novel truck or carriage supporting the motor or other prime mover and the flexible mechanism driven thereby, which truck or carriage has wheels adapted to travel on rails as well as on the floor, work bench, and the like, for the convenient movement of the machine from place to place.

A further object is the provision of novel means on such truck or carriage for supporting the motor or prime mover and a swinging arm or boom forming a part of the flexible mechanism, and enabling various motors to be used and adjustments made to conform thereto.

A still further object is the provision of such a mechanism having novel means of adjustment for accommodating different sizes or styles of motors, and for tightening the belts.

The invention has for another object the provision of novel means at the free terminal of the flexible mechanism for the attachment of a saw mandrel, drill bit shank, or other similar member or shaft, and also a bearing or other member of a device or attachment for said end of the mechanism, the present mechanism being intended especially for use with the attachments disclosed in my copending applications filed July 5, 1921, Serial Nos, 482,380, 482,381, 482,382 and 482,383, although other attachments or devices can also be used for various purposes. The machine or apparatus including the present mechanism and such attachments is especially useful as a carpentering machine to be used on the premises when a building is in the course of construction, for facilitating the working of wood, such as sawing board, either across, with or at an angle with the grain, with either a square or miter cut, or for boring into the wood at different angles, or for mortising for door locks, window pulleys, etc.

With the foregoing and other objects in view, which will be apparent as the description proceeds, the invention resides in the construction and arrangement of parts hereinafter described and claimed, it being understood that changes can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of the mechanism.

Fig. 2 is a section on the line 2—2 of Fig. 1, showing the truck or carriage and other parts in side elevation.

Fig. 3 is a sectional detail taken on the line 3—3 of Fig. 1.

Fig. 4 is a longitudinal section on an enlarged scale showing the hollow spindle or arbor and accompanying parts, with the mandrel, shank or shaft in elevation.

Fig. 5 is an enlarged section on the line 5—5 of Fig. 1.

The mechanism, generally considered, is somewhat the same as the mechanism disclosed in the first-named copending application, and, for the main part, similar reference numerals have been used in the first-named and present applications.

In the improved construction, there is provided a turn table stand 1 supported on a movable truck or carriage 2, which will be described in detail more fully hereinafter. A pair of uprights or posts 3 is secured on the end portions of an elongated turntable 9, which also serves as a base for an electric motor 8 or other prime mover disposed between said posts. Said posts have the vertical slots 5 in which pivot bolts 4 are disposed, to be clamped in various vertical positions, and a yoke 6 disposed astride the motor 8 has its arms mounted on the bolts 4 at the inner sides of the posts 3 for the swinging movement of said yoke

partly around the motor. An arm or rod 10 is secured to the yoke 6 and extends away from the motor and forms a boom which can be swung upwardly and downwardly about the horizontal axis of the pivot bolts 4.

Supported from the arm or boom 10 is a yoke 12^a having bearings 12 at its ends, and a sleeve 12^b between its ends fitted on the boom 10 for longitudinal adjustment, and secured in place by means of a set screw 12^c carried by said sleeve. A shaft 13 is journaled in the bearings 12, and has a pulley wheel 14 secured on one terminal thereof, which pulley wheel is connected by an endless belt 15 with a pulley wheel 16 on the armature shaft of the motor 8.

At this point, it may be noted that motors or prime movers of different sizes or styles can be used, and after the motor is secured on the turntable or base 9, with its axis in the vertical plane of the slots 5, the bolts 4 are loosened and adjusted to make the pivot axis of the boom 10 coincide with the axis of the motor armature, whereby the belt 13 in swinging with the boom 10 is kept taut. Furthermore, the sleeve 12^b can be loosened for applying the belt 15, and then slid away from the yoke 6 for tightening the belt when pulley wheels or belts of different sizes are used.

Suspended or extending from the shaft 13 is a flexible hanger or arm 17, which has a yoke 18 at its upper end provided with bearings 19 at its ends embracing the shaft 13, within the yoke 12^a, whereby said yoke can swing around the axis of said shaft, thereby enabling the arm 17 to be swung forwardly and rearwardly or away from and toward the carriage, as well as being capable of vertical or up and down movement with the shaft 13 and boom 10. The arm 17 includes an upper section 20 having its upper end pivoted, as at 22, within the intermediate portion of the yoke 18, so that said section 20 can swing in a plane in which the axis of the shaft 13 and the yoke 18 are disposed, the axis of the pivot 22 being at right angles with the axis of the shaft 13. A lower section 23 of the arm is in alinement with the section 20 and has its lower end pivoted, as at 25, within the intermediate portion of a yoke 26, whereby said section 23 and yoke 26 can swing relatively in a plane in which the axis of the section 23 is disposed. The arm 17 includes an intermediate section 27, the lower end portion of which has a bore or socket 28 threadedly receiving the section 23, and the section 20 has a socket 29 receiving the upper end of the section 27, for the sliding connection of the several sections of the arm. A coiled expansion spring 30 is disposed in the socket 29 and in confined between sections 20 and 27, whereby to separate them, and a lock nut 31 is screw-threaded on the section 23 to bear against the lower end of the section 27. The nut 31 can be adjusted for adjusting the arm length-wise to increase or decrease its length, or to move the sections 20 and 27 toward one another, for compressing the spring 30, in order to increase the tension thereof. The connection of the sections 20, 27 and 23 also permit said sections to turn with respect to one another, and the pivots 22 and 25 being at right angles with the axis of the arm 17, will permit the terminal yokes 18 and 26 and body portion of the arm composed of the sections 20, 27 and 23, to swing relatively to one another, in substantially the same manner as disclosed in the aforesaid application, for positioning the yoke 26 according to the work to be done.

