

No. 724,373.

PATENTED MAR. 31, 1903.

J. L. ARMITAGE & A. PINNEY.

SECTIONAL BOILER.

APPLICATION FILED NOV. 10, 1902.

NO MODEL.

4 SHEETS—SHEET 1.

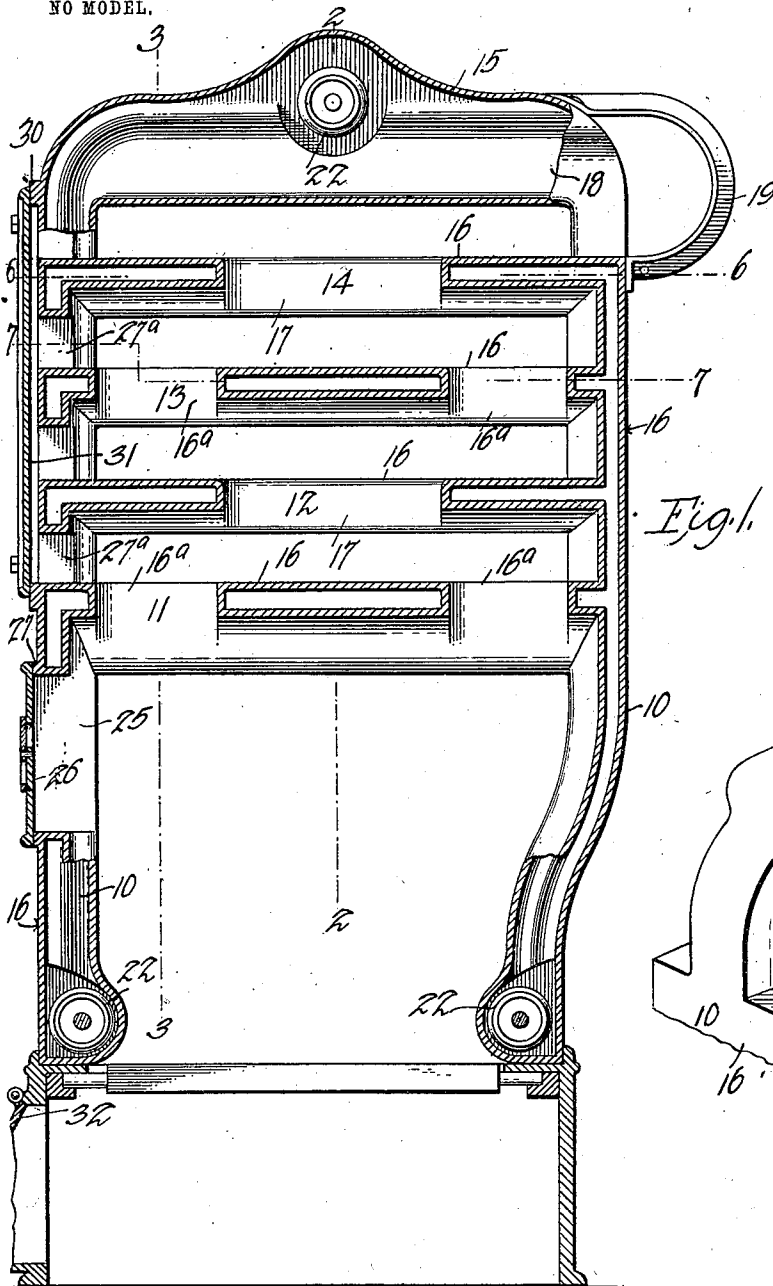


Fig. 1.

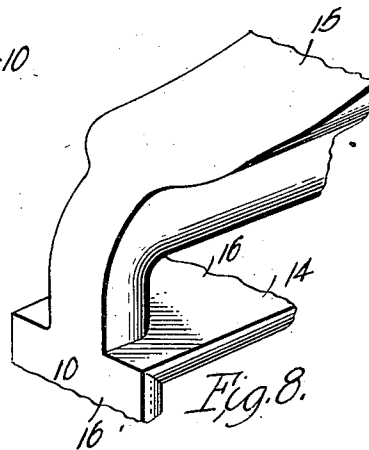


Fig. 8.

