No. 838,663. PATENTED DEC. 18, 1906.

J. W. T. STEPHENS.

EXCAVATING MACHINE.

APPLICATION FILED JULY 8, 1904.

3 SHEETS—SHEET 1.

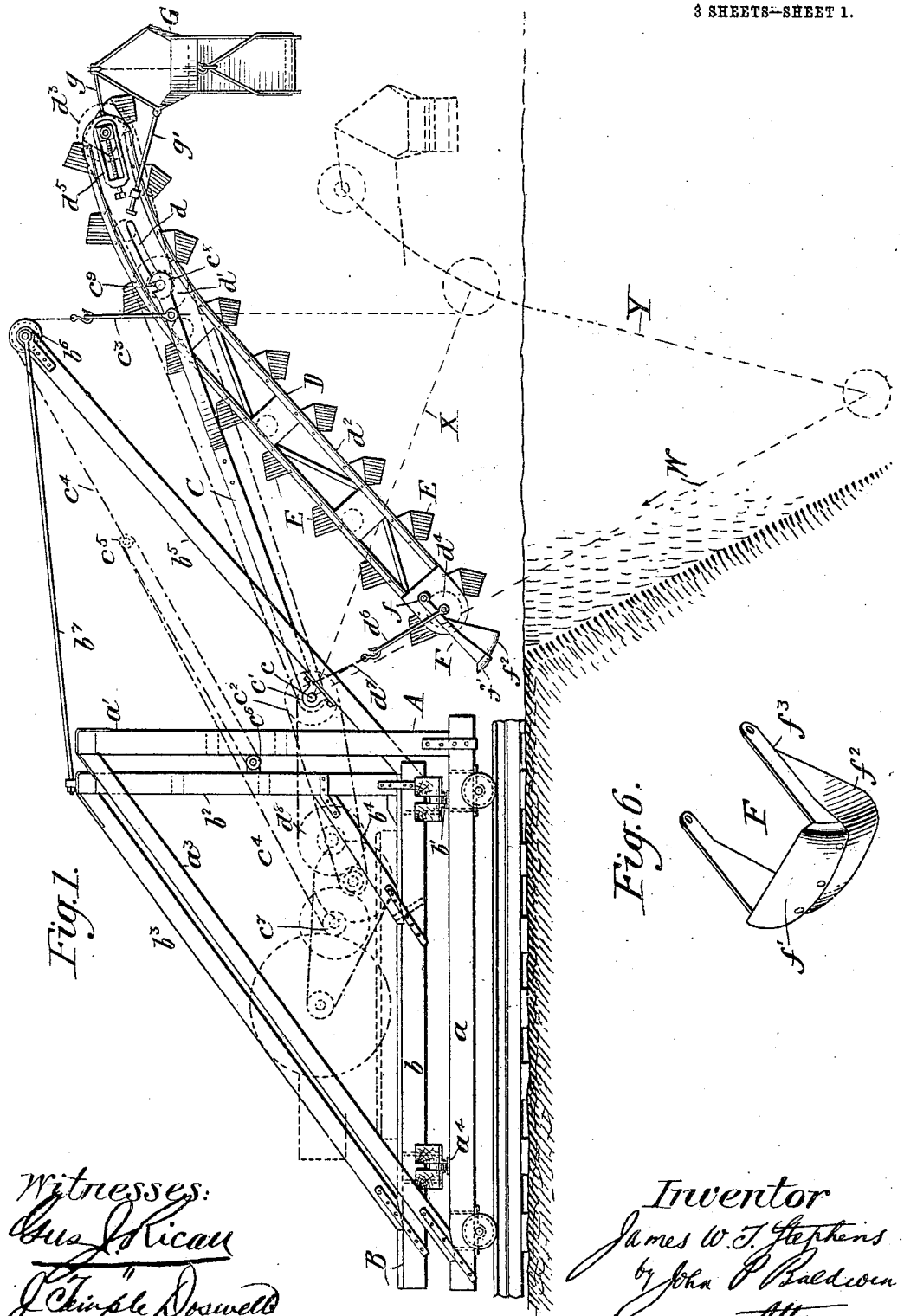

Fig. 1.

