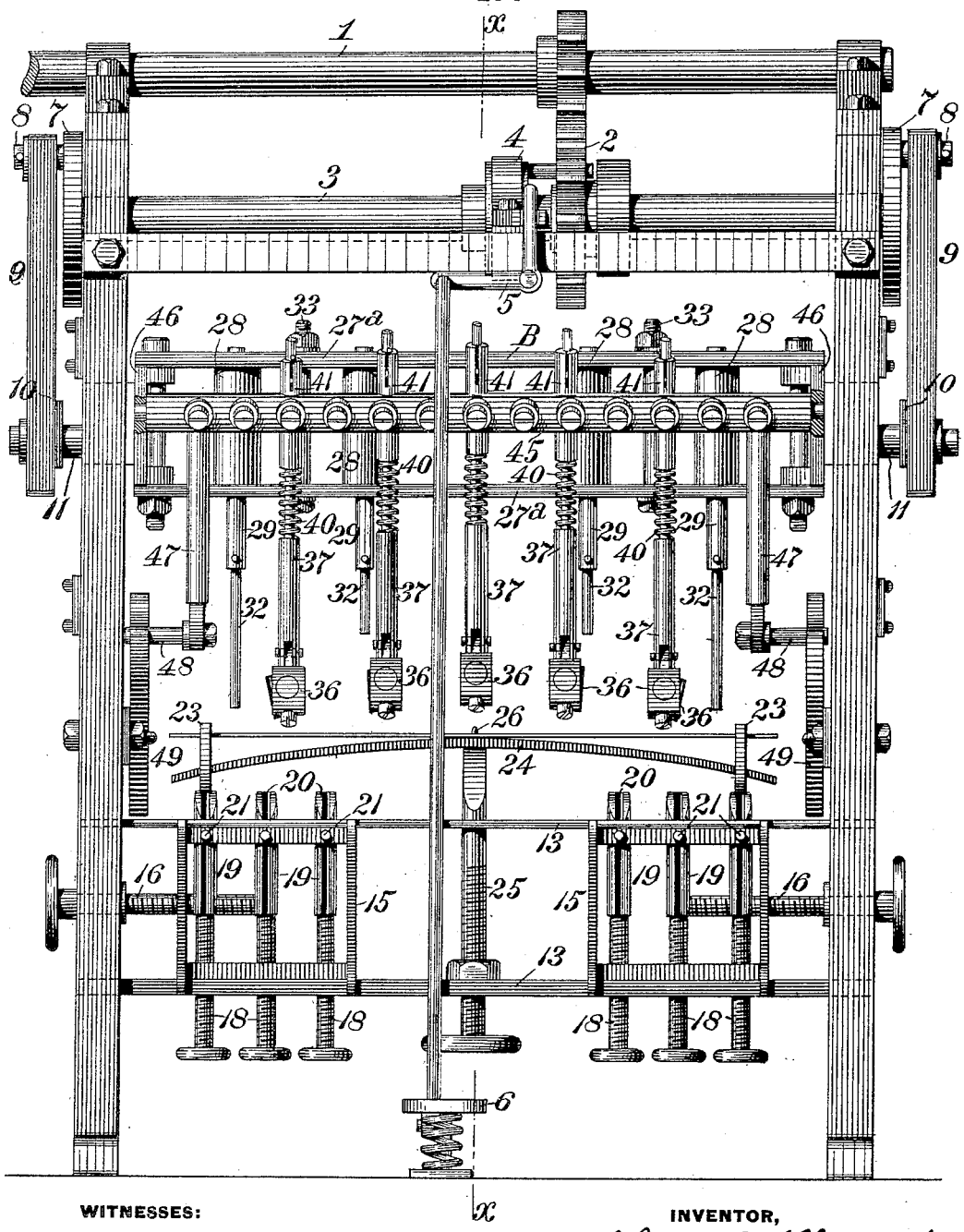
(No Model.) 3 Sheets—Sheet 1.

C. F. SHOEMAKER.

MACHINE FOR SHAPING SPRINGS.

No. 453,779. Patented June 9, 1891.

FIG. 1.



