A. LEE.

EXPLOSION ENGINE.

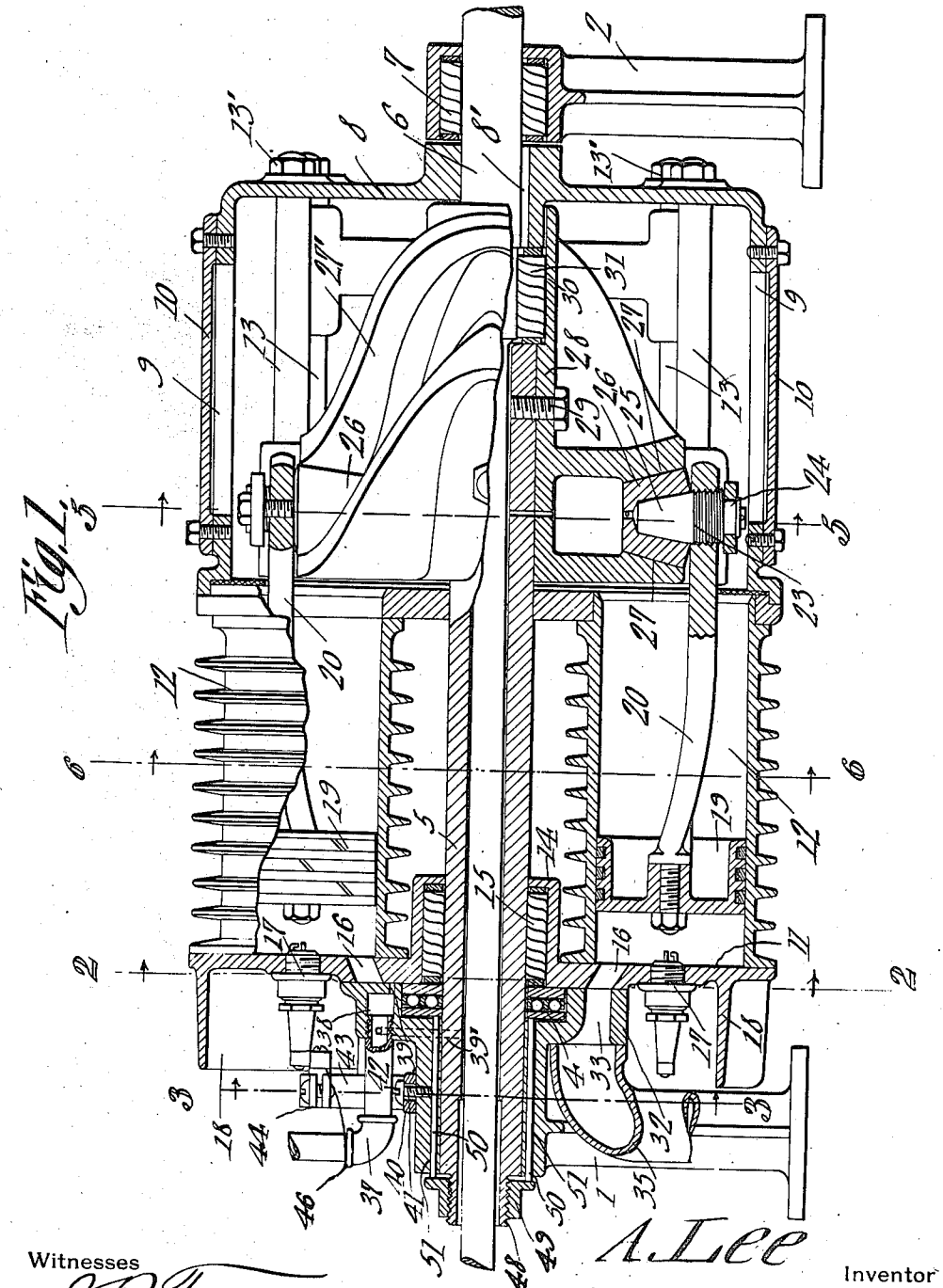
APPLICATION FILED MAR. 1, 1915.

1,183,470.