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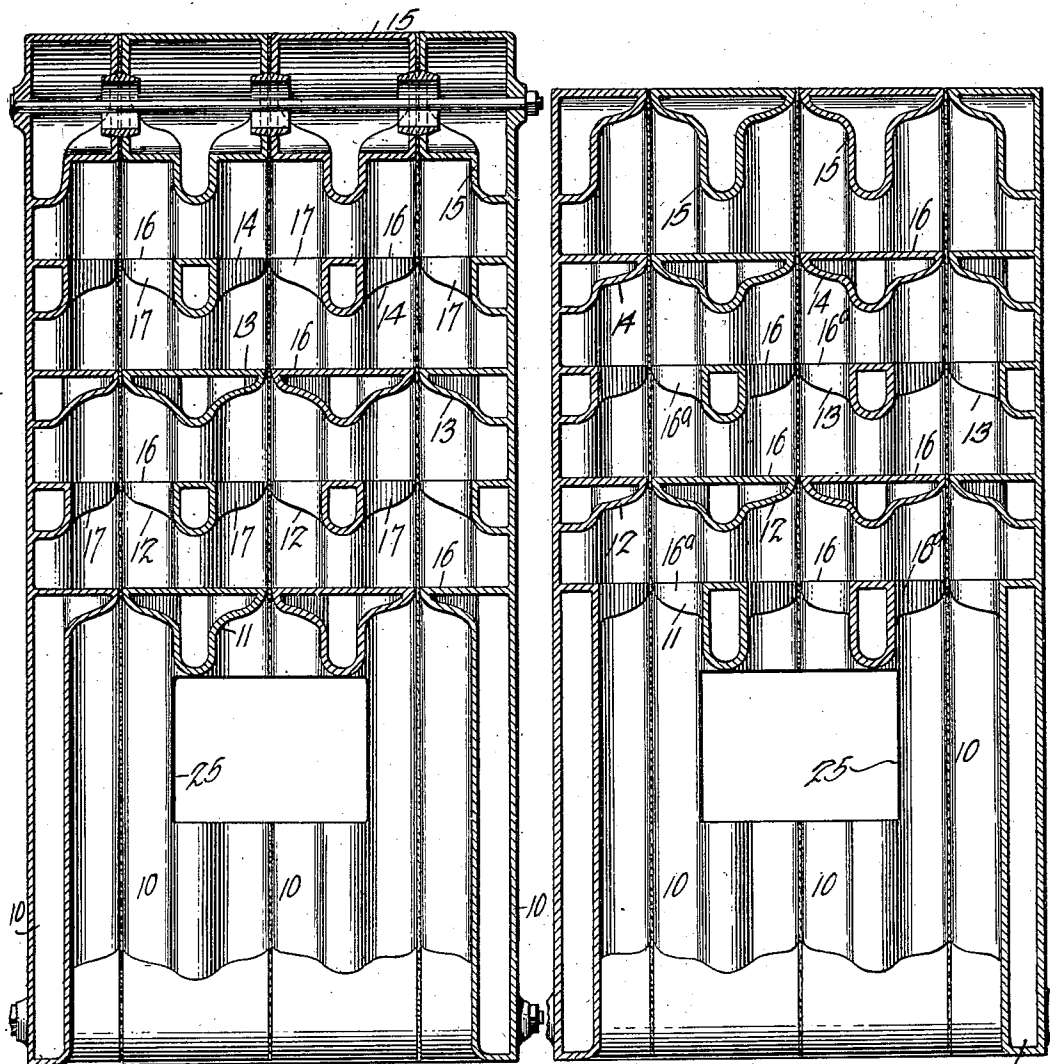


Fig. 2.

Fig. 3.

