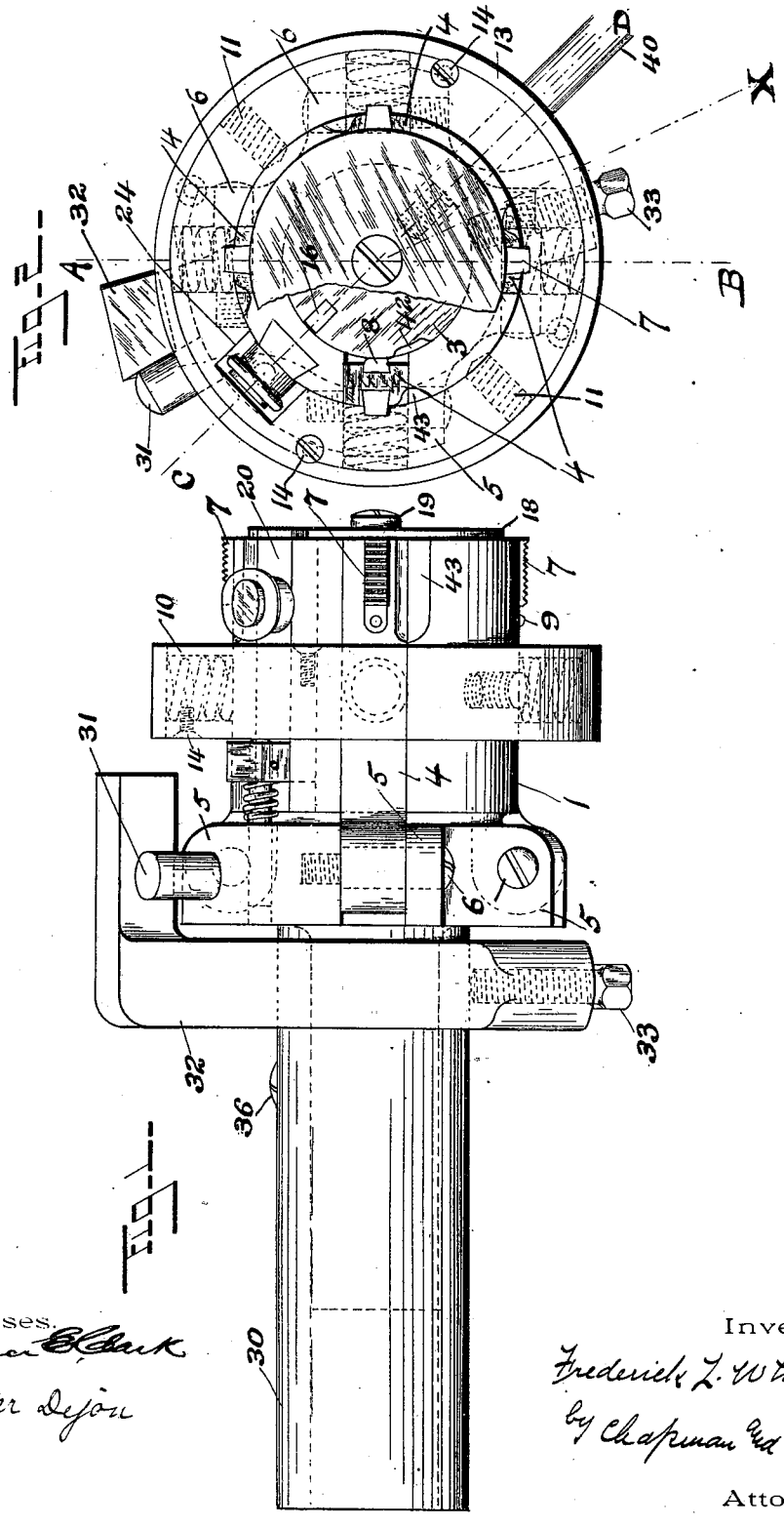
No. 627,556. Patented June 27, 1899.

F. L. WHITE.

TAP.

(Application filed Mar. 14, 1898.)