Patented May 16, 1916.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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3 SHEETS—SHEET 2.

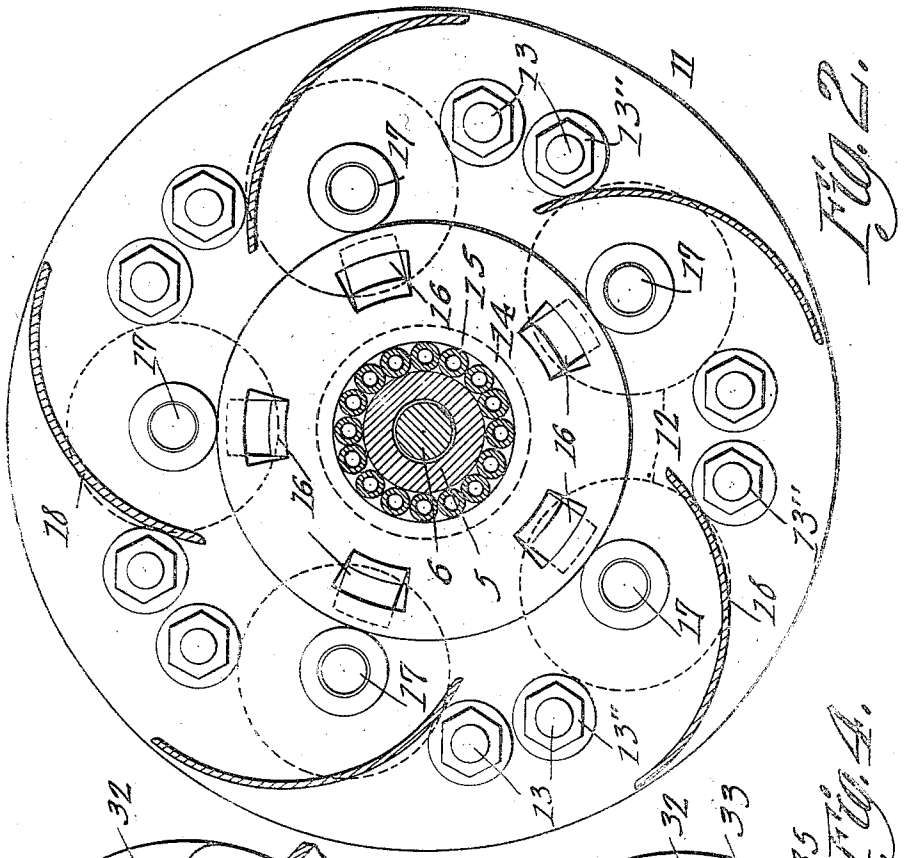


Fig. 2.

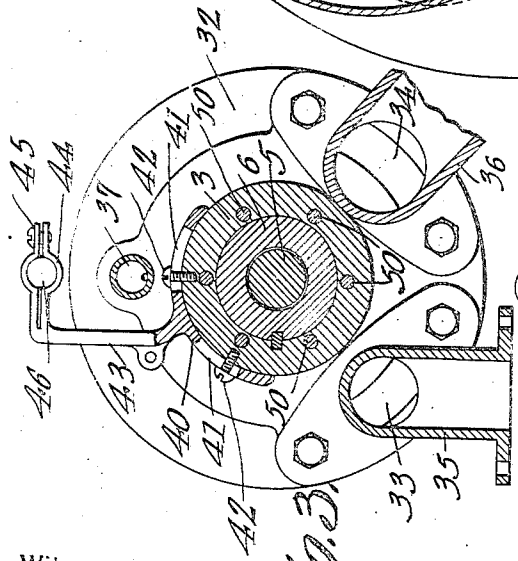


Fig. 3.