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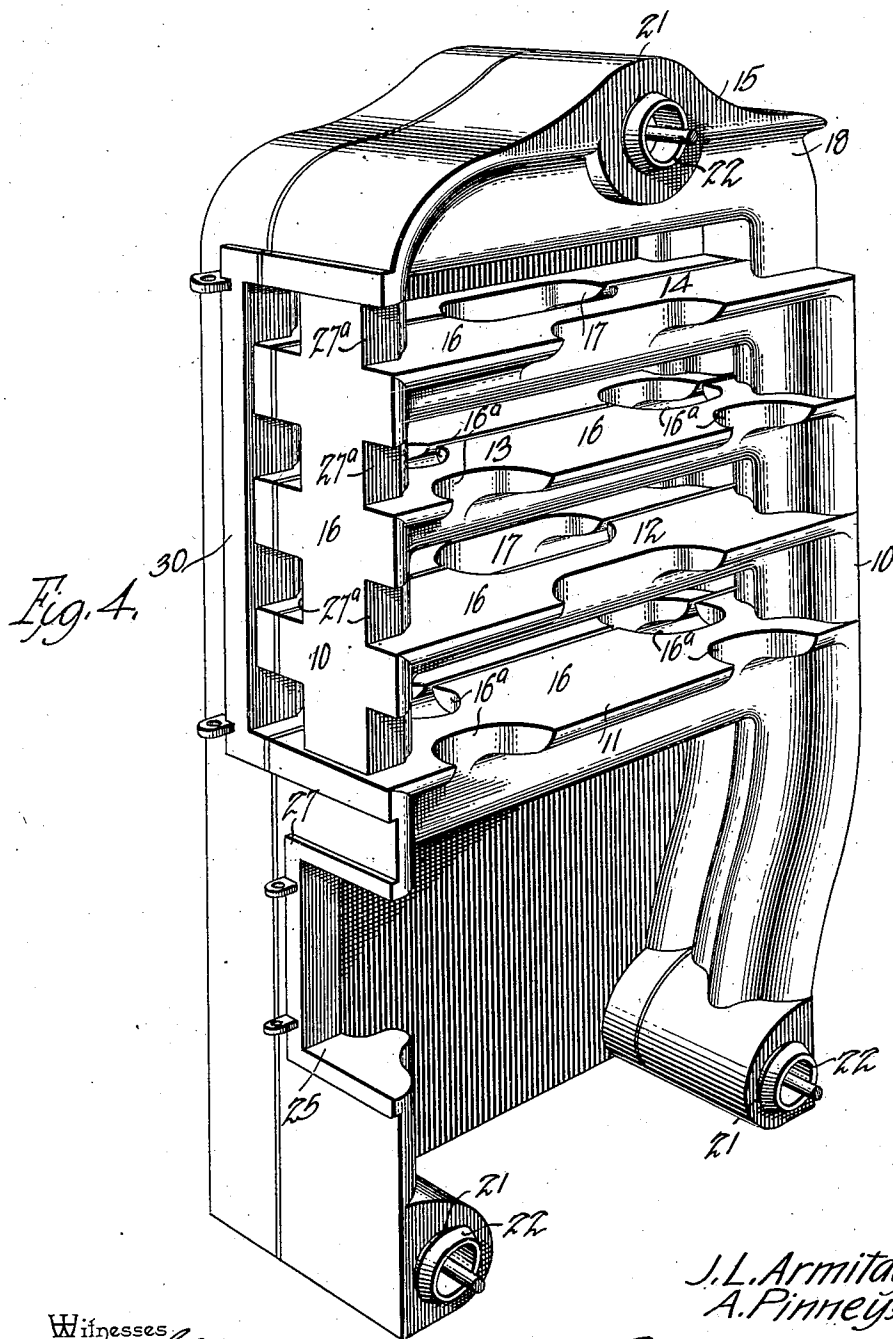
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4 SHEETS—SHEET 3.

NO MODEL.