(No Model.) 2 Sheets—Sheet 1.



Witnesses.
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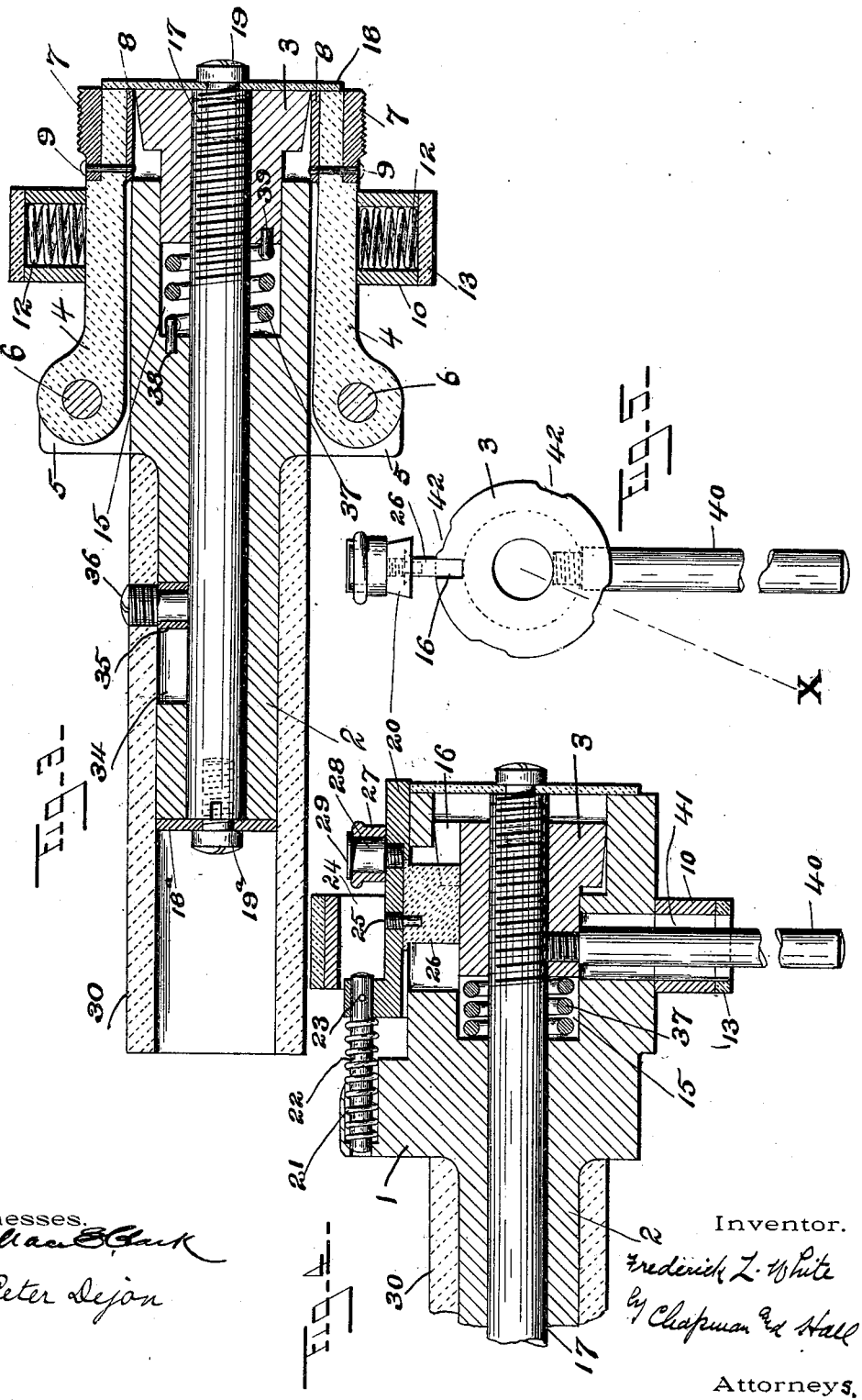

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UNITED STATES PATENT OFFICE.