Fig. 6.

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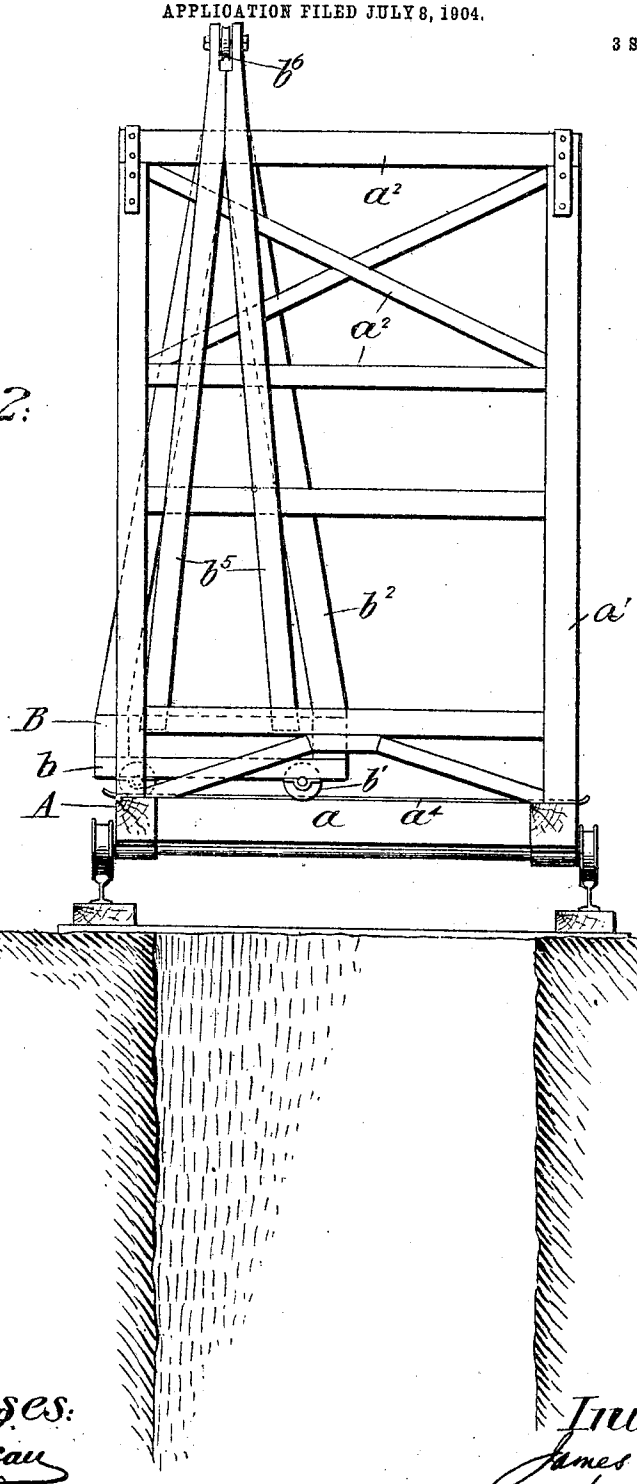
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