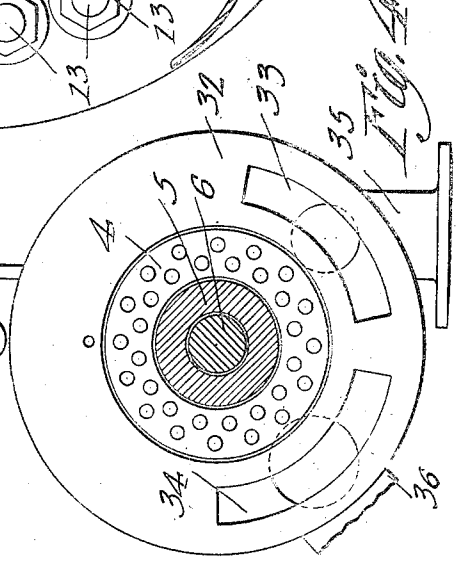


Fig. 4.

Witnesses

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EXPLOSION ENGINE.

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1,183,470.

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3 SHEETS—SHEET 3.

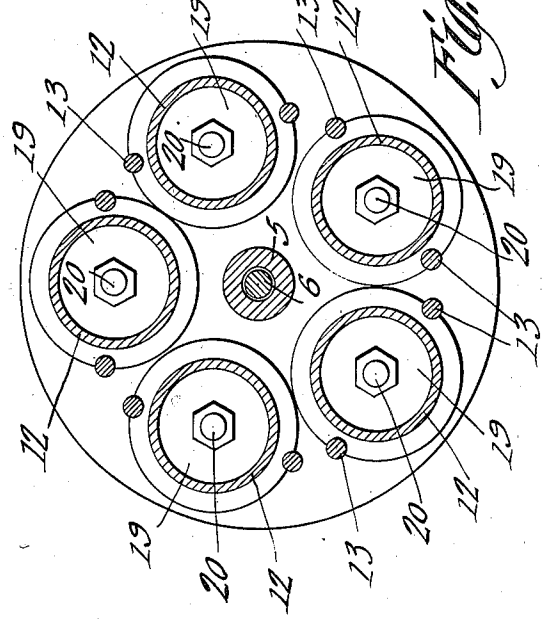


Fig. 6.

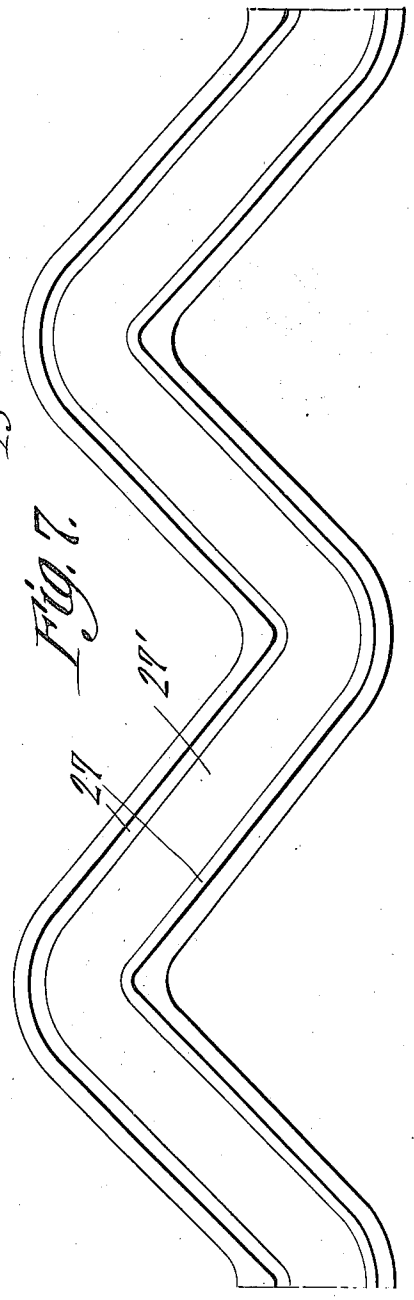


Fig. 7.