WITNESSES:

Dennis S. Wolcott

F. E. Gaither

INVENTOR,

Charles F. Shoemaker

by George H. Christy

Atty.

(No Model.) 3 Sheets—Sheet 2.

C. F. SHOEMAKER.

MA 'HINE FOR SHAPING SPRINGS.

No. 453,779. Patented June 9, 1891.

FIG. 2.

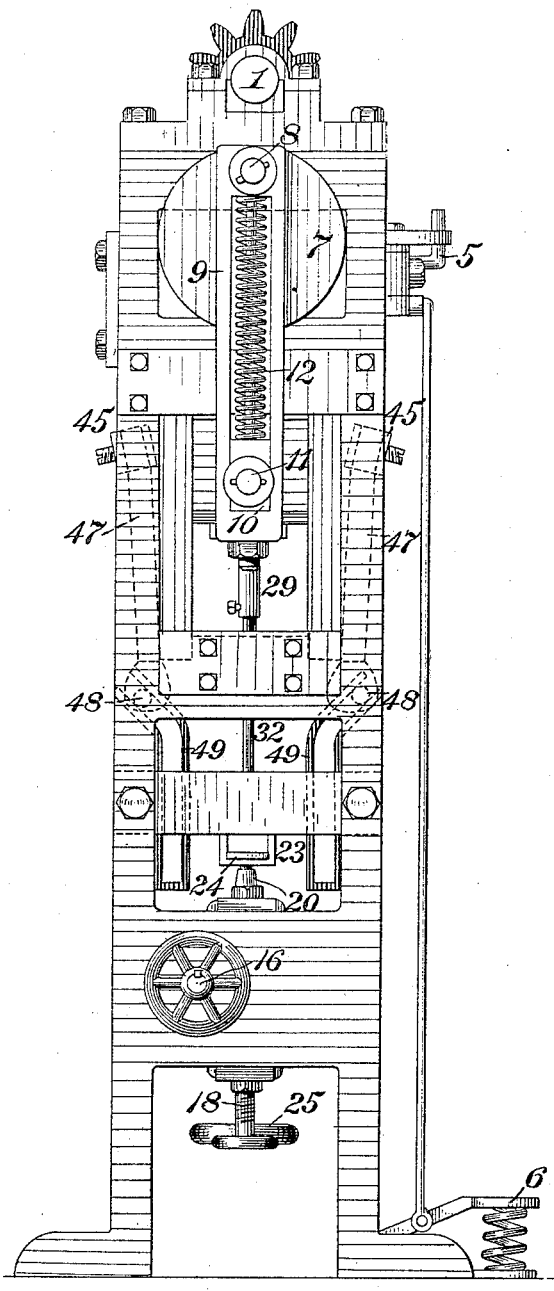
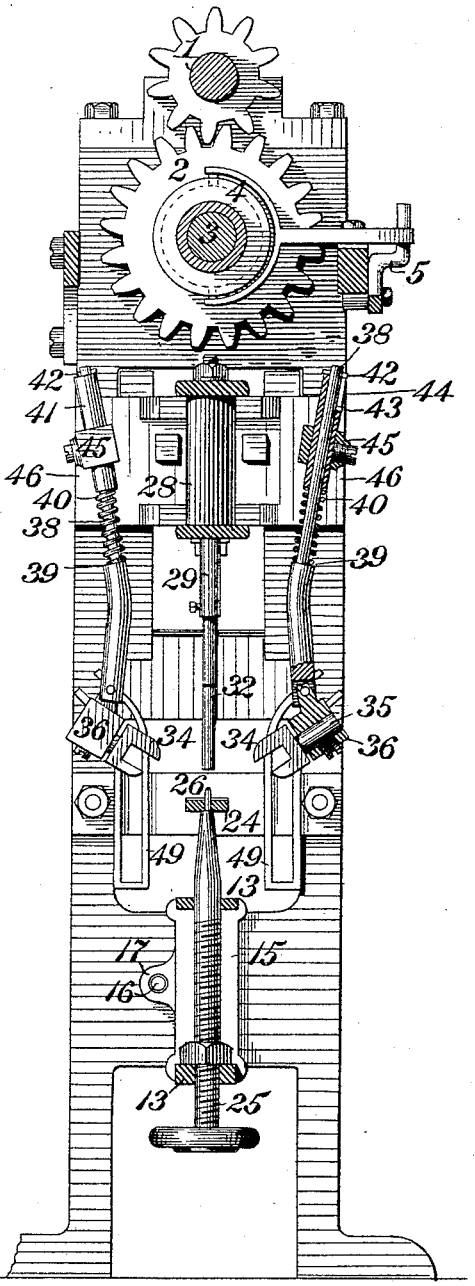


FIG. 3.