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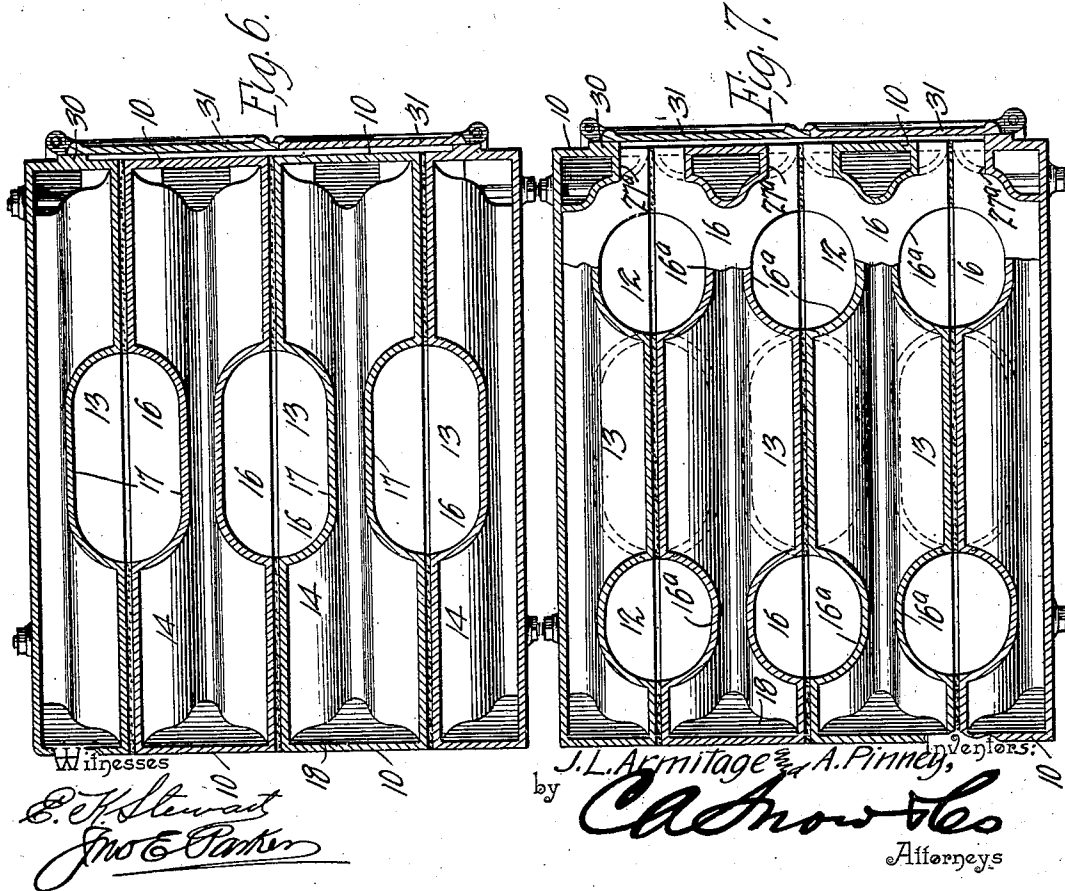
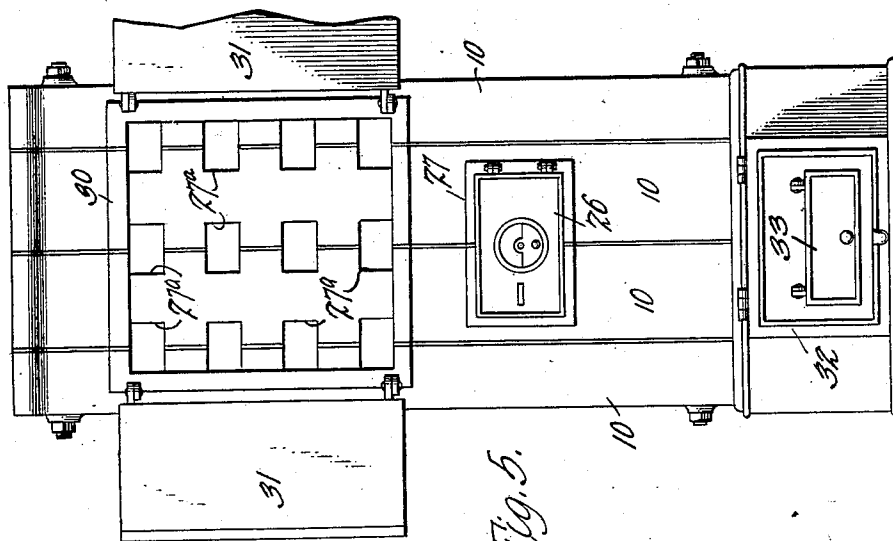
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NO MODEL.