FREDERICK L. WHITE, OF WATERBURY, CONNECTICUT, ASSIGNOR TO GEORGE H. CLOWES, OF SAME PLACE.

TAP.

SPECIFICATION forming part of Letters Patent No. 627,556, dated June 27, 1899.

Application filed March 14, 1898. Serial No. 673,790. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK L. WHITE, a citizen of the United States, residing at Waterbury, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Taps, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention comprises a tap whose cutting diameter can be increased or decreased to cut an internal thread of greater or less diameter and also comprises mechanism whereby the cutting parts of the said tap will collapse when a thread has been cut of a predetermined depth, thus allowing the tap to be withdrawn from the threaded hole by a single straight pull instead of a continuous backward rotation, as in taps of ordinary construction.

It is my object to construct the mechanism of a tap having these qualities of few parts that will be sure and positive in their operation and that can be manufactured at a slight cost and assembled in such a manner as to require little or no skill to operate them.

With these ends in view my invention consists of the tap having certain details of construction and combination of parts, as will be hereinafter described, and more particularly pointed out in the claims.

Referring to the drawings, in which like numerals designate like parts in the several views, Figure 1 is a side elevation of the tap complete. Fig. 2 is an end elevation of the same. Fig. 3 is a longitudinal transverse section upon line A B of Fig. 2. Fig. 4 is a fragmentary section upon line C D of Fig. 2. Fig. 5 is an end elevation of the supporting-head and slide.

The tap-body is composed of a head portion 1 and a shank portion 2, the outer end of the head portion being recessed for the reception of the supporting-head 3.

A plurality of radial grooves are cut in the tap-head 1, within which are fitted the carriers 4, whose outer faces are substantially flush with the periphery of the said tap-head. The carriers 4 are pivotally connected at their rear ends, by means of the screw-pins 6, with the ears 5 5, projecting from the tap-head. I have shown in my drawings an illustration of a tap having four carriers; but this number is not essential, as the device will operate equally as well with more or less, and I do not, therefore, limit myself to a tap having only four carriers. In the outer ends of the carriers and in the top sides thereof are the chasers or thread-cutters 7, and in the under side thereof are the hardened shoes 8. A pintle 9, which passes through the said cutters 7, carriers 4, and shoes 8, holds the said parts in their proper relative positions. By inserting new sets of chasers having teeth of the required size and shape the tap can be used for cutting threads of an endless variety with only a slight cost for tools.

Surrounding the tap-head 2 and the carriers 4 is a collar 10, made fast to the tap-head by the headless screws 11, and upon the outside of the collar is the band 13, locked thereto by the screws 14. A plurality of radial holes corresponding to the number of carriers are bored through the said collar 10 from the outside thereof to the central bore and within which are inserted the coil-springs 12, resting upon the top of the said carriers and prevented from flying outward by the band 13.

The supporting-head 3 is made with an enlarged portion having an outer surface tapering from the front to the rear end and a reduced portion of substantially the same diameter as the recess 15 in the tap-head, within which it is free to partially rotate and to slide when being adjusted. Upon the outside of the tapered portion is cut a series of grooves 42, corresponding in number with the carriers 4, and through the same enlarged portion is the radial slot 16, the function of which will be hereinafter described.

Within the central bore of the tap-body is the adjusting-shaft 17, one end of which is threaded and the supporting-head 3 screwed thereon. At either end of the adjusting-shaft 17 is a collar 18 18^a, secured to the said shaft by the screws 19 19^a.

The numeral 20 designates the trip-slide, which operates within a longitudinal groove upon the outside of the tap-head 1 and is retained in its normal position by the action of the coil-spring 21, surrounding a spring-shaft 22, which is secured to the trip-slide by the pintle 23. The collar 10 is cut away at 24 to

allow the projecting portions of the trip-slide to pass through. Projecting downward from the bottom of the trip-slide 20 through the outer shell of the tap-head 1 and secured to the said slide by means of the screw 25 is the locking-tongue 26 for holding the supporting-head 3 against rotation when the radial slot 16 is brought into register therewith. Near the front end of the trip-slide 20 is mounted a loose roll 27 upon a fixed stud 28, having the shoulder 29 of larger diameter than the bore of the roll.