WITNESSES:

Darwin J. Wolcott

F. E. Gaither.

INVENTOR,

Charles F. Shoemaker

by George H. Christy Att'y.

(No Model.) 3 Sheets—Sheet 3.

C. F. SHOEMAKER.

MACHINE FOR SHAPING SPRINGS.

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FIG. 4.

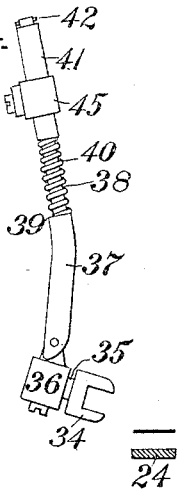


FIG. 5.

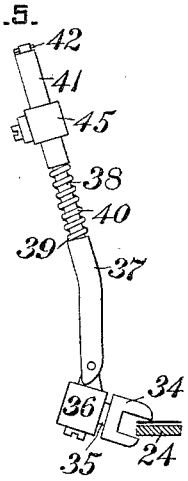


FIG. 6.

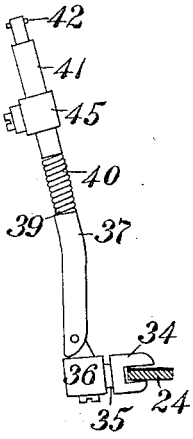


FIG. 7.

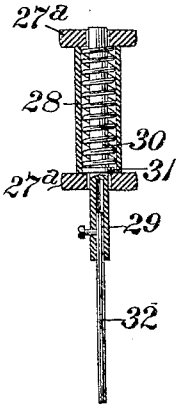


FIG. 8.

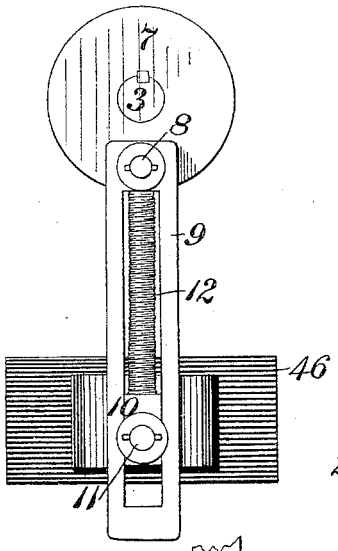


FIG. 9.

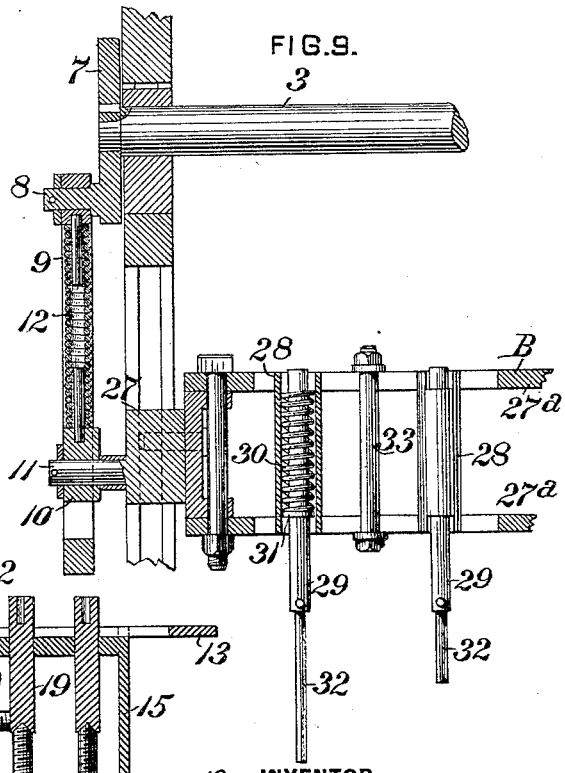
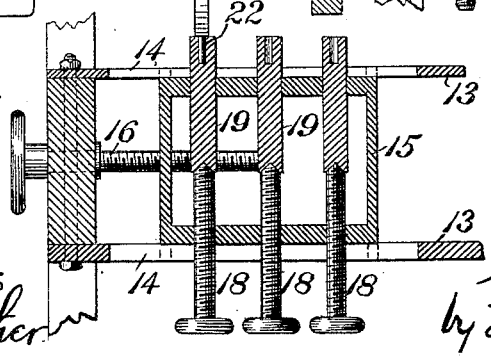