4 SHEETS—SHEET 4.



UNITED STATES PATENT OFFICE.

JOHN L. ARMITAGE, OF NEW KENSINGTON, AND ADAM PINNEY, OF ALLEGHENY, PENNSYLVANIA; SAID PINNEY ASSIGNOR TO SAID ARMITAGE.

SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 724,373, dated March 31, 1903.

Application filed November 10, 1902. Serial No. 130,793. (No model.)

To all whom it may concern:

Be it known that we, JOHN L. ARMITAGE, residing at New Kensington, in the county of Westmoreland, and ADAM PINNEY, residing at Allegheny, in the county of Allegheny, State of Pennsylvania, citizens of the United States, have invented a new and useful Sectional Boiler, of which the following is a specification.

16 The invention relates to certain improvements in cast-iron sectional boilers of that class employed in connection with hot-water or low-pressure heating systems.

15 One object of the invention is to provide a boiler of this character in which an extensive surface will be exposed to the products of combustion and in which a free and continuous circulation of water may be maintained between the several sections constituting the boiler.

20 A further object of the invention is to provide a form of sectional boiler in which the number of special castings is reduced to a minimum and in which any desired number of sections may be assembled to form a boiler of any desired capacity.

25 A further object of the invention is to so construct each of the sections as to provide, when a number of sections are assembled, for the formation of tortuous flues or passages by which the flame and gaseous products of combustion may be made to impinge on an extensive heating-surface, and, further, to so construct the sections that the surface against which the flame impinges, while offering the greatest possible area, will not retard or check the passage of the products of combustion to any material extent.

30 A still further object of the invention is to provide a boiler of this class in which each section is provided with a separate flue for the escape of the products of combustion, thus evenly distributing the heat throughout the boiler without regard to the number of sections of which it is formed and permitting the assembly of any desired number of sections without alteration in the size of the escape-flue.

35 A still further object of the invention is to provide a sectional boiler in which each sec-

tion is provided with depending legs, forming when assembled a continuous water fire-box, the legs being connected by a plurality of transverse water-chambers, through each of which passes one or more heating-flues.

55 With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

60 In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of a sectional steam-boiler constructed in accordance with the invention. Figs. 2 and 3 are transverse sectional elevations of the same on the lines 2 2 and 3 3, respectively, of Fig. 1. Fig. 4 is a detail perspective view of one of the sections detached. Fig. 5 is a front elevation of the boiler, illustrating the general arrangement of the flue and fire-board. Fig. 6 is a plan view, partly in section, on the line 6 6 of Fig. 1. Fig. 7 is a view similar to Fig. 6, the section being taken on the line 7 7 of Fig. 1. Fig. 8 is a perspective view of upper rear portion of one of the sections.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

75 The boiler-sections are each of the construction illustrated in Fig. 4, comprising vertically-disposed water-legs 10, united by a number of transverse connections, (indicated at 11, 12, 13, 14, and 15,) the latter forming a steam-dome. Each of the members when viewed in cross-section has a flat face 16, which in the leg members is outermost and in the horizontal members uppermost, and each has also an opposite wall or face arranged in the form of a double-ogee curve to form an extensive heating-surface for contact with the products of combustion.

85 In the opposite sides of the members 11 and 13 at points near each end thereof are recesses 16 of semi-elliptical form, and when the sec-

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tions are assembled together these recesses form elliptical flues for the passage of the products of combustion. The members 12 and 14 of each section are provided on opposite sides with centrally-disposed recesses 17, each of an area approximately equal to the sum of the areas of two of the recesses 16 and the several recesses forming continuous tortuous flues, through which the products of combustion are directed, as indicated by the arrows in Fig. 1.

The several flue-forming recesses are made by reducing the width of the water-space of the several horizontal members of each section; but this is accomplished without materially interfering with the free circulation of water through said members, while the peculiar shape of the flame-impinging surfaces is such as to present a very extensive heating area without materially checking the passage of the products of combustion.