Secured in the terminals of the yoke 26 are bushings 36 and 36′, and a tubular spindle or arbor 37 is fitted for rotation in said bushings. A pulley wheel 42 is secured on the spindle 37 by means of a set screw 42′ and retains said spindle in place. Said tubular spindle or arbor receives a mandrel, shank or shaft 38 of a saw, drill bit, or other tool or implement, said shaft 38 (which it will be termed for convenience) being slid rearwardly into said spindle, and the spindle having a screwthreaded portion 37′ at its rear end into which the rear screw-threaded terminal 38″ of the shaft 38 is screwed, and the shaft has a collar 38′ thereon to bear against the forward end of the spindle, for fastening the shaft securely in place, so that it will rotate with the spindle for driving the tool or implement (not shown). The bushing 36 is extended from the yoke 26, and has an annular groove 39. This is for the purpose of enabling a bearing 40 or other member to be slipped on the extended portion of the bushing, for convenience in positioning or manipulating the spindle 37 and shaft 38, and a ball or catch 41 slidable in the bearing or member 40 is adapted to snap into the groove 39 under the influence of a spring 41′, for retaining the bearing or member 40 and yoke 26 in assembled relation, yet permitting them to be pulled apart. In this way, the various attachments as disclosed in the copending applications hereinbefore referred to, can be used interchangeably with the operating mechanism.

The spindle or arbor 37 is driven from the shaft 13, and, for this purpose, a pulley wheel 43 is secured on the shaft 13 within the yoke 18, and a flat belt 44 passes around the pulley wheels 42 and 43 and its opposite runs extend longitudinally along the arm 17 at opposite sides thereof. The belt 44 passes the opposite ends of the pivots 22 and 25 edgewise, and to guide the belt and cause it to bend substantially the same as the arm in the axes of the pivots 22 and 25, guide rollers 45 and 46 are carried by the yokes 26 and 18, respectively, at the oppo-

site sides of the yokes and at the opposite sides of the axes of the respective pivots. The belt 44 passes between the rollers of the pairs and said rollers guide the belt for movement in planes in which the axes of the pivots are disposed, and the belt is twisted between the pulley wheel 42 and rollers 45 and between the pulley wheel 43 and rollers 46. Said rollers are disposed to guide the belt in planes coinciding with the axes of the pivots 22 and 25 across the opposite ends of said pivots, so that the sections of the arm and terminal yokes thereof can swing relatively to one another, in which event the belt will bend over the rollers in substantially the same manner as the parts of the arm. This arrangement admits the use of a flat belt, so that there is less liability of slipping, than if a round belt were used, because the belt has broad bearing surfaces against the pulleys. Furthermore, the rollers 45 and 46 will hold the runs of the belt in place when the sections of the arm are rotated relatively by the provision of the swivel connections between them. The spring 30 in exerting a tension to elongate the arm, will keep the belt 44 taut. The rollers 45 are mounted on axle pins 47 extending through the yoke 26, and the terminals of said pins, at the opposite sides, are preferably connected by means of cross bars 48 secured thereon. The rollers 46 are similarly mounted on axle pins 49 extending through the yoke 18.

The arm or boom 10 and arm or hanger 17 suspended therefrom are counter-balanced. Thus, the terminals of the yoke 6 are extended, as at 50, beyond the pivots 4 opposite to the boom 10, and weights 51 are slidable on said extensions 50 and are secured in place by means of set screws 52. These weights can be adjusted so that the boom 10 will be balanced, to move upwardly and downwardly freely, and to remain in or assume a normal position, as seen in Fig. 1.

The carriage or truck 2 comprises a suitable body or deck 52 having bearings 53 at the lower surface mounted on transverse axles 54 to which the wheels 55 are secured. As seen in Fig. 1, the wheels 55 at one side have smooth broad tread surfaces 56 to travel on one rail 57, while the wheels 55 at the opposite sides have annular peripheral grooves 58 to engage the other rail 59 of a track. The track can extend along the floor, on a bench, or the like, for the movement of the carriage from place to place, and angle irons are conveniently used for the rails. The grooves 58 in engaging one rail, will prevent the transverse shifting of the wheels on such rail, and the broad smooth tread surfaces 56 of the opposite wheels can travel on the rail 57, even though the rails are not strictly parallel or are laid with slight variations in gauge. The wheels 55 are also provided with rubber tires 60 of larger diameter than the portions of the treads of the wheels which run on the rails, so that the carriage can be run on the floor or other surface without scratching or marring the most delicate surface, and to also cushion the carriage to eliminate noise and jars or shocks. The carriage can thus be conveniently run on a track, or removed from the track and pushed around over the floor or bench.