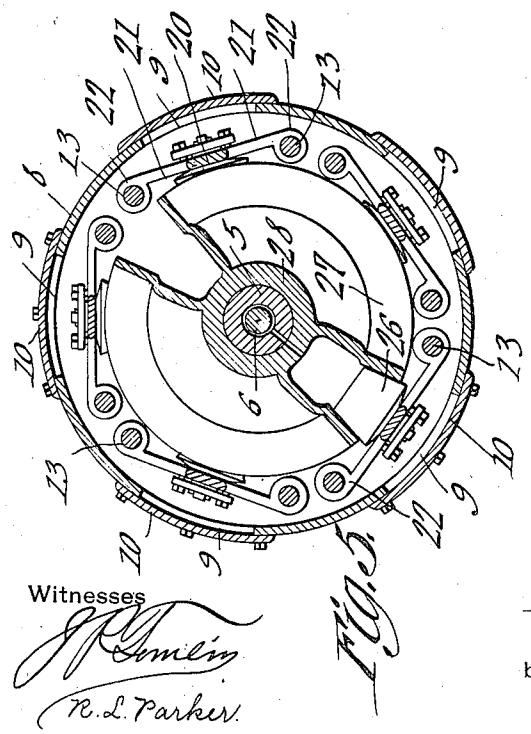


Fig. 5.

Witnesses

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UNITED STATES PATENT OFFICE.

ALFRED LEE, OF BELLINGHAM, WASHINGTON.

EXPLOSION-ENGINE.

1,183,470. Specification of Letters Patent. Patented May 16, 1916.

Application filed March 1, 1915. Serial No. 11,242.

To all whom it may concern:

Be it known that I, ALFRED LEE, a citizen of the United States, residing at Bellingham, in the county of Whatcom and State of Washington, have invented a new and useful Explosion-Engine, of which the following is a specification.

The present invention relates to improvements in explosion engines, and of that type, in which an annular series of longitudinal cylinders are connected for simultaneous rotation to serve as a fly wheel and thus dispense with the ordinary balance or fly wheel and make a compact and simple engine particularly for use upon automobiles, air craft and the like, one object of the invention, being the provision of a novel construction and arrangement of parts, by means of which the carbureted air is properly supplied to the cylinders in proper time and exhausted therefrom also in proper time.

A further object of the present invention, is the provision of a rotating member, including an annular series of parallel power cylinders each having a reciprocatory piston mounted therein, the rod of which is guided in a straight line movement by the means that connect the various rotary parts together, said rods also being operatively connected to a cam member whereby the reciprocatory movement imparted to the piston is in turn transformed into a rotary movement of the rotating member which as before stated includes the power cylinders and their pistons, such cylinders constituting the balance member or momentum device and consequently dispensing with the usual fly wheels.

A still further object of the invention, is the provision of an engine of this character, which is simple, inexpensive and durable in construction and which is thoroughly efficient and practical in use.

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

In the drawings—Figure 1 is a view partly in section and partly in side elevation of the complete engine. Fig. 2 is a section taken on line 2—2 of Fig. 1. Fig. 3 is a section taken on line 3—3 of Fig. 1, with the portion to the rear of the section dispensed with. Fig. 4 is a reverse view of the parts shown in Fig. 3. Fig. 5 is a section taken on line 5—5 of Fig. 1. Fig. 6 is a section taken on line 6—6 of Fig. 1. Fig. 7 is a diagrammatical view of the stationary cam groove.

Referring to the drawings, the numerals 1 and 2 designate the pillar supports or standards of the present engine, the support 1 being provided with the V-shaped member which in turn properly incases the end thrust bearing 4 and has mounted rigidly therein, the tubular shaft 5. Disposed for rotation within the tubular shaft 5 and also in the bearing portion of the standard 2 is the drive shaft 6, which is supported by roller bearings 7, and a supporting member 3 is supported by the standard 1.

A casing 8 which is keyed, as at 8′, to the shaft 6 is provided with a plurality of hand holes 9, closed by covers 10 so that access may be had to the working parts of the engine later to be described.