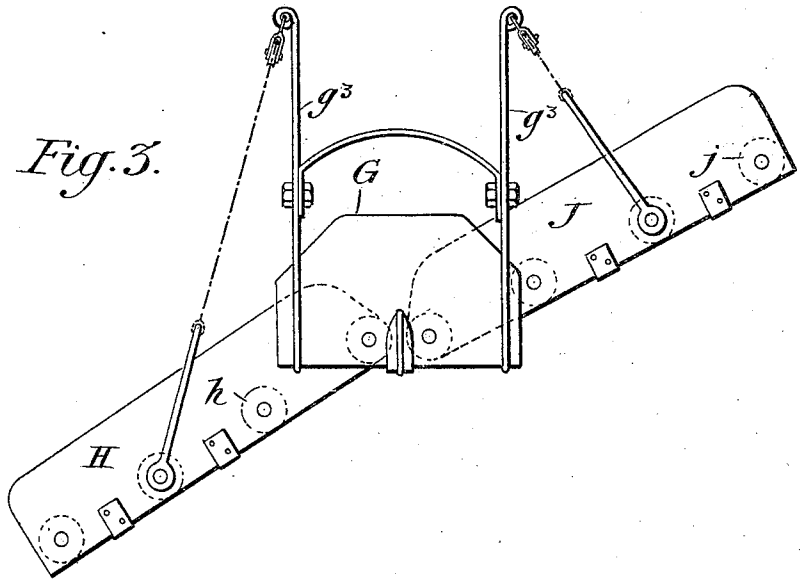


Fig. 5.

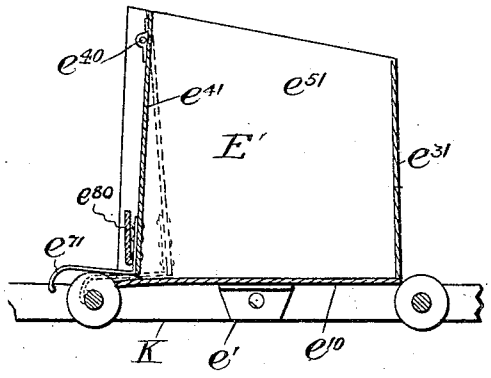
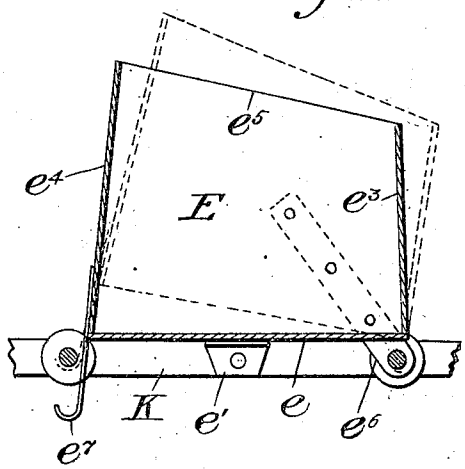


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES WILLIAM TYLER STEPHENS, OF NEW ORLEANS, LOUISIANA.

EXCAVATING-MACHINE.

No. 838,663. Specification of Letters Patent. Patented Dec. 18, 1906.

Application filed July 8, 1904. Serial No. 215,776.

To all whom it may concern:

Be it known that I, JAMES WILLIAM TYLER STEPHENS, a citizen of the United States, residing at New Orleans, parish of Orleans, State of Louisiana, have invented a new and useful Improvement in Excavators, of which the following is a specification, the accompanying drawings forming a part of the same.

In such drawings, Figure 1 shows a side elevation of the supporting-frame, supporting-bar, carrier-frame, and excavating-blade supported thereby. Fig. 2 is a front view in elevation of the frame, the supporting-bar and carrier-frame being removed. Fig. 3 is a front view of the discharge-chute. Fig. 4 is a side view in section of the carrying-buckets, and Fig. 5 is a similar view of a different construction of bucket. Fig. 6 is a perspective view of the cutting implement.

The same reference character is used in all the several figures to indicate the same part.

The objects of my invention are, first, to provide an excavator of new and improved form in which the supporting-framework is always permitted to rest on solid ground, the excavation advancing toward such framework; second, to provide a secondary carrying-frame movable within the first along lines transverse to the line of the advancing cut, whereby a cut of considerable width may be made without the necessity of moving the primary frame; third, to provide a support for the cutting implement to permit it to make a cut of great depth and operating means for the same whereby the power will be most advantageously applied; fourth, to provide an improved form of cutting-blade whereby the same may be advantageously employed with carrying-buckets to receive the material excavated; fifth, to provide an improved construction of carrying-bucket which will readily deliver all the contained material when inverted, all as will hereinafter be more particularly described and claimed.

