

No. 857,121.

PATENTED JUNE 18, 1907.

T. L. & T. J. STURTEVANT.
CRUSHING AND GRINDING MILL.

APPLICATION FILED SEPT. 27, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

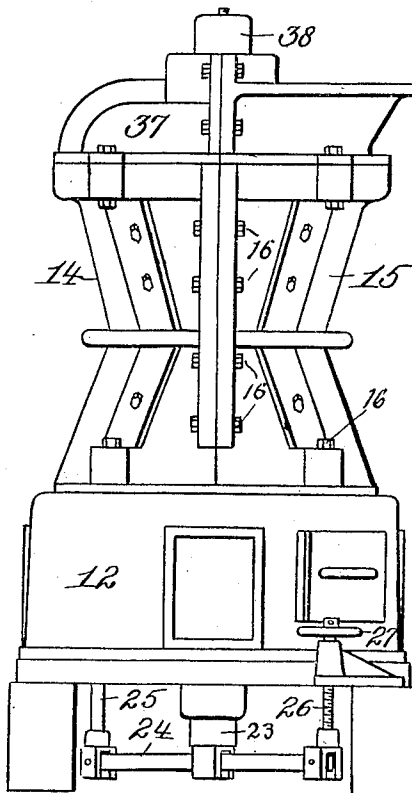
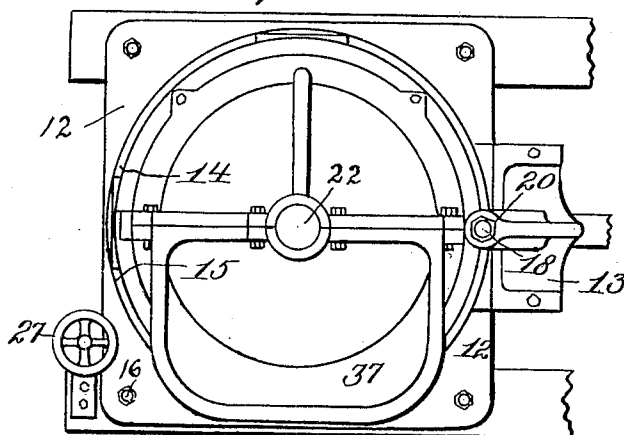


Fig. 2.



Witnesses:

Wm. L. Sweeney
McDonald

Inventors:

Thomas L. Sturtevant
Thomas J. Sturtevant
by [Signature]
Atty.

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3 SHEETS—SHEET 2.

Fig. 3.

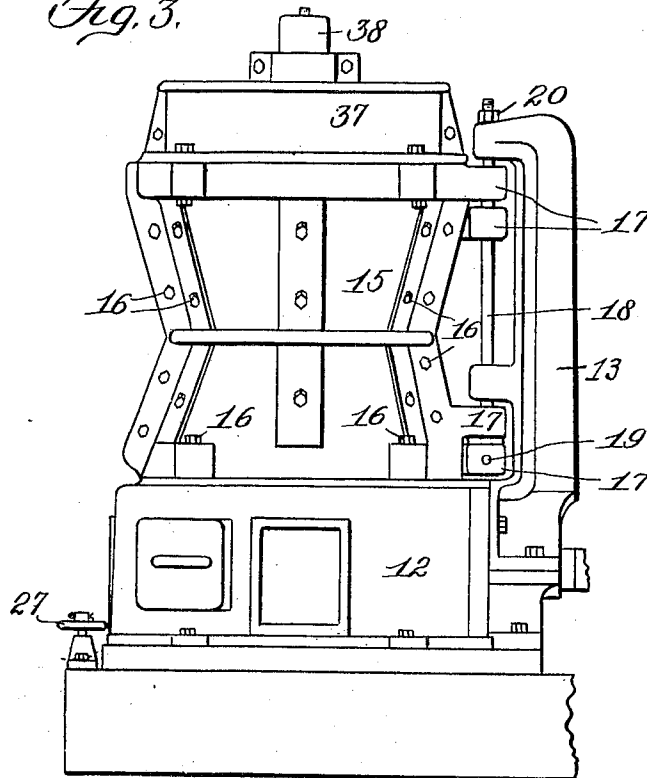


Fig. 5.

