

(No Model.)

F. A. SMITH.

PROCESS OF MAKING CARRIAGE BOLTS.

No. 324,180.

Patented Aug. 11, 1885.

Fig. 1 Fig. 2

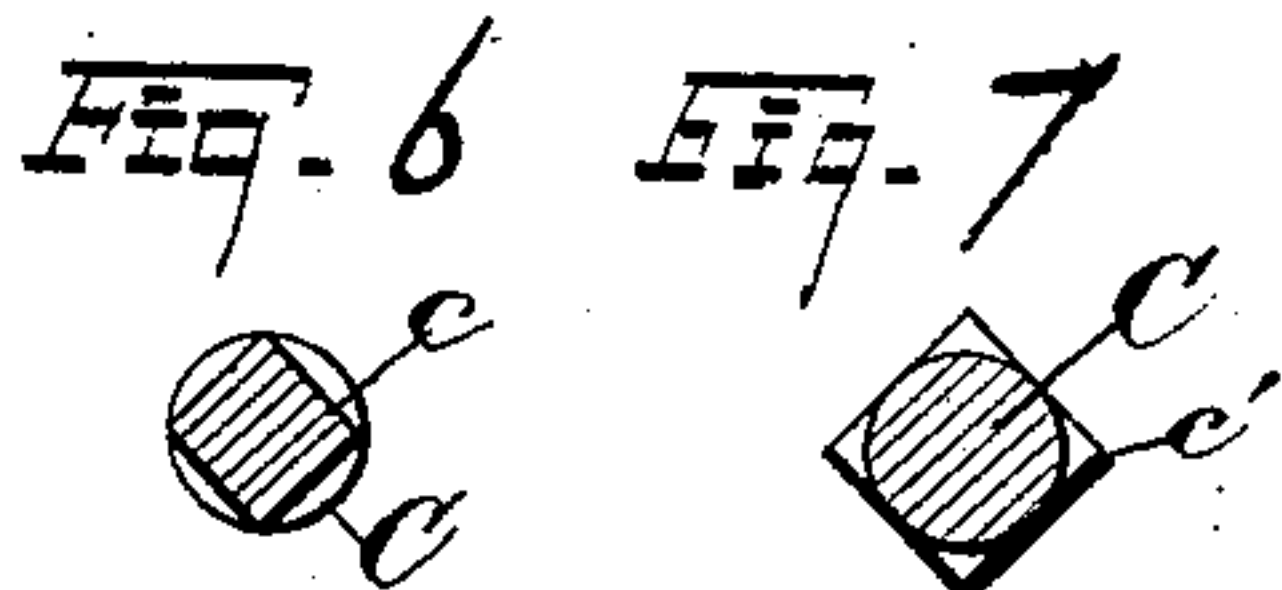
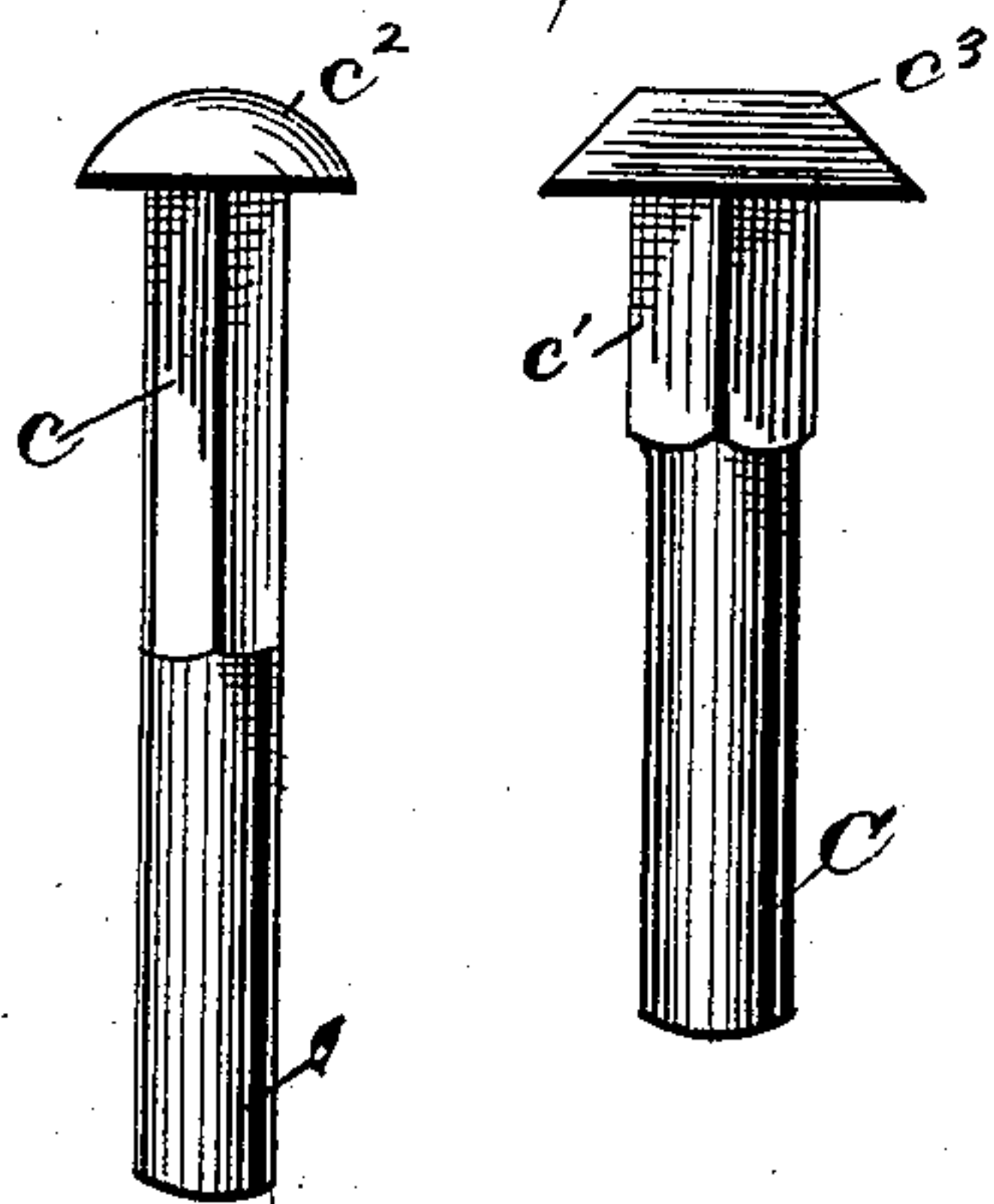