FIG. 10.



WITNESSES:

Dennis S. Walcott

F. E. Gaither

INVENTOR,

Charles F. Shoemaker

by George N. Christy Att'y.

UNITED STATES PATENT OFFICE.

CHARLES F. SHOEMAKER, OF ALLEGHENY, PENNSYLVANIA.

MACHINE FOR SHAPING SPRINGS.

SPECIFICATION forming part of Letters Patent No. 453,779, dated June 9, 1891.

Application filed February 3, 1891. Serial No. 379,981. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. SHOEMAKER, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented or discovered a certain new and useful Improvement in Machines for Shaping Springs, of which improvement the following is a specification.

The invention described herein relates to certain improvements in machines for shaping the leaves of elliptical and other springs; and the invention has for its object an arrangement of gripping and clamping jaws, whereby the heated plates are grasped at any desired number of points along its edges and clamped against a suitably-shaped former until sufficiently cooled to retain the desired shape; and it is a further object of said invention to provide for the formation or shaping of the various kinds and sizes of leafed springs.

In general terms the invention consists in the construction and combination of mechanical devices or elements, all as more fully hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a view in side elevation of my improved machine. Fig. 2 is an end elevation of the same. Fig. 3 is a sectional elevation, the plane of section being indicated by the line $x\,x$, Fig. 1. Figs. 4, 5, and 6 are detail views, on an enlarged scale, of the gripping and clamping devices shown in different operative positions. Fig. 7 is a sectional detail view of one of the press-rods. Fig. 8 is a detail view of the mechanism employed for operating the carrier-head. Fig. 9 is a sectional view on the line $y\,y$, Fig. 7; and Fig. 10 is a sectional detail view of the portion of the machine-support and ends of the spring-former.

The power-shaft 1 is mounted in suitable bearings on the top of the frame A, and has secured thereon a pinion intermeshing with a gear-wheel 2, loosely mounted on the shaft 3, which is journaled in suitable bearings in the frame. The gear-wheel has formed on or attached to it one member of a suitable clutch mechanism 4, the other member being adapted to slide along but rotate with the shaft 3. The movable member of the clutch mechanism is shifted along the shaft by a lever 5, operated by a treadle 6, provided with a spring arranged to so hold the treadle that the movable member of the clutch will be normally out of engagement with the other member.

Disks 7, provided with eccentrically located pins 8, are secured on the ends of the shaft 3, and on said pins are mounted one end of the slotted links 9. Blocks 10 are arranged in the slots of the links, and in said blocks are journaled pins 11 on the ends of the carrier-head B, arranged to slide in suitable ways or guides in the frame. The diameter of the circle described by the pins 8 is somewhat greater than the required vertical movement of the head B, and the blocks 10 are normally held at the ends of the slots in the links 9 by springs 12, as shown in Figs. 2, 7, and 8. The purpose of this construction will be hereinafter stated.