The tap, as illustrated in the drawings, is designed for use in the head of a turret-lathe, and in order that the same may be held rigid within the said turret-head and still have a limited longitudinal movement I have provided the sleeve 30, which surrounds the shank 2 and is held fast in the turret-head by any of the methods common among that class of machinery. The tap-body is held against rotation in relation to the sleeve 30 by means of the stop 31, projecting from the head of the tap and resting against the arm of the dog 32, which is rigidly secured to the sleeve 30 by the set-screw 33. A limited longitudinal movement of the tap-body within the sleeve 30 is derived from the coöperation of the elongated slot 34 in the shank 2 and the antifriction-roll 35 within the said slot mounted upon the lower end of the screw 36 in the sleeve 30.

The operation of my improved tap is as follows: The sleeve 30 is made fast in the turret-head, and the article to be tapped is secured in the chuck of an ordinary turret-lathe. In the drawings the tap is shown ready for the threading operation—that is, the outer ends of the carriers resting upon the enlarged portion of the supporting-head 3 and held in such position by the action of the coil-springs 12, which bear against the outside of the same. The trip-slide 20 is in the extreme outward position, and the locking-tongue 26 is in register with the radial slot 16, thereby holding the supporting-head against rotation. The lathe is now started, thereby rotating the chuck and the article to be threaded. The tap is started in the hole and the turret-head held fast in this position. When the tap is started into the hole to be threaded, the stop 31 is brought up against the laterally-projecting arm of the dog 32, and thereby prevents the rotation of the same. As the tap feeds itself into the hole it is drawn out of the sleeve 30 and derives a longitudinal movement which is accommodated by the elongated slot 34 in the shank, the antifriction-roll 35, and screw 36. When the tap has reached a predetermined depth, the roll 27 is brought up against the face of the article being threaded and is pushed backward, carrying with it the trip-slide 20, until the tongue 26 is drawn out of the slot 16 in the supporting-head 3, thereby freeing the same. The said supporting-head now receives a partial rotation through the action of the spring 37 within the recess 15, the ends of which abut against the pins 38 39 in the tap-body and the supporting-head, respectively. A lever 40, screwed into the adjusting-head 3, projects outward through a recess 41 in the tap-head 1, collar 10, and band 13 and limits the rotation of the said supporting-head by striking against one end of the above-mentioned recess. The position of the lever 40 when the tap has collapsed is shown by the broken lines X, representing the center of the said lever, in Figs. 2 and 5. When the supporting-head 3 has reached the limit of its rotation, the grooves 42 in the said head are brought into line with the shoes 8 upon the under side of the carriers, and the outer ends of the said carriers are forced into the said groove toward the center of the tap and away from the threaded hole by the action of the springs 12, which bear against the outside of the said carriers. The grooves 42 are of sufficient depth to admit of the carriers being pressed toward the center of the tap and to free the chasers from the thread. The tap is now withdrawn from the threaded hole by a single straight pull, and the operation is completed. To prepare the tap for another insertion, the lever 40 is pushed back to its original position, (shown by full lines in Figs. 2 and 5,) bringing the tongue 27 into register with the slot 16, which will then slide into said slot by the action of the coil-spring 21 and lock together all of the parts. As the supporting-head is being rotated backward the carriers are forced outward against the action of the springs 12, the shoes 8 upon the under side of the carriers resting upon the periphery of the said supporting-head and riding out of the grooves 42 to the outer surface of the head by such backward rotation. The parts will now occupy these relative positions until tripped again through the roll 27 and its coöperating mechanism or by the lever 40.

In front of each of the cutters 7 a portion of the head and carriers is cut away, as at 43, to provide a clearance for the chips made during the cutting operation.