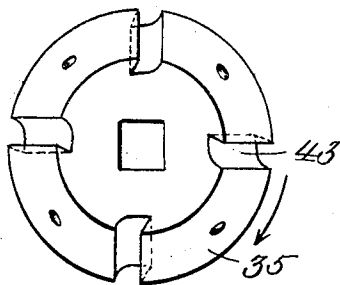


Fig. 6.

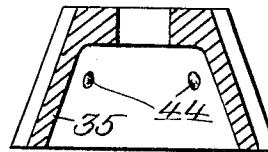
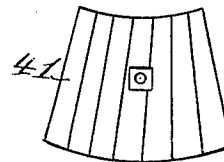


Fig. 8.



Witnesses:
C. M. Sweeney
McDonald

Inventors:
Thomas L. Sturtevant
Thomas J. Sturtevant
by *Sturtevant*

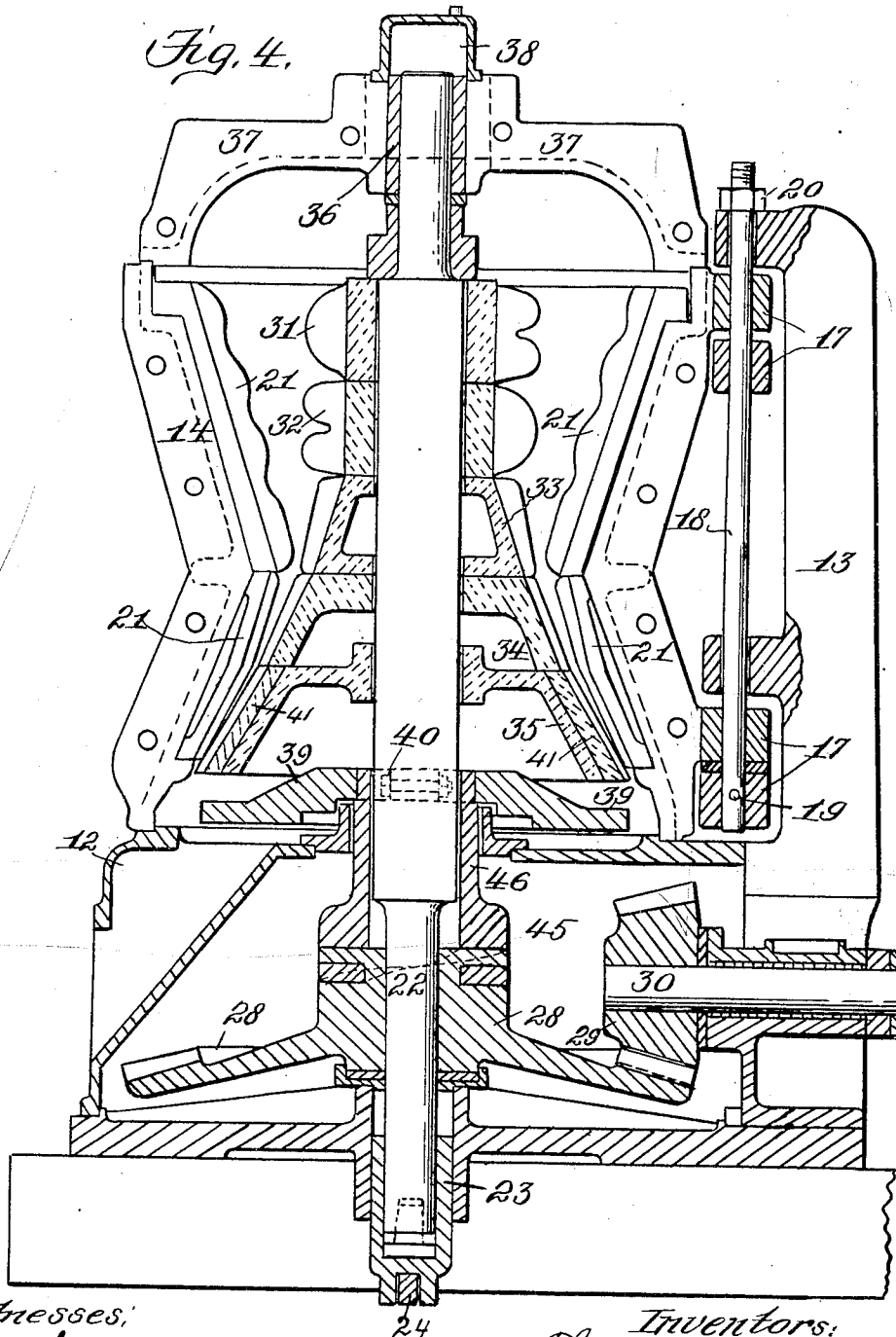
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3 SHEETS—SHEET 3.



