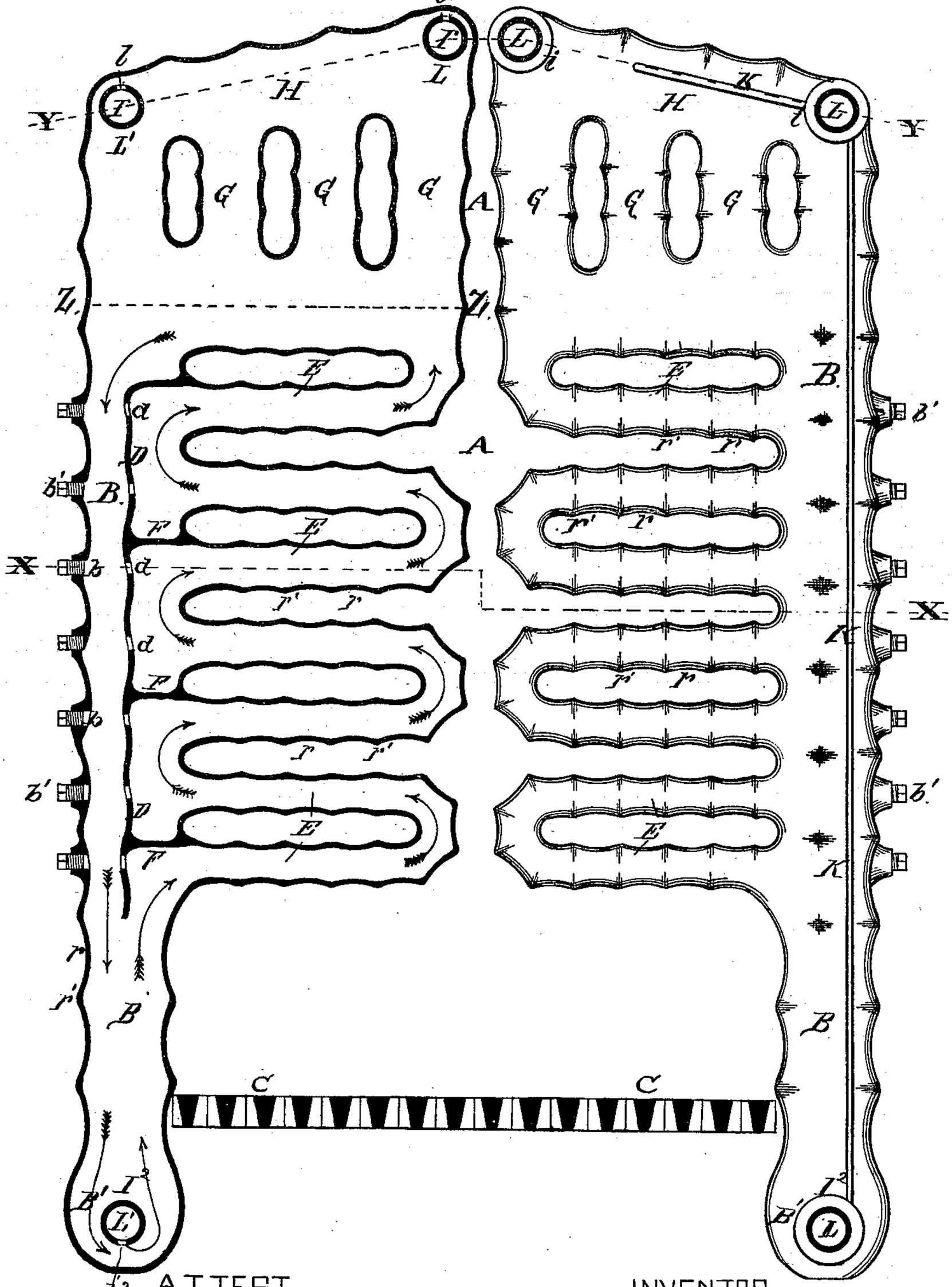
2 Sheets—Sheet 1.

J. G. MINER.

Sectional Boiler.

No. 201,273. Patented March 12, 1878.

FIG. 1.



ATTEST:

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INVENTOR.