If it is desired to cut a thread in a body having a smaller bore, or vice versa, I decrease the diameter of the tap by removing either one of the end screws 19 or 19^a and the caps 18 or 18^a, and by rotating the adjusting-shaft 17 the position of the supporting-head 3 is changed in relation to the end of the tap. As the ends of the carriers rest upon the supporting-head, it is obvious that by shifting the position of the said supporting-head in relation to the end of the carriers the opposing carriers will be drawn closer together or forced apart, and thus vary the cutting diameter of the tap according to the position of said head upon the centrally-disposed adjusting-shaft. In Fig. 3 the supporting-head is shown as holding the carriers in their maximum outward position for cutting the thread of the largest diameter, and in Fig. 4 the head is shown in the position wherein the tap is adapted to cut the thread

of the smallest diameter within the range of the tool.

If it is desired to use this tool or tap by hand or in other machines than a turret-lathe, the sleeve 30 can be dispensed with, if necessary, without altering the operation of the cutting mechanism.

In practice it has been found advantageous to operate the lever 40 when in the position designated by the broken line X and throw the carriers out to their full diameter by a stationary cam or lug upon the turret-lathe, which may be placed in any position about the lathe in the path of the tap and be constructed in any manner common to that class of devices.

By the construction of a tap as herein shown and described it requires but a single tool to cut a large variety of threads, and these may be of various diameters. It is also apparent that a much larger amount of work can be done upon the same machine when the tap is withdrawn by a single straight pull rather than by reversing the motion of the lathe and allowing the tap to feed itself out by the thread it has cut while entering. In fine threads this manner of withdrawing a tap is especially desirable, as the tap frequently catches, stripping the thread and spoiling an otherwise perfect piece of work. Again, by my device, wherein the tap collapses when it has reached a predetermined position or depth, the thread upon a large number of articles can be cut of exactly the same depth and the tap released without requiring the attention of the operator.

It is apparent that in carrying out my invention some changes from the construction herein shown and described may be made, and I would therefore have it understood that I do not limit myself to the exact construction herein shown and described, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

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

1. A tap having a recess in the outer end thereof inclosing an auxiliary head and spring mechanism for actuating the said auxiliary head, the combination therewith of a longitudinally-movable trip-slide having a depending tongue coöperating with a slot in the said auxiliary head to lock the same against rotation, substantially as set forth.

2. In a tap having a plurality of independent cutters, and a longitudinally-adjustable auxiliary head, the combination therewith of a plurality of cutter-carriers pivotally mounted at their rear ends to projecting ears upon the body of said tap and the front ends thereof held by springs against the outside of said auxiliary head, thread-cutters or chasers removably attached to the outside, and hardened shoes removably attached to the inside of the said cutter-carriers adjacent to the front end thereof, substantially as set forth.

3. In a tap having independent cutters, cutter-carriers, and mechanism for supporting the same, the combination therewith of a collar surrounding the body of said tap and having a number of radial holes corresponding to the number of cutter-carriers, extending from the periphery to the bore of the said collar, coil-springs within the said radial holes bearing against the said cutter-carriers and a band upon the outside of said collar, all constructed and operating substantially as set forth.

4. In a tap having an auxiliary head for supporting the cutter-carriers, the combination therewith of a combined locking and trip mechanism consisting of a slide operating within a groove in the body of said tap, a depending tongue adapted to be brought into register with a slot in the said auxiliary head and an antifriction-roll secured to the said slide, all constructed and operating substantially as set forth.

5. In a tap having a body portion, independent thread-cutting portions and an auxiliary head for supporting the said thread-cutting portions, the combination therewith of spring-actuated mechanism for locking the said auxiliary head against rotation, substantially as set forth.

6. In a tap having a body portion, independent thread-cutting portions and an auxiliary head, the combination therewith of means for imparting a limited rotary movement to said auxiliary head and means for locking the said auxiliary head rigid against rotation in either direction, substantially as set forth.

7. In a tap having a body portion, independent thread-cutting portions, and an auxiliary head, the combination therewith of means, as a longitudinally-actuated tongue, for locking the said auxiliary head against rotation, means for releasing the said locking mechanism and means for imparting a limited rotary movement to the said auxiliary head, substantially as set forth.