After making contact with the lower surface of the upper member 15 of each section the products of combustion are directed to escape-flues 18, a portion of each flue being formed by recessing the adjacent walls of the sections, and thence to a drum 19, preferably formed of a separate casting bolted to each section and in communication with the flues 18, there being as many drum-sections as there are boiler-sections and all of the drum-sections being provided with bolting-flanges to permit the assembling of any desired number of sections and the formation of a continuous drum into which the products of combustion are directed. By this arrangement the number of sections may be increased or diminished to form a boiler of any desired capacity, and each section will receive or be subjected to the action of precisely the same number of heat units from the fuel on the grate. The construction further permits freer drafts and the better absorption of heat by the water than in section-boilers of that class where a number of continuous horizontal flues are formed by arranging a plurality of sections together, the length of the flues being increased in proportion to the number of sections and the different sections being thus subjected to different degrees of heat. The construction further permits of the assembling of an indefinite number of sections, and the size of any plant may be readily altered with but little trouble and expense by the addition of a few grate-bars and a number of additional sections without rendering it necessary to practically dismantle the boiler.

The sections are connected to each other at three points—that is to say, at the top of the members 15 and at the bottom of each water-leg—by the formation of alining openings 21, through which are passed push-nipples 22, the nipples and sections being held in place by continuous bars extending from end to end of the boiler through the alining openings and nipples, or by suitable securing-bolts

separately connecting each section to the two adjacent sections, or, if desired, the manifold connection usually employed in sectional boilers may be employed to connect the several sections.

The end members or sections are somewhat narrower than the intermediate sections and at one side are provided with integral solid plates in order to prevent any escape of the products of combustion, while the inner sides of each of the end sections are provided with the flue-recesses 16 and 17, mating with the similar flue-sections of the next adjacent members of the boiler.

The fire-doors are preferably so arranged as to extend over a part of two adjacent sections, the water-legs being recessed at 25, as illustrated in Fig. 4, and two of such recesses forming when assembled an opening of sufficient size for firing purposes, while the recesses do not extend completely across the water-legs in order to permit the circulation of water throughout the entire length of each leg. The firing-openings are closed by suitable doors 26, hinged to lugs projecting from a door-frame 27, bolted to the boiler-sections.

At the front of each section the vertical members are provided with side recesses 27 in alinement with the several flue-passages between the members 11, 12, 13, 14, and 15, and these recesses permit the introduction of cleaning-tools or flue-scraping devices when it becomes necessary to remove accumulations from the tops of the several horizontal members of each section. A separate door may be provided for each of these cleaning-openings; but it is preferred to employ a front plate 30, having large doors 31, which will cover a number of the openings.

The supporting-base, ash-pit, and grate may be of any desired construction, while the ash-pit door is preferably of the form illustrated in Figs. 1 and 5, comprising a flap-door 32, carrying an auxiliary hinged door 33 in order to more accurately control the draft.

Having thus described the invention, what is claimed is—

1. The combination in a boiler, of a plurality of sections each having front water-legs, the water-legs of adjacent sections being recessed to form a firing-opening.

2. The combination in a boiler, of a plurality of sections each having front and rear water-legs, the front legs of adjacent sections being recessed to form a fire-door opening, and a door for covering said opening.

3. A boiler-section comprising a front and a rear water-leg, a plurality of horizontal members connecting the front and rear legs and recessed to form flues, the lower faces of said members having double-ogee shape to form flame-deflecting surfaces.

4. A boiler-section comprising front and rear water-legs and a plurality of horizontal members connecting the legs, said members having side recesses arranged in different vertical planes to form a tortuous passage,

and an escape-flue forming a part of each section and in communication with said passage.

- 5 5. A boiler-section comprising front and rear legs, a plurality of horizontally-disposed members connecting the legs and arranged to form passages or flues, and an independent escape flue or pipe section connected to each boiler-section.
- 10 6. The combination in a boiler; of a plurality of sections each comprising front and rear water-legs and a plurality of horizontal members; the horizontal members of adjacent

sections being in alinement with each other and permitting free communication between 15 the flues or spaces formed between said horizontal members.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

JOHN L. ARMITAGE.
ADAM PINNEY.

Witnesses:

W. F. CRAWFORD,
HENRY MEYER.