Witnesses:
G. M. Sweeney
McDermott

Inventors:
Thomas L. Sturtevant
Thomas J. Sturtevant
by *Wm. L. Fitts*

UNITED STATES PATENT OFFICE.

THOMAS LEGGETT STURTEVANT, OF QUINCY, AND THOMAS JOSEPH STURTEVANT, OF WELLESLEY, MASSACHUSETTS, ASSIGNORS TO STURTEVANT MILL COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

CRUSHING AND GRINDING MILL.

No. 857,121.

Specification of Letters Patent.

Patented June 18, 1907.

Application filed September 27, 1905. Serial No. 280,329.

To all whom it may concern:

Be it known that we, THOMAS LEGGETT STURTEVANT and THOMAS JOSEPH STURTEVANT, citizens of the United States, residing, respectively, at Quincy and Wellesley, in the county of Norfolk and State of Massachusetts, have invented or discovered certain new and useful Improvements in Crushing and Grinding Mills, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to that class of crushing and grinding mills in which the rotary crushing and grinding elements are carried by a vertical shaft rotating within a casing to which is fixed certain of the co-operating stationary crushing and grinding elements; and the invention comprises certain improvements in this class of mills, and more particularly certain improvements in the "open-door" crusher of our U. S. Patent No. 759,643, May 10, 1904. These "open-door" crushers comprise hinged or pivoted casing parts or doors which may be swung aside when access to the interiors of the mills is necessary, and as these hinged or pivoted casing parts with their attached stationary crushing elements are very massive and heavy it is desirable that they should be so mounted as to be easily moved from closed to open positions, or vice versa, when they are unbolted from each other and from the base portions of the mills to which they are attached when in working positions.

The present invention has for its object to provide such a construction and mounting of the hinged casing parts that they may be easily moved on their pivots when necessary, as also to provide certain other detailed improvements which will render this class of mills more convenient and efficient than heretofore, as will hereinafter more fully appear.

In the accompanying drawings Figure 1 is a front elevation of a vertical mill embodying the present invention, and Figs. 2 and 3 are, respectively, partial top and side views of the same. Fig. 4 is a vertical sectional view of the improved mill. Fig. 5 is a plan view of a preferred form of the lower cone or shell of the mill, and Fig. 6 a vertical section of the same. Figs. 7 and 8 are views, respectively, of grinding top and side plates or liners

which are removably attached to the form of cone shown in Figs. 5 and 6.

Referring to the drawings, 12 denotes the base portion of the mill on which is mounted a heavy post or standard 13. The casing of the mill comprises two sections or parts 14 and 15 which, when the mill is in operative condition, are removably secured together and to the base 12 by bolts 16, these casing parts being provided with ears 17 by which they are hinged or pivoted to a vertical rod or pintle 18 mounted on the post or standard 13. The hinged casing parts or doors are formed smallest at their middle portions, to render them strong, and are flared or enlarged thence upward and downward, so as to afford good receiving capacity to the upper part of the mill and good delivering capacity to the lower part thereof.

The lowermost of the ears 17 is attached to the rod 18 by a pin 19, or otherwise, and said rod is threaded at its upper end and provided with a nut 20 bearing against an upper part of the post or standard 13 in such a manner that when the said nut is screwed down against the said upper part of said post or standard the casing parts 14 and 15 will be positively and simultaneously lifted slightly from the base 12, so that they may be easily swung to open or closed positions on the hinge or pivot provided by the said rod. As these hinged casing parts or doors carry the stationary crushing elements or plates 21 and are very massive and heavy, it is desirable that they should be lifted slightly from the base 12, on which they rest when the mill is in operation, when they are to be swung to open or closed positions so as to avoid the heavy frictional contact with said base which would otherwise exist, and this lifting can be effected in the construction herein shown, simply by turning down the nut 20 with a wrench. While the lifting rod and its nut afford a convenient means for raising these hinged casing parts from the base of the mill, it will be understood that other equivalent means, such as a cam or screw, might be provided for this purpose.