Referring to the accompanying drawings, the character A indicates the structure I designate the "primary" supporting-frame. Such frame comprises a horizontal framework a, mounted on flanged wheels adapted to run on properly-placed rails laid on the ground adjacent to the desired excavation. Uprights a' are secured to the two corners of the framework which are nearer to the cut to be made, and for convenience in description such portion will be designated as the "front" of such framework. Interbrace-work a^2 is secured between such uprights, and rear braces a^3 extend from the upper portions of the uprights to the rear of the horizontal framework. Properly-placed rails or trackwork a^4 are secured on the horizontal frame, such rails being placed at substantially a right angle to the rails carrying the primary frame.

The secondary frame B comprises a horizontal platform b, suitably braced and mounted on rollers b', arranged to run on the rails or trackwork a^4 of the primary frame. Uprights b^2 are placed at the front corners of the secondary frame, such uprights being inclined to meet at their upper ends, which are secured together, and rear braces b^3 extend from the upper ends of such uprights to the rear of the platform b. Additional bracework b^4 is also provided to extend from the platform to the uprights near the lower ends of the same. Derrick-beams b^5 b^5 project forwardly from the front end of the secondary framework, such beams projecting between the uprights a' of the primary frame and below the bracework between such uprights. These beams project at their outer ends above the top cross-brace a^2 and are inclined so their outer ends meet and are secured together, the sheave b^6 being supported between the meeting ends. A rear brace b^7 extends from the outer ends of the derrick-beams rearwardly to the top of the uprights b^2 of the secondary frame, such brace being above the top cross-brace a^2, the arrangement being such that the secondary frame may have a free movement on the rails a^4 of the primary frame from one upright a' of such frame to the other. A steam-operated windlass, shown, however, only in dotted lines, as the details of the same form no part of my invention as claimed in this application, is secured in proper position on the platform of the secondary frame.

The supporting-boom C, properly interbraced, is pivoted at its rear end to the derrick-beams b^5 about one-third of the length of said beams from the point of attachment of the same to the secondary frame. The shaft c, forming the pivot of such attachment, is rotatably mounted in ears c', secured to the derrick-beams, and a double driving-pulley c^2 (shown in dotted lines) is mounted to rotate on the shaft c, the larger of said pul-

leys being driven by suitable belt connection from a driving-pulley operated by the steam-winch on the secondary platform.

The outer ends of the supporting-boom are sustained by a hoisting rope or chain c^4, one end of said rope being secured to a bail c^3, attached at its ends to the sides of the supporting-boom, the said rope or chain passing over the sheave b^6 and over blocks c^5 c^6 and thence to a hoisting-drum c^7 of the steam-winch. The outer ends of the supporting-booms terminate in slotted ears c^8, which support a shaft c^9, the said shaft being adjustably secured in the slots d of the carrier-frame D. A second double driving-pulley d' is revolubly mounted on the shaft c^9 between the side bars of the carrier-frame and is driven by belt connection from the driving-pulley c^2. The carrier-frame D comprises the two side frames d^2, properly spaced apart and interbraced and carrying the chain-pulleys d^3 d^4 at the ends of such frame. The usual take-up mechanism d^5 is provided at the upper end of the frame for the outer chain-pulley d^3, the said pulley d^3 being driven by belt connection from the driving-pulley d'. The chain-pulleys d^3 d^4 are either double or single, as preferred, and are arranged to drive the carrier-chain to which the buckets E are secured.

The ends of the shaft carrying the lower pulley d^4 project beyond the side frames, and a supporting-bail d^6 is attached at its ends to the ends of said shaft. An operating rope or chain d' is secured at one end to such bail and passes over a sheave supported on the shaft c to a second operating-windlass driven from the steam-winch on the secondary platform.