8. In a tap having a body portion, independent thread-cutting portions and an auxiliary head the combination therewith of means, as a longitudinally-actuated tongue for holding the said auxiliary head rigid during the thread-cutting operation, means for actuating said tongue and releasing the said auxiliary head when a thread has been cut of a predetermined depth and means for imparting a limited rotary movement to the said auxiliary head when released, substantially as set forth.

9. In a tap having a body portion and independent thread-cutting portions, the combination therewith of a spring-actuated auxiliary head for supporting the said cutting portions, the said auxiliary head having a plurality of grooves in its periphery, means for locking the said auxiliary head against rotation, means for imparting a limited rotation

to the said auxiliary head and means for imparting a limited backward rotation whereby the said auxiliary head and said locking mechanism may be brought into register, substantially as set forth.

10. In a tap having a body portion independent thread-cutting portions and an auxiliary supporting-head, provided with a plurality of grooves in the periphery thereof, the combination therewith of a slide having a depending tongue which when brought into register with a slot in the said auxiliary head will lock the same against rotation, substantially as set forth.

11. In a tap the combination of a cutter-supporting head having a longitudinal radial slot through one portion thereof, and a plurality of grooves around its periphery, a slide having a longitudinal motion parallel to the axis of said supporting-head, and a tongue attached to the said slide and adapted to hold the said supporting-head rigid when the same is brought into register with the said radial slot, substantially as set forth.

12. In a tap having independent cutting portions, the combination of an auxiliary supporting-head, having a plurality of grooves around its periphery, of a slide carrying a locking-tongue and slide-operating mechanism comprising a roll mounted upon a stud fixed in the said slide substantially as set forth.

13. In a tap comprising a tap-body, an auxiliary supporting-head, mechanism for locking the said auxiliary head against rotation, cutter-carriers, the rear ends of which are pivotally secured to the said tap-body and the forward ends resting upon the said auxiliary head; the combination therewith of a collar surrounding the said tap-body and inclosing radially-acting coil-springs which bear against the outside of the said cutter-carriers and hold the same against the said supporting-head, substantially as set forth.

14. In a tap, the combination of a tap-body, auxiliary supporting-head, in the periphery of which is a plurality of grooves, cutter-carriers, a spring within the said body to impart limited rotatory movement to the said auxiliary supporting-head and an adjusting-shaft having mounted thereon the said auxiliary head, constructed and operating substantially as set forth.

15. A tap having a body and shank portions and a sleeve loosely fitted upon the said shank portion; the combination therewith of a dog rigidly attached to the said sleeve and coöperating with a projection upon the said body portion to prevent the rotation of the said tap within the said sleeve, substantially as set forth.

16. In a tap comprising a body and a shank portion having a central bore therethrough, with a sleeve fitted loosely upon said shank portion, and extending rearwardly therefrom, the combination therewith of means, as a stud fixed to said sleeve and projecting into a recess in the said shank, which recess is in one side of said shank and terminates at the bore thereof, whereby the said body portion may move longitudinally in relation to the said sleeve and be held against rotation, substantially as set forth.

17. In a tap having a body and shank portions, the said shank portion having an elongated slot therein, the combination therewith of a holding-sleeve surrounding the said shank portion, a fixed key-stud within the said sleeve projecting into the said elongated slot, and a dog rigidly attached to the said sleeve and coöperating with a projection upon the said body portion to prevent the rotation of the said body portion while allowing a limited longitudinal movement in relation to said sleeve, substantially as set forth.

18. In a tap having a body and shank portions; the combination therewith of the slotted sleeve 30, stud 36, roll 35 adapted to move in the slot in said slotted sleeve, dog 32 and pin 31, constructed and operating substantially as set forth.

19. In a tap, the combination of the tap-body 1, auxiliary head 3, slide 20, tongue 26, antifriction-roll 27, spring-shaft 22 and spring 21 surrounding the said shaft, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK L. WHITE.

Witnesses:

GEORGE E. HALL,

EDWARD R. LEZOTT.