In the form of the invention herein illustrated the vertical mill shaft 22 is stepped in a bearing box or sleeve 23 resting upon a lever 24 pivoted at one end on a hanger 25 depending from the base 12, and connected at

its opposite end to a lifting screw 26 through the medium of which and a hand wheel 27 the said shaft may be raised and lowered for the purpose of regulating the desired degree of coarseness or fineness of the output of the mill. The said shaft is provided in the usual manner with a gear wheel 28 meshing with a bevel gear 29 on the driving shaft 30 to which power is applied in any suitable manner, said gear wheel being suitably connected with said shaft, as by a grab-clutch 45 and sleeve 46, the upper part of the latter embracing the lower squared portion of said shaft. Loosely mounted on the squared portion of the said shaft are the crushing nuts 31, 32, and the crushing and grinding cones 33, 34 and 35. The shaft 25 preferably has its upper bearing in a sleeve 36 which is embraced by the central recessed or apertured parts of the two-part hopper 37, the said parts of said hopper being mounted on and practically forming upward continuations of the casing parts 14 and 15, so as to be movable with the same when the latter are swung to open or closed positions after the bolts securing the same and the said hopper parts in working position have been removed. While this bearing sleeve is preferred it is not indispensable for the reason that the two movable hopper parts might serve directly as the upper bearing for the shaft, as shown in Fig. 2, without the interposition of the sleeve. On one of the parts of the hopper above the shaft 22 is mounted a box 38 adapted to contain oil or other lubricant for the said shaft.

The cone 35 is attached in any suitable manner to the shaft 22 and the superposed cones and crushing nuts are loosely strung on said shaft in such a manner that they may be easily removed therefrom, if desired, when the casing parts 14 and 15 are swung open; or the said shaft may be lifted entirely out of the mill when the fastening for the lower cone has been loosened or removed, thus leaving the crushing nuts and cones free to be removed horizontally from the mill casing when such removal becomes desirable or necessary.

In order that the scrapers 39, which carry the reduced material to the delivery opening or openings of the mill, may be readily secured to or removed from the shaft 22 they are preferably formed as parts of a split collar or clamp 40 the two halves of which are bolted together around said shaft, so that when the bolts securing the parts of such split collar or clamp have been removed the scraper parts can be readily taken out without disturbing the shaft. The lower cone 35 is preferably provided with removable "liners" or plates 41 each of which is furnished at one end with an inwardly projecting hook or flange 42 adapted to engage a correspondingly-shaped recess 43 in the

cone; the said plates or liners being secured to the cone by bolts 44 which, however, need not be sufficiently strong to resist the strain incident to the operation of the said plates or liners, said strain being very largely borne by the interlocking hooks and recesses 42 and 43 which help to hold the plates or liners in place, as will be understood.

The construction herein shown and described by which the vertical mill shaft 22 may be raised and lowered from below not only enables the fineness or coarseness of the output of the mill to be regulated, but provides means to facilitate the cleaning of the mill when the casing is opened, as by lifting the said shaft convenient access to the chamber of the mill below the cones and scrapers is afforded, as also for the more ready removal of obstructions. Thus if a piece of wire, for example, were to get wound about the shaft and partly below the scrapers, it might be very difficult to remove it when the hinged casing was opened, without lifting the shaft from below, and this can be done after the casing is opened, owing to the manner in which the said shaft 22 is stepped in the bearing box or sleeve 23 and the manner in which said sleeve is steadied and supported.

From the foregoing it will be apparent that one or both of the vertically pivoted or hinged casing parts may be swung aside like a door or doors when access to the interior of the mill is desired, said casing parts or doors, being pivoted or hinged to a separate or independent support, are capable of simultaneous horizontal swinging movements in opening or closing.

With machines of this character it sometimes occurs that the mills becomes