Fig. 3

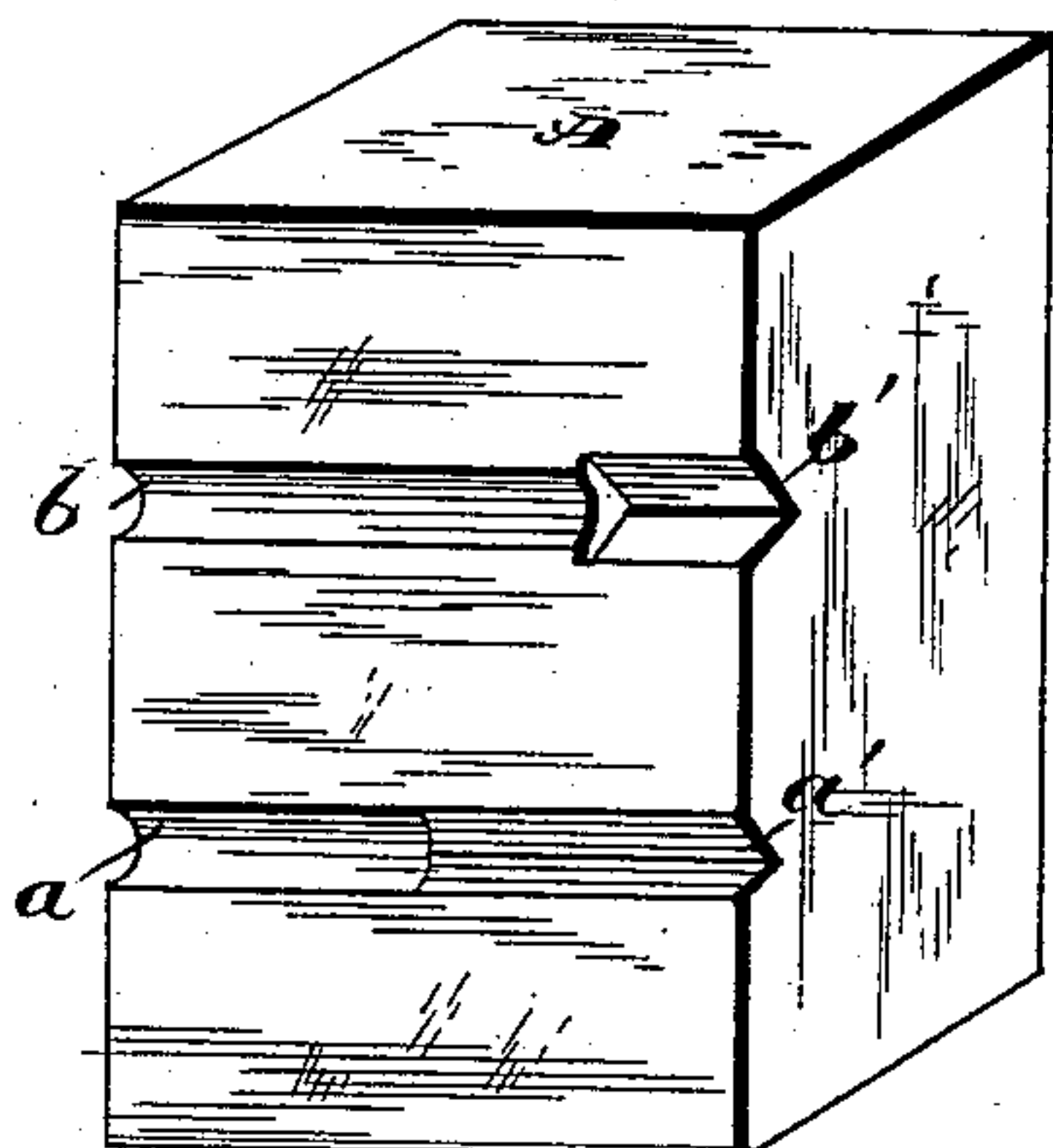