The disk 11, which constitutes a common head for the cylinders 12 is connected together with the cylinders by means of the tie bolts 13 to the casing 8, so that the casing 8, cylinders 13 and head 11 rotate in unison. The disk 11 is provided with a port 16 for each cylinder 12 and with a spark plug 17 one for each cylinder, said port 16 constituting an intake and an exhaust port as will presently appear. The ends of the respective tie bolts 13 are threaded to receive the respective lock nuts 13′ and 13″, so that the head 11 is clamped firmly upon one end of the cylinder 12, while the casing 8 is clamped upon the opposite end thereof. Carried by the head 11 is the inwardly projecting bearing carrying sleeve 14, which is provided with the roller bearings 15 which surround the stationary tubular shaft 5 at such point and thus form with the roller bearings 7 and 31 the proper anti-frictional support for the rotating member of the present engine. The thrust bearing 4 is so disposed as to abut the outer face of the head 11, and thus take care of the end thrust of the rotating parts.

Upon the outer face of the disk 11 are provided the tangentially disposed plates 18, which constitute a fan means whereby when the member is rotating, the air is caused to

flow toward the center of the head of the present engine and consequently keep the same cooled, while the outsides of the cylinders 12 are provided with air cooling flanges of usual construction.

A piston 19 is mounted for reciprocation within each cylinder 12 and has a piston rod 20 attached thereto. Cross arms or heads 21 are attached to the piston rods 20 and have sleeves 22 embracing guide rods 13, two guide rods being provided for each piston rod. These two rods 13 constitute a guiding means for the piston rod 20 so as to insure a straight line movement thereof during the reciprocation of the piston 19. Also connected to the piston rod at the junction of the cross arms thereto, is the threaded member 23, which is held in place by the nut 24, and is provided with the truncated member 25, which is anti-frictionally connected to the cone roller 26, which is adapted to fit within the groove 27 between the flanges 27′ thereof, of the stationary member 28. Thus as the pistons 19 are reciprocated, the cam groove being stationary, will impart a rotary movement to the parts 8, 11 and 12 and consequently through the key 8′ drive the shaft 6. The member 28 is connected by means of the screw or other means 29 to one end of the stationary sleeve 5, thus insuring the rigidity of such member. Disposed within the encircling ends 30 of the member 28 and about the shaft 6, are the rollers 31, thus producing a bearing at this point.

Upon the outer face of the member 11 carried by the sleeve 3 of the standard 1, is a disk 32, which is provided with the intake port 33 and the arcuate exhaust port 34, there being connected to such plate to control the admission of the carbureted charge to the port 33, the intake manifold 35 and also connected to the member 32 so as to control the exhaust of the burnt gases from the port 34 is the exhaust manifold 36. Thus these parts remain stationary and as the respective ports 16 of the cylinders 12 are brought into registration therewith, the charge is drawn within the chamber of the respective cylinders 12, compressed therein and exploded, as will presently appear to thus impart the desired reciprocation of the piston 19 and consequently through the rollers 25 and the member 28 the desired rotation with the shaft 6.

To provide a means for timing the action of the ignition system, an arcuate supporting member 40 which is provided with the elongated slots 41, is attached to the member 3 by means of the set screws 42, so that the same may be adjusted circumferentially thereon to thus place the arm 42 which carries the split clamping member 44 and consequently holds the sparking terminal or conducting member 46 in place, so that the terminal carried thereby will be disposed in the path of to engage the outer end of the respective spark plugs 17 during the rotation of the disk 11. Thus by moving the arcuate member 40 to different positions upon the member 3, the energization of the respective spark plugs will be advanced or retarded.

In order to adjust the thrust bearing 4, the outer end of the stationary shaft is threaded as at 48 for the reception of the adjusting nut 49, whose flange is disposed in the path of to engage the sliding rods 50 mounted in the slot 51 of the member 3 so as to project their ends against the thrust bearings 4 and adjust the same relatively to the member 11. This is provided so that any wear may be taken care of at this point.

In order to provide a means for lubricating the present engine, and more particularly the faces of the stationary member 32 and disk 11, the lubricant is supplied through the conduit 37, which opens into the chamber 38 of the member 32, and consequently is fed through the ports 39 between the faces of the respective members 32 and 11 and also through the duct 39′ to the shaft 6. Other points of lubrication are provided for wherever it is found necessary.