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2 Sheets—Sheet 2.

J. G. MINER.

Sectional Boiler.

No. 201,273. **Patented March 12, 1878.**

FIG. 2.

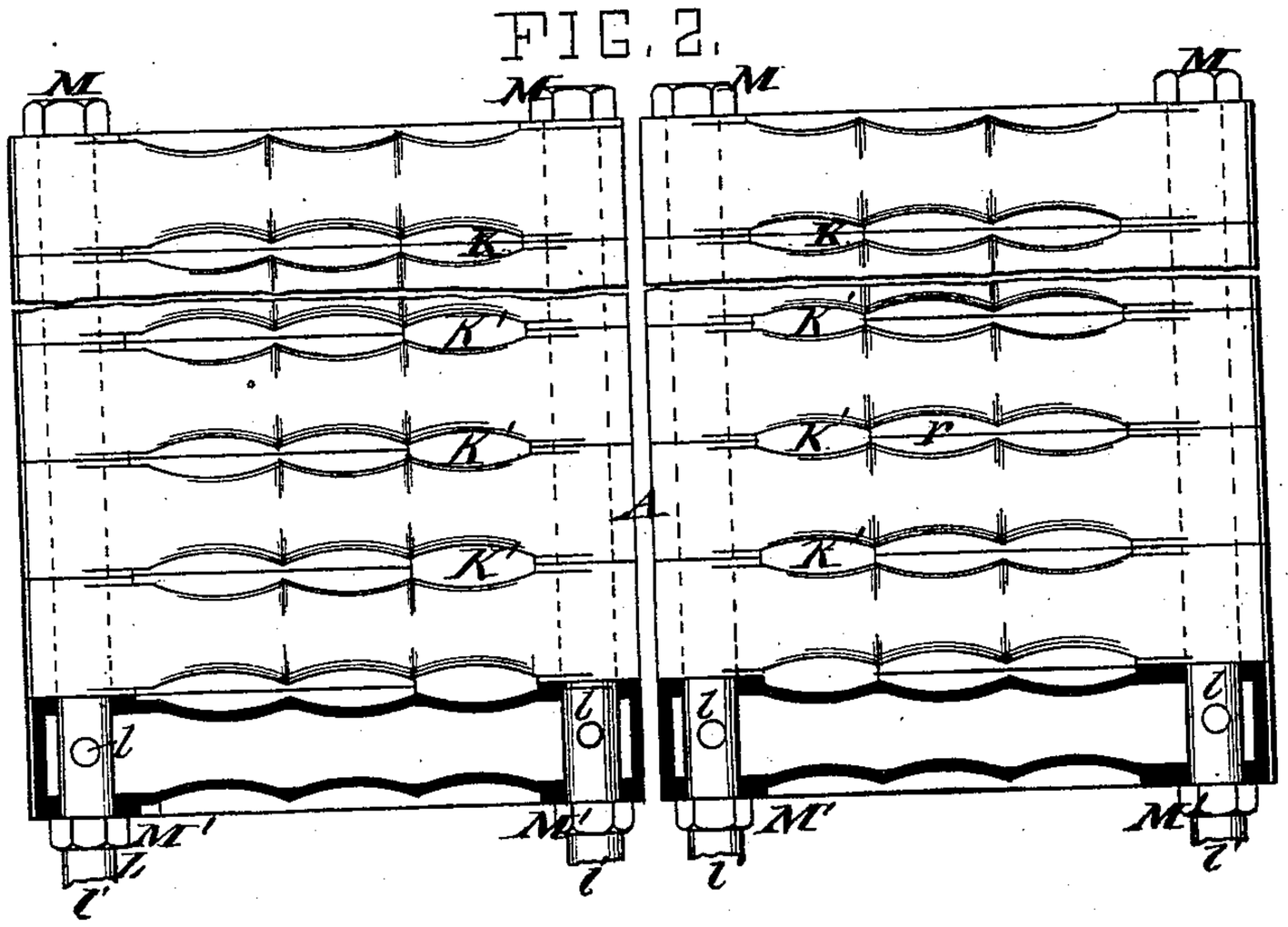
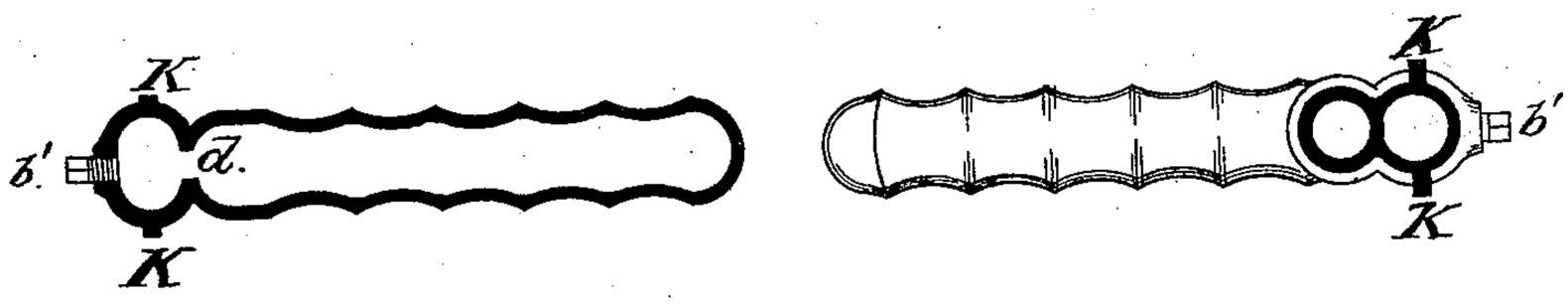