Fig. 4

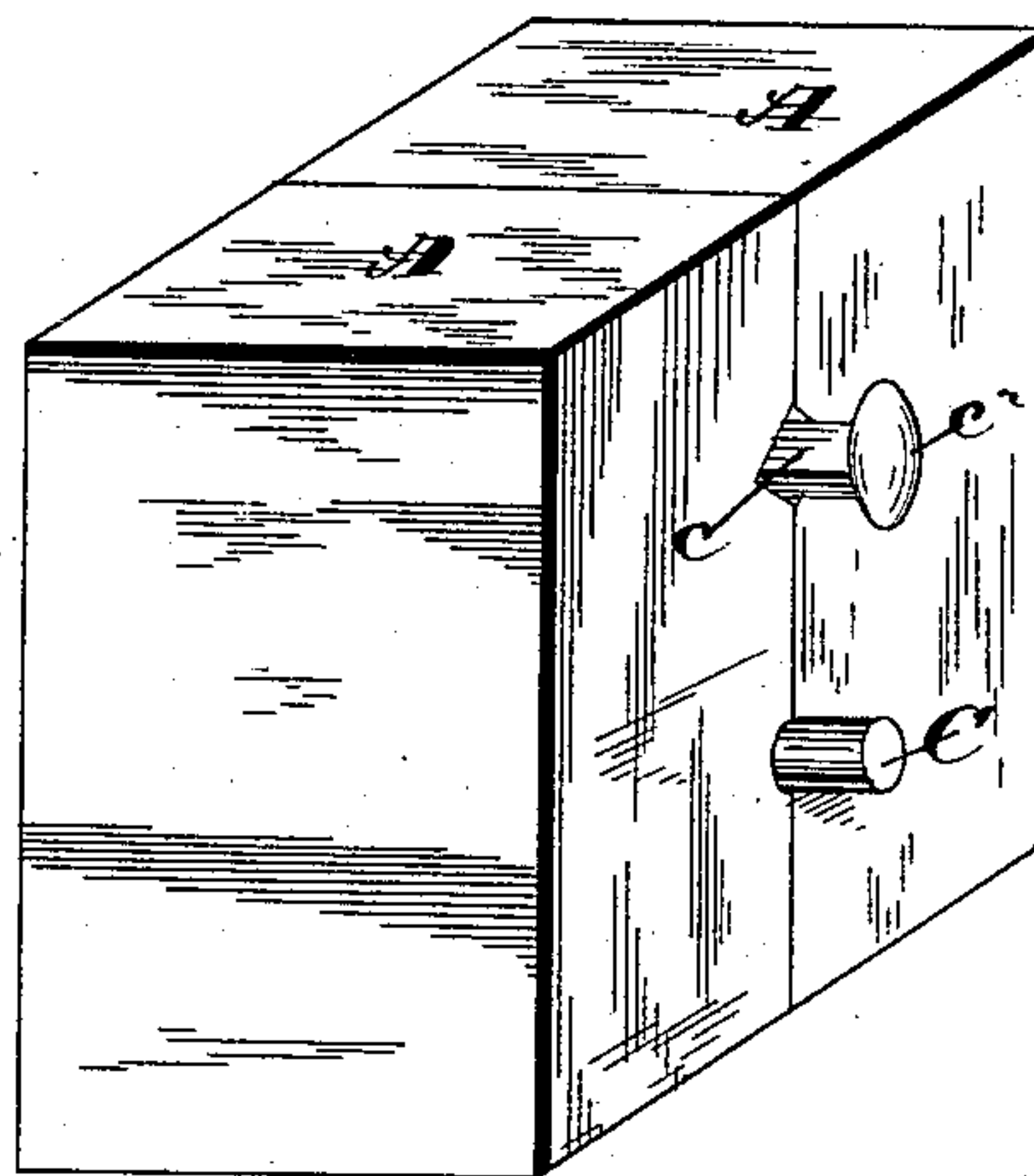