The excavating blade or spade F is pivotally secured to studs f on the lower end of the carrier-frame D, the said blade comprising a knife or cutting portion f', a chute portion f^2, and arms f^3, extending from the knife ends for attachment to the pivot-studs f. If desired, the knife portion may be detachably secured to the arms f^3 that the same may be removed to be sharpened or to be changed for one of a different shape of cutting edge. The chute portion f^2 is formed to receive the material excavated and direct the same into a carrier-bucket as such bucket passes around the lower end of the frame and between the arms f^3. The arms are pivoted on the studs f, as stated, and rest upon the extended ends of the shaft carrying the pulley d^4 or upon lugs projecting from the side frames.

A delivery-apron G, with chutes H J pivoted thereto, is supported by braces g and g', secured to the upper ends of the carrier-frame D, the lower, g', of said braces being adjustably attached, as shown, to the end of the frame to provide a proper leveling means for the delivery apron and chutes. The chutes H J are pivoted at their inner ends to the apron-platform, their outer ends extending laterally of the carrier-frame and being supported by ropes or chains secured to braces extending upwardly from the sides of the apron-frame. If desired, carrier-belts may be operated on the chutes H J, being supported thereon by the rollers h j. The carrier mechanism comprises the usual link chain K, supported to run on the sides of the carrier-frame D and driven by sprocket-wheels driven from the end pulleys d^3 d^4. If desired, the driving-sprockets may be mounted on the shaft c^9, the chain being supported at its ends by end rollers substituted for the pulleys d^3 d^4. This construction will permit the shaft c^9 to have a free sliding motion in the slots d of the side frame D, and for some classes of work such arrangement is desirable.

Any desired and suitable construction of carrier-bucket may be used with the construction above described; but I prefer the construction of bucket shown in Figs. 4 and 5. As shown in Fig. 4, such bucket E comprises the bottom e, secured to brackets e', riveted to the side links of the carrier-chain K and upright sides fitted to rest on the bottom e and movable therefrom. Such sides comprise the forward end portion e^3, the rear end portion e^4, and the two side portions proper, e^5. The rear portion e^4 is longer than the front portion e^3, and the sides at their top slant from the rear portion downwardly to the front portion, the arrangement being such that the top of the bucket is approximately horizontal when supported on the carrier-frame. Straps e^6 are secured to the side portions of the bucket and project forwardly along the direction of the travel of the bucket and downwardly below the bottom of the bucket and are pivoted on the front pintle of the side links carrying the brackets e'. A hooked strap e^7 is secured to the rear portion e^4 and projects downwardly, the hook engaging the rear pintle of the side links to keep the sides from swinging too far away from the bottom when the bucket is inverted as it passes over the delivery end of the carrier-frame. This construction permits the ready and complete delivery of the excavated material the instant the bucket is inverted, as the sides swing away from the bottom, permitting the access of air between the bottom and the material, so that the material is not held in the bucket by air-pressure, and the bucket is completely emptied of all material while over the delivery-apron G.

A different construction of bucket is shown in Fig. 5, in which the front end portion e^{31} and the side portions e^{51} are rigidly secured to the bottom e^{10}, which is secured to the usual brackets e' on the side links, and the rear end portion e^{41} is pivoted near its upper end to a shaft-bolt e^{40}, mounted in the sides e^{51} in such manner that the said end e^{41} may swing inwardly of the bucket. A hooked strap e^{71}, projecting from the end e^{41}, engages

the chain-pintle to prevent too great a movement inward of such end. The end e^{41} is kept from swinging too far outwardly from the sides and bottom by any proper stop e^{80}, affixed to the sides or bottom.

The buckets are formed of a size to permit them to pass between the arms f^3 of the excavating-spade, the upper edge of the rear end e^4 of the bucket passing over the inner surface of the chute f^2 to take up the material in such chute as the bucket passes around the lower end of the carrier-frame.