From the foregoing description, it is evident that a recipro-rotating four cycle valveless explosion engine is provided, the members 32 and 11 constituting the valve for the intake and exhaust of the gases and thus rendering it unnecessary for the use of other valve mechanisms as is the usual practice in engines of this character. The extreme inner end of the exhaust port 24 is about 5 degrees from the extreme inner end of the intake port, so that shortly after the exhaust, the port 16 of the respective cylinder is brought into registration with the intake port and thus as the piston 19 is moving inwardly, the charge is drawn in, this requiring an 85 degree revolution on the part of the member 11 of the cylinder 12 before the piston begins to return to compress the explosive mixture during a period of approximately 95 degrees of a revolution when the explosion occurs, the port 16 being closed during the explosive stroke for approximately a period of 75 degrees of the revolution, then port 16 comes in communication with the exhaust port and moves for a distance of approximately 100 degrees to the beginning of the revolution or at the time when it leaves the exhaust port and comes in communication with the intake port. Thus with each revolution of the members 8, 12 and 11, a four cycle effect is produced in the power pistons 19.

What is claimed is:

1. An explosion engine, including a fixed tubular shaft, a rotatory shaft having a portion thereof journaled therein, two support-

ing members, one for the tubular shaft and the other for the free end of the rotatory shaft, a plurality of cylinders disposed radially about the tubular shaft and in parallel relation to each other, a casing surrounding the two shafts and one end of the cylinders, tie rods connecting the casing to the cylinders, whereby the cylinders and casing rotate in unison, pistons for the cylinders, piston rods for the pistons, means connected to the piston rods and to the tie rods for guiding the pistons in straight line movement during the reciprocation thereof, means fixed to the tubular shaft and operably connected to the piston rods, whereby as the pistons are reciprocated, the cylinders and casing are rotated, the head end of each cylinder being provided with a gas conducting port, and means for controlling the intake and exhaust of gases from said port.

2. An explosion engine, including a fixed tubular shaft, a rotatory shaft projecting therethrough, a plurality of cylinders connected for simultaneous rotation with the shaft, pistons for the cylinders, means fixed to the tubular shaft and operably connected to the pistons, whereby as the pistons are reciprocated, the cylinders are caused to rotate, the head end of each cylinder being provided with a gas conducting port, a stationary gas conducting member opposed to such end for controlling the intake and exhaust to and from the ports of the cylinders as the cylinders are rotated, a spark plug carried by the port end of each cylinder and projecting exteriorly thereof, and an adjusting terminal member carried by the tubular shaft and disposed in the path to engage the spark plugs during the rotation of the cylinders.

3. An explosion engine, including a fixed tubular shaft, a rotatory shaft projecting therethrough, a plurality of cylinders connected for simultaneous rotation with the shaft, pistons for the cylinders, piston rods connected to the pistons and extending through and exteriorly of the cylinders, guiding means for the pistons to insure a straight line movement thereof, means fixed to the tubular shaft and operably connected to the piston rods, whereby as the pistons are reciprocated, the cylinders are caused to rotate, the head end of each cylinder being provided with a gas conducting port, a stationary gas conducting member opposed to such end of the cylinders for controlling the intake and exhaust to and from the ports of the cylinders as the cylinders are rotated, a spark plug carried by the port end of each cylinder and projecting exteriorly thereof, and an adjusting terminal member carried by the tubular shaft and disposed in the path to engage the spark plugs during the rotation of the cylinders.

4. An explosion engine, including supporting members, a fixed tubular shaft carried by one of said members, a rotatory shaft journaled in the tubular shaft and in the other supporting member, a casing and a plurality of cylinders connected for simultaneous rotation with the shaft and about the tubular shaft, pistons for the cylinders, means fixed to the tubular shaft and operably connected to the pistons, such means being surrounded by the casing, the head end of each cylinder being provided with a gas conducting port, a stationary gas conducting member opposed to such end for controlling the intake and exhaust to and from the ports of the cylinders as the cylinders are rotated, a spark plug carried by the port end of each cylinder and projecting exteriorly thereof, and an adjusting terminal member carried by the tubular shaft and disposed in the path to engage the spark plugs during the rotation of the cylinders.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ALFRED LEE.

Witnesses:
W. H. Abbott,
Lin. H. Hadley.