Two transverse bars 13, each provided with slots 14, are secured to the frame of the machine, as shown in Figs. 1 and 2, and between these bars are placed the sliding frames 15, said frames being shifted laterally of the machine by screws 16, passing through the ends of the main frame and engaging threaded holes in lugs 17 on the sliding frames 15. The lower sides of the frames 15 are provided with threaded openings for the screws 18, which extend down through the slots 14 in the lower bars 13. Upon the upper ends of these screws 14 rest the studs 19, which extend up through openings in the upper sides of the frames 15 and the slots 14 in the upper bar 13. These studs 19 are provided with longitudinal grooves 20, with which pins 21 or other equivalent devices engage, so as to prevent the rotation of the studs. In the upper ends of these studs are formed sockets for the reception of stems 22 of the forks 23, which support the ends and adjacent portions of the spring-former 24, the middle portion thereof being supported by a screw 25, passing through holes in the bars 13, the hole in the lower bar being threaded, so as to engage the threaded lower portion of the screw. The upper end of the screw is provided with a pin 26, constructed to pass through an opening in the

center of the former 24 and also to engage a hole in the spring-leaves to be shaped thereon. Ordinarily it is necessary to support only the center and ends of the former, as shown in Fig. 1; but, if desired, forks may be placed in the other studs, so as to support intermediate portions of the former. The independent vertical adjustability of the frames 15 renders it possible to employ formers varying greatly in length and shape. The prongs of the forks 23 are made of such a length as to extend sufficiently far above the former as to serve as guides for the ends of the spring-leaf when pressed down against the former.

The spring-leaf when properly heated is placed upon the former, as shown in Fig. 1, when the operator depresses the treadle 6, thereby causing the members of the clutch mechanism to engage and rotate the shaft 3 and its disks and causing the head B to descend. This head consists of blocks 27 and slotted plates 27^a, connecting said blocks. Sleeves 28 are arranged between the plates 27^a, the reduced ends of said sleeves entering the slots therein, as shown in Fig. 9, and within said sleeves are placed rods 29, which are surrounded by springs 30, the upper ends of said springs bearing against the upper plate 27^a and the lower ends against collars 31 on the rods 29. The collars 31 are made of a diameter greater than the width of the slots in the lower plate 27^a, so that said rods, while free to slide up, compressing the spring 30, cannot be forced out of the sleeves 28 by said springs. The lower ends of the rods 29 have sockets formed therein for the reception of the studs 32, which, when the head B is depressed, as stated, bear up the heated leaf and cause it to conform to a greater or less degree with the former. Only two of these studs bearing upon the leaf at or near its ends are generally necessary; but additional studs bearing upon intermediate points may be employed. The sleeves 28 are adjustable along the slots in the plates 27^a, and are held in their adjusted positions by causing said plates to bear firmly against the shoulders at the ends of the sleeves by tightening up the nuts on the bolts 33, passing through said plates. The studs 32 are removable from the pins 29, thereby permitting of the substitution of longer or shorter studs therefor, as circumstances may require. As the spring-leaf is caused to conform approximately with the former by the studs 32, the edges of the leaf are caught and clamped tightly to the former by the grippers 34. These grippers consist of two rigid jaws, the upper one projecting a short distance beyond the lower one and separated therefrom a distance a little greater than the combined thicknesses of the former 24 and the leaf operated on. The grippers are provided with stems 35, adapted to fit in sockets formed in the blocks 36, and adjustably held therein by set-screws, as shown in Figs. 4, 5, and 6. These blocks are pivotally connected to the lower ends of rods 37 in such manner that while the blocks and gripper can turn up freely their downward and outward movements will be arrested, so as to leave the jaws in operative position, as will be hereinafter described. The rods 37 have their upper portions reduced in size, forming stems 38 and shoulders 39, and over these stems are slipped springs 40 and sleeves 41, the springs being interposed between the sleeves and the shoulders 39. The stems are held as against dropping out of the sleeves by pins 42 or other suitable means, and from rotation therein by pins 43 on the rods engaging longitudinal slots 44 in the sleeves, as shown in Fig. 3. The sleeves are adjustably secured by set-screws in rock-shafts 45, journaled in wings 46 on the sliding blocks 26 of the head B, as shown in Figs. 1 and 3. These rock-shafts have arms 47 secured thereto, said arms having transverse slots in their lower ends for the reception of pins 48, adjustably secured therein, said pins being adapted to engage grooved cams 49, secured to the end pieces of the main frame. As the head B descends, causing the studs 32 to effect a partial shaping of the leaf, the rock-shafts 45 are so turned by the conjoint action of the cams 49 and arms 43 that the grippers are moved inwardly from the position shown in Fig. 4 until their lower jaws will just clear the edges of the former and leaf on the further downward movement of the grippers, as shown in Fig. 5. As the head B continues its downward movement the upper jaws of the grippers rest upon the leaf, so that on the further movement of the head the grippers are turned upward, thereby bringing the lower jaw under the former, as shown in Fig. 6. The lower jaw will now act as a fulcrum and the continued movement of the head will cause the upper jaw to bear firmly upon the leaf and press it down upon the former. The springs 40 have a sufficient tension to effect the clamping movement described; but the tension should not be so great that the pressure of the upper jaw will deface the leaf.