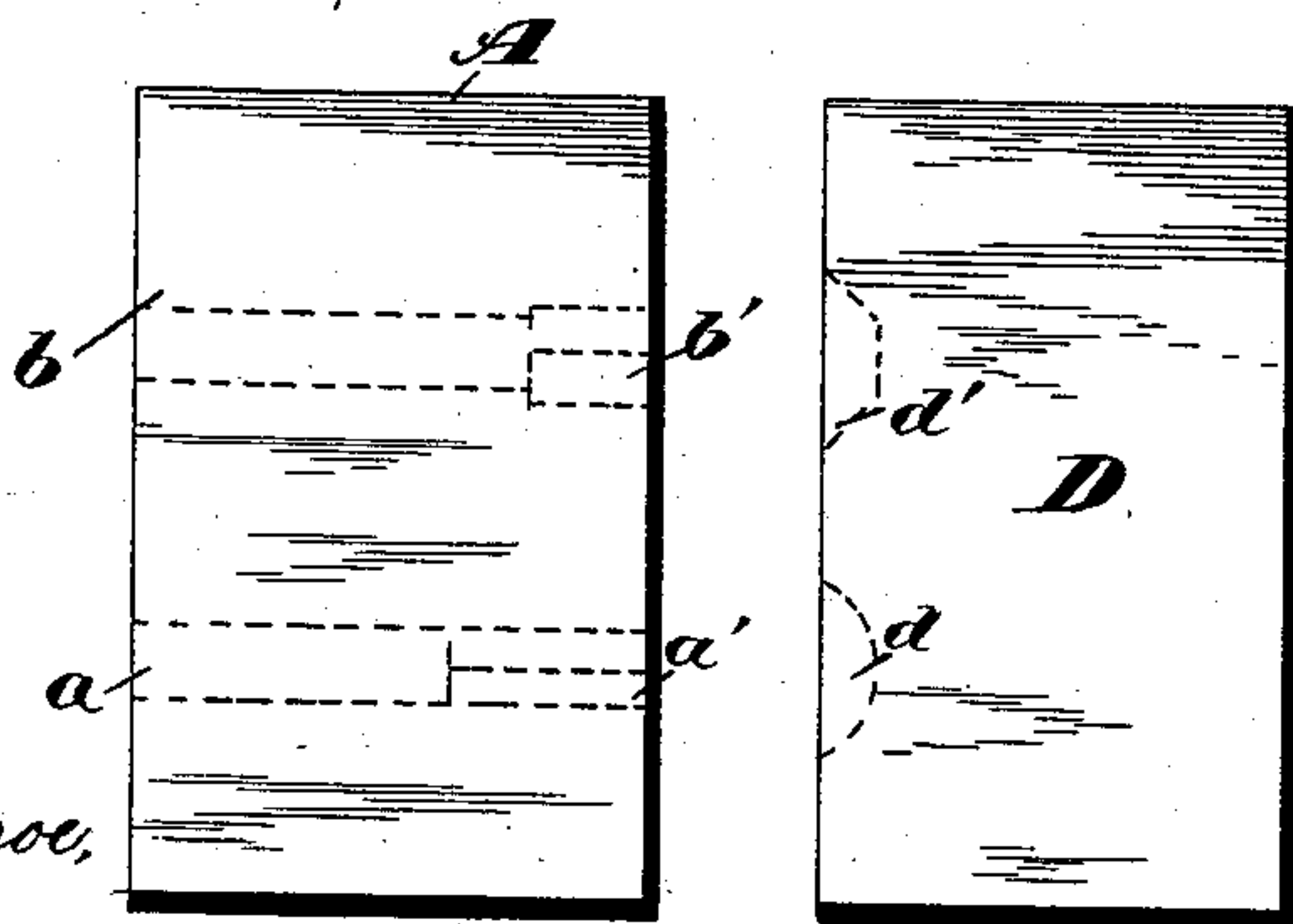