FIG. 3.



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UNITED STATES PATENT OFFICE.

JAMES G. MINER, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN SECTIONAL BOILERS.

Specification forming part of Letters Patent No. **201,273,** dated March 12, 1878; application filed August 18, 1877.

To all whom it may concern:

Be it known that I, JAMES G. MINER, of the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This improvement belongs to that class of boilers in which a number of metallic sections are associated together. Each section has at the outer side a vertical part, ending at bottom in a water-leg extending below the grate-bars, and from whose inner side project a number of U-formed pipes. The top of each section is divided by transverse flues into a number of connecting-pipes, as shown. A corrugated division extends vertically through the vertical portion of the boiler, to form a separation between the ascending and descending water. Each flue, between the legs of the U, is connected to the vertical division-plate, so as to insure a positive circulation of the water. At the outer sides and top corners of each section are flanges, which come in contact with like flanges of the proximate sections, and form a case, dispensing with the necessity of an inclosing case or walls where the room is limited to such an extent as to render it desirable.

The whole shell of the section is fluted transversely, the convex sides of the flutes being inward and the metal thickened at the springing points of the arcs. The purposes of this construction are to allow the uneven expansion and contraction of the metal without injury, and to enable resistance to a high steam-pressure.

In the drawings no fire front or casing is shown, as no novelty is claimed in these, and the peculiar construction of my boiler allows the latter to be dispensed with.

Figure 1 is one half in front elevation and one half in section at line *z z*. Fig. 2 is a top view of the boiler, with part in section at *y y*, Fig. 1, to show the stay-pipes. Fig. 3 is a horizontal section at *x x*, Fig. 1, through a pair of the sections.

The boiler may consist of any number of metallic sections standing in pairs transversely to the depth of the furnace, thus arching over it. There is a space, A, between the sections of the opposite sides for the upward passage of the products of combustion. The sections on each side are, at the outer edge, in close connection with the others upon the same side, and the interiors are in communication at three points, and through the apertures of communication extend the stay-pipes, which run from front to back of the boiler, and upon which are nuts, which screw against the outside of the front and back sections upon each side.

A description of one section will apply alike to each of the others, except that some are made with a rib extending around their whole outer side and top, to make close connection with the other sections, and others are made with a portion of the rib absent at the crown, so that a passage is left for the smoke into the chimney.

Each section has at the outer side a vertical pipe, B, ending at bottom in a water-leg, B′, which extends below the level of the grate-bars C.