As hereinbefore stated, the diameter of the circle described by the wrist-pins 8 is greater than the vertical movement of the head required for causing the grippers to clamp the leaf, so that there will be a further downward movement of the pins after the head has been arrested by grippers. This continued movement of the pins is permitted by movable spring-held blocks 10, connected with the head B, which is held by the grippers as against further downward movement, while the links 9 slide over the blocks 10 during the onward movement of the wrist-pins 8. This construction and mode of operation permits of the holding of the leaf against the former for a sufficient interval to allow of the cooling and setting thereof without arresting the continuous operation of the power mechanism. The cooling and setting of the leaf may be facili-

tated by the application thereto of water or other cooling medium in the manner customary in spring-shaping machines.

I claim herein as my invention—

1. In a spring-shaping machine, the combination of a former and two series of two or more grippers constructed to engage opposite edges of a spring-leaf and clamp it upon the former, substantially as set forth.

2. In a spring-shaping machine, the combination of a former, a reciprocating head, and two series of two or more grippers connected to said head and constructed to engage opposite edges of a spring-leaf and clamp it upon the former, substantially as set forth.

3. In a spring-shaping machine, the combination of a former, a reciprocating head, two series of two or more grippers having a pivotal connection with the head, and cams for shifting the grippers in line for engagement with the spring-leaf on the descent of the head, substantially as set forth.

4. In a spring-shaping machine, the combination of a former, a reciprocating head, rock-shafts mounted on said head, yielding rods adjustably secured to the rock-shafts, grippers pivotally connected to said rods, and cams for operating the rock-shafts, substantially as set forth.

5. In a spring-shaping machine, the combination of a former, a reciprocating head, yielding studs connected to the head for pressing the leaf against the former, and grippers for engaging the edges of the leaf and clamping it upon the former, substantially as set forth.

6. In a spring-shaping machine, the combination of a former, a reciprocating head, yielding studs adjustably connected to the head and adapted to press the spring-leaf against the former, and grippers for clamping the leaf in position, substantially as set forth.

7. In a spring-shaping machine, the combination of a former, a reciprocating head provided with the former, rotating crank or wrist pins, links connected to the crank-pins and having yielding connections with the reciprocating head, substantially as set forth.

8. In a spring-shaping machine, the combination of a former, a reciprocating head provided with means for causing a spring-leaf to conform with the former, rotating crank or wrist pins, slotted links connected with said pins, and spring-held blocks arranged in the slots in the links and connected to the reciprocating head, substantially as set forth.

9. In a spring-shaping machine, the combination of a screw, a series of two or more vertically-adjustable studs, and a former supported by the screw and stud, substantially as set forth.

10. In a spring-shaping machine, the combination of a screw, a series of two or more vertically and laterally adjustable studs, and a former supported by said screw and studs, substantially as set forth.

11. In a spring-shaping machine, the combination of a screw, laterally-adjustable frames, a series of two or more studs arranged in said frames, a like series of screws also arranged in the frames and supporting the studs, and a former supported by the screw and studs, substantially as set forth.

12. In a spring-shaping machine, the combination of a screw provided with a centering-pin, a series of laterally and vertically adjustable studs, forks detachably connected to the studs, and a former having a central opening for the reception of the pin on the screw and supported at or near its ends by the forks, substantially as set forth.

In testimony whereof I have hereunto set my hand.

CHARLES F. SHOEMAKER.

Witnesses:

DARWIN S. WOLCOTT,

FRANCIS X. BARR.