The turntable stand includes an upright bearing 61 having a base flange 62 secured on the carriage body 52, and in which a post 63 is fitted, and a depending bearing 64 has a flange 65 at its upper end on which the turntable 9 is secured, said bearing 64 being fitted on the post 63 and resting on the bearing 61. The turntable 9 can thus be turned on the post 63 to turn the boom 10 around a vertical axis.

In operation, a great latitude of flexibility of the mechanism enables the tool or implement to be applied to the work in practically all positions, so that the mechanism will conform to various requirements and conditions. There are seven distinct adjustments, which can be made either individually or jointly with one another, that will enable the tool or implement to be manipulated in a great many ways, sufficient for practically all needs. First, the carriage 2 can be moved on the track or surface. Second, the turntable 9 can be turned about a vertical axis. Third, the boom 10 can be swung upwardly and downwardly about a horizontal axis in the different positions of the turntable. Fourth, the yoke 18 can be swung around the shaft 13 with the arm 17. Fifth, sections 20, 27 and 23 of the arm can be swung about the pivot 22. Sixth, the yoke 26 can be swung about the pivot 25. Seventh, the yoke 27 can be turned about the axis of the arm 17.

The mechanism is conveniently used in the shop, factory or on the premises of a building under construction, to enable various tools or implements to be driven effectively, and permitting such implements to be moved about and positioned according to the work to be done. The machine is also readily moved about to be used by different workmen or for different jobs.

Having thus described the invention, what is claimed as new is:—

1. A mechanism of the character described comprising a motor, a support for the motor, a boom, operating means carried by the boom and connected to the motor, and means for pivotally supporting the boom and adjustable to bring the axis of the pivot into alinement with the axis of the motor.

2. A mechanism of the character described comprising a motor, a boom, operating means carried by the boom and operatively con-

nected with the motor, and means for supporting said motor and boom for the swinging movement of the boom and to adjust the motor and boom relatively to bring the axis of the motor and pivotal axis of the boom in alinement.

3. A mechanism of the character described comprising a motor, a support for the motor, a boom, operating means carried by the boom and connected with the motor, and an adjustable mounting for the boom including a post carried by said support and having a slot, and a pivot for the boom adjustable in said slot to aline with the axis of the motor.

4. A mechanism of the character described comprising a motor, a support for the motor, a boom having a yoke disposed astride the motor and pivotally mounted on said support to move partly around said motor, and operating means carried by the boom and operatively connected with said motor.

5. A flexible operating mechanism according to claim 4 wherein the yoke has an extended terminal, and a weight adjustable on said terminal to counterbalance the boom and operating means.

6. A mechanism of the character described comprising a motor, a base for the motor, a pair of posts rising from the base and having vertical slots, pivots adjustable in said slots to aline with the axis of the motor, a boom having a yoke disposed astride the motor and engaging said pivots, and operating means carried by the boom and connected with the motor.

7. A mechanism of the character described comprising a motor having a pulley wheel, a boom, a shaft supported by the boom, a pulley wheel on said shaft, a belt passing around said pulley wheels, flexible operating means connected to said shaft, and means for supporting said motor and boom for the swinging movement of the boom about an axis and for the relative adjustment of the motor and boom to bring the aforesaid axis and axis of the motor in alinement.

8. A mechanism of the character described comprising driving means including a pulley wheel, a boom swingable around the axis of said means, a member adjustable on the boom, a shaft carried by said member, a pulley wheel on said shaft, a belt passing around said pulley wheels, and flexible operating means connected to said shaft.

9. A mechanism of the character described comprising a flexible arm, a bushing at the free terminal of said arm and extended from the arm for the engagement of a bearing or member thereon, a tubular spindle rotatable in said bushing for receiving a mandrel, shank or shaft, and flexible means extending along the arm for rotating said spindle.

10. A mechanism of the character described comprising a flexible arm, a pair of bushings carried by the arm at the free terminal thereof, one of the bushings being extended for the engagement of a bearing or member thereon and having means for the engagement of a catch for holding the bearing or member in place, a tubular spindle mounted for rotation in said bushings, a pulley wheel secured on said spindle between the bushings, said spindle having means for the attachment of a mandrel, shank or shaft therein, and a belt extending along said arm and passing around said pulley wheel.

11. A mechanism of the character described comprising a shaft, an arm having one end engaging said shaft and having a plurality of sections, two sections having an adjustable connection and two sections a slidable connection, spring means between the lastnamed sections for separating them, a spindle carried by the other end portion of the arm, pulley wheels on said shaft and spindle, and a belt extending along said arm and passing around said pulley wheels.

12. A flexible operating mechanism having a flexible arm with a free terminal portion provided with a portion for the engagement of a bearing or a member, a spindle mounted in said terminal portion of the arm, and flexible means extending along the arm for rotating said spindle, the spindle being formed for the engagement of a mandrel, shank or shaft.

In testimony whereof I have signed my name to this specification.

P. L. BILLINGSLEY.