Fig. 5



WITNESSES

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FREDERICK A. SMITH, OF CLEVELAND, OHIO, ASSIGNOR TO THE HOTCHKISS & UPSON COMPANY, OF SAME PLACE.

PROCESS OF MAKING CARRIAGE-BOLTS.

SPECIFICATION forming part of Letters Patent No. 324,180, dated August 11, 1885.

Application filed September 11, 1884. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK A. SMITH, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Manufacturing Carriage-Bolts; 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 pertains to make and use the same.

My invention relates to a process of manufacturing carriage-bolts, the object being to form a suitable head and square shank of the desired length, the sides of which in cross-section should be at least as large as the diameter of the blank, and to complete the operation without reheating the blank.

With this object in view my invention consists in the process hereinafter described, and pointed out in the claims.

The mechanism for carrying out the process, and also the work at different stages of the process, are illustrated in the accompanying drawings.

Figure 1 is a side view in elevation of the work after the compression of the shank and partial formation of the head. Fig. 2 is a side view in elevation of the completed bolt. Fig. 3 is a view in perspective of one of the dies. Fig. 4 is a view in perspective of the compressing-dies closed, and shows the work protruding, subject to the action of the heading die or plunger. Fig. 5 is a side view in elevation of the dies and plunger, showing their relative position when the latter is drawn back, and showing in dotted lines the internal chambers and recesses. Fig. 6 is a diagram showing the comparative sizes in cross-section of the compressed shank and blank after the first operation. Fig. 7 is a diagram showing the comparative sizes of the blank and shank in cross-section when the work is completed.