In operation at the commencement of a cut the supporting-ropes are released to lower the supporting-boom C to the dotted-line position X and the carrier-frame to the dotted-line position Y, and the cut is made along the dotted line W in the direction of the arrow. In its lowermost position the cutting-blade F rests on the ground, being bent upward on the pivot-studs f at an angle to the carrier-frame. As the lower end of the frame is elevated the blade F falls relative to the frame until the arms f^3 rest on the ends of the shaft d^4. The straightening of the toggle formed by the arms f^3 and the carrier-frame thrusts the blade into the earth, and the continued upward movement of the lower end of the frame causes the blade to cut the earth above the same, the full lifting force of the windlass less only the slight force required to overcome the weight of the lower end of the frame being applied to make the cut. If the blade should become fast in any obstacle, such as a tree root or stump, it is only necessary to slightly lower the lower end of the frame, the blade then turning upward and being withdrawn outward from below the obstacle. The provision of the supporting-boom enables the operator to make the face of the cut at any desired angle to the horizon, and as the secondary frame is readily movable on the primary frame a cut the full width between the uprights of such primary frame may be made without the necessity of moving such primary frame.

Having thus described my invention, I claim—

1. An excavator comprising a frame, a carrier-frame supported on said first-mentioned frame, an excavating implement attached to the end of said carrier-frame, carriers mounted on said frame to receive, carry and deliver the excavated material, and means for operating the end of said carrier-frame to which the implement is attached to move said implement to excavate upwardly toward said first-mentioned frame.

2. An excavator comprising a frame, a supporting-boom pivoted thereon, a carrier-frame pivotally supported on said boom and carrying an excavating implement at one end, means for raising the end of said boom and the said implement, and carrier-buckets on said carrier-frame.

3. An excavator comprising a frame, a supporting-boom pivoted thereon, a carrier-frame supported on said boom, an excavating-blade supported on one end of said carrier-frame, and carrier-buckets mounted to travel on said frame and to pass between said blade and the end of said carrier.

4. An excavating implement comprising a cutting portion, a chute portion, and supporting-arms intermediate said portions.

5. An excavating implement comprising supporting-arms, a blade portion, and a chute portion.

6. An excavator comprising a carrier-frame, carrier-buckets arranged to travel on said frame, an excavating implement comprising arms pivoted to said frame, a blade portion and a chute portion carried by said arms, and means for elevating said carrier-frame to cause said implement to excavate.

7. An excavator comprising a supporting-frame, a supporting-boom pivoted thereon, a frame pivoted to said boom, and an excavating implement pivoted to said frame, and comprising supporting-arms and a cutting portion.

8. An excavator comprising a supporting-frame a secondary frame movable on such supporting-frame, a supporting-boom pivoted to said secondary frame, a carrier-frame supported from said boom, an excavating implement provided with side arms for attachment to the end of said carrier-frame, buckets arrranged to travel on said carrier-frame and to pass between said arms, and means for elevating said supporting-boom, and the end of the carrier-frame to which said implement is attached.

9. An excavator comprising a frame, an excavating implement secured to one end of said frame, a delivery-apron carried at the other end of said frame, discharge-chutes pivoted to said apron to project laterally of the frame, and means arranged to travel on said frame to convey the material from said implement to said apron.

10. In a carrier mechanism, a chain comprising side links and pintles, a base rigidly secured to a pair of links, and walls coöperating with said base to form a receptacle and pivotally secured to a pintle of said side links.

11. An excavator comprising a supporting-boom, a frame supported from said boom and carrying an excavating implement, and a carrier-bucket arranged to travel on said frame and to convey the material excavated, said bucket comprising a bottom portion, and sides movable from said bottom portion.

12. An excavator comprising a primary frame, a secondary frame movable on said primary frame, a supporting-boom pivoted to said secondary frame, a frame adjustably

and pivotally supported at the end of said boom, an excavating implement secured to one end of said last-mentioned frame, and means for elevating said boom, and the end of the frame carrying said excavating implement.

13. An excavator comprising a primary frame, a secondary frame movable on said primary frame, a supporting-boom pivoted at one end to said secondary frame, a carrier-frame adjustably and pivotally supported at the free end of said boom, an excavating implement secured to one end of said carrier-frame, and carrier-buckets mounted to travel on said carrier-frame.

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

JAMES WILLIAM TYLER STEPHENS.

Witnesses:
RENE TRICOU,
J. C. SPOTTS.