D is a transverse vertical partition that extends the greater part of the height of the pipe B, so as to form a separation between the downward current on the outer side and the upward current on the inner side of said partition. Extending inward from the pipe B are a number of U-formed pipes or loops, E, as shown. In line with each leg of the loop is a perforation, *d*, in the partition D, and in the same line is a hole, *b*, in the outer side of the pipe B, stopped by a plug, *b′*, to allow access being had to the interior of the pipes E for the purpose of cleaning them inside. F is an extension of the lower side of the lower leg of each return-bend pipe E, which extends to the vertical partition D, so as to close the upward course at the inner side of the vertical partition D, and force the water to traverse the return-bend pipes E, as indicated by arrows.

Above the system of return-bend pipes E the boiler-section consists of vertical pipes G and an inclined pipe, H, the latter forming the top of the section. At the upper corners of the section are holes passing through the section horizontally, and marked, respectively, I and I¹. These holes have a projecting margin, *i*, faced off flush with the rib or riser K, which projects from the front and rear side

of the pipe B. The faces *i* of one section are tight-jointed to the similar faces of the proximate sections. At the bottom of the section is a similar hole, I^2, for communication from section to section at the bottom. Through the holes I I^1 I^2 extend fore and aft pipes L and L′, running the whole depth of the boiler, so as to form a means for connecting the sections together, said pipes receiving nuts L′, bearing against the front and rear section of the boiler. The pipes L are the steam-pipes, and are perforated only at the upper side at *l*, so as to receive the steam which is generated in each section and conduct it to the outside at l^1, when connection is made to the steam-pipe extending to the engine or other place.

It will be understood that the steam-pipes L are perforated only at the upper side, so that dry steam only will flow into them.

The pipe L′ passes through the lower end of all the sections, and forms the feed-water pipe, having a bottom perforation at l^2, through which the feed-water enters each section.

It will be seen that the feed-water will enter the section with a downward current, so as to prevent the formation of sediment or scale at the bottom of the water-leg. The blowing off is done through the pipe L′, and the muddy water will be forced through the holes l^2, and thus will all be taken from the bottom of the water-leg, and consequently all the muddiest will be taken first.

In my preferred construction each section is cast in one piece, and the surface consists of circumferential flutes or rings, made with the convex sides *r* facing inward, and the salient rings *r′*, formed somewhat thicker, so as to support the strain brought upon the arched part *r*.

I do not confine myself to cast-iron as the material used, as more or less may consist of piping of wrought-iron or other metal, without essentially changing the principle of the invention. The riser or rib K at each side of the section has a straight face, which closely fits a similar rib on the sections beside it, so that the fire-space is inclosed without any special case, or walling in the boiler.

In Fig. 2 are shown apertures K′, in addition to that A for the escape of the products of combustion from the fire-chamber to the smoke-stack or chimney, the rib K being cut away at such places, so as to leave apertures K′ for this purpose.

Any part of the space A between the sections may be closed at top in any suitable manner.

M are close-ended nuts or caps screwing onto one end of the pipes L, and M′ are open nuts screwing on those ends of the pipes L and L′ that project for communication to the steam and water conveying pipes respectively.

Operation: The feed-water enters through one end of the pipe L′, and flows downward into the water-leg of each section through the holes l^2, so as to stir up any sediment that might otherwise harden in such place. By occasional blowing off, all the muddy water may be drawn off from the bottom of the water-legs. The steam escapes in a dry state from the upper part of each section through the holes *l* in the upper side of the pipe L. The circulation of the water will be positive in the direction shown by the arrows, because the return-bends E will be heated much above the temperature of the outer part of the pipe B, and consequently the water will have an upward current in them, which will be supplied by the downward current in the part of the pipe B.

I claim as my invention—

1. The boiler-section provided with upright pipe B, having partition D, in combination with the bent pipes E, having extensions F, substantially as set forth.

2. The combination, in a boiler-section, of the upright pipe B with division D, bent pipes E, and water-leg B′, extending beneath the fire-grate, as set forth.

3. The boiler composed of sections containing the elements B B′ D E G, connected together by pipes L L′, with nuts M M′, substantially as set forth.

J. G. MINER.

Witnesses:
SAML. KNIGHT,
CHAS. HALL.