The outside dimensions of the dies A and the plunger D are made to conform to the machine for which they are intended, and may be made to operate in any of the ordinary machines that are adapted to this class of work. One of the dies A is usually stationary, while the other is reciprocating sidewise to open and close the dies, and the plunger D is reciprocated endwise, and when drawn back from the

dies forms a stop or gage for the end of the blank when the latter is first placed in the dies. The inner faces of the dies have, respectively, grooves *a* and *b*, semicircular in cross-section, that when dies are closed form cylindrical chambers, the walls of which are adapted to grasp the blank and hold it firmly. The groove *a* terminates in a triangular groove, *a'*, a cross-section of which represents an isosceles right-angle triangle, with the hypotenuse approximately equal to the diameter of the blank. The groove *b* terminates in the triangular groove *b'*, of the same shape as the one just described, but whose sides laterally are at least equal to the diameter of the blank. These triangular grooves *a'* and *b'*, when the dies are closed, form sockets square in cross-section in which the shanks are formed. The heated blank, of round iron in cross-section and cut in suitable length, is first placed between the open dies at the grooves *a* and *a'*, with the end of the blank extending beyond the face of the dies to the plunger. The plunger is always drawn back when the dies are open, and thus forms a stop or gage for the end of the blank, leaving just enough metal outside of the face of the dies to form the head. When the dies are closed, a portion of the blank is compressed within the grooves *a*, forming a long square shank, as shown at *c*, Fig. 1. While the dies are closed the plunger D advances and upsets the end of the blank and forms a head, *c'*. When the dies are again opened, the blank is removed to the grooves *b* and *b'* above, and is given a quarter-turn to bring any fins that may have been formed on the shank by the closing of the dies into the solid corners of the grooves *b'*. The plunger again serves as a gage, and when the partially-formed head *c'* engages the heading-recess *d'* in the plunger the arrangement of parts is such that the point of union between the round and square parts of the blank will be at the corresponding part of the dies. When the dies are closed, the round part of the blank is grasped and firmly held in the grooves *b*, while the part *c* is inclosed in the grooves *b'* and extends some distance beyond the face of the dies, as shown at Fig. 4. When the plunger advances, the shank *c* is upset into the groove *b'*, and as the dies are closed tight

before this upsetting occurs, and as the shank *c* has already square full corners, the result is that the finished shanks *c'* are as full, square, and perfect as could be desired. The grooves *b'*, although considerably larger, are so much shorter than the grooves *a'* that there is sufficient metal in the shank *c* to fill the groove *b'*, and usually a surplus is had in front of the dies after the grooves *b'* are filled, and this surplus metal is compressed into the finished head *c'*. A small jet of water is applied to the face of the dies to keep these parts from becoming overheated, and although but one or two seconds of time are required for the whole operation of forming the bolt, still the water slightly chills and hardens the protruding part of the bolt, so that the hottest, and consequently the softest, part of the shank is inside the groove *b'*, so that this part is first upset, entirely filling, as aforesaid, these grooves. The countersink or recess *d'* in the plunger may be of any suitable shape to form the required head.

What I claim is—

1. The process herein described of forming the head and shank of a carriage-bolt from a heated cylindrical blank, and consisting, essentially, first, in compressing a portion of the blank in suitable dies, so as to form a long shank square in cross-section, with the sides in a lateral direction less than the diameter of

the blank, and after such compressing upsetting the end of the blank projecting beyond the dies into a head; second, upsetting the compressed shank into a suitable cavity in the dies, forming a shorter and larger shank square in cross-section, and with sides at least equal to the diameter of the blank, and at the same operation compressing and finishing the head, substantially as set forth.

2. The process hereinbefore described of forming the shank and head of a carriage-bolt from a heated cylindrical blank without reheating, and consisting, essentially, in the following steps: first, compressing a portion of the blank in suitable dies, forming a shank square in cross-section, and the sides laterally less than the diameter of the blank, and by the same operation compressing a head by the action of the plunger; second, upsetting the compressed shank into a suitable recess or chamber in the dies, and forming a shank square in cross-section, and with sides at least equal to the diameter of the blank, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 14th day of August, 1884.

FREDERICK A. SMITH.

In presence of—

CHAS. H. DORER,
ALBERT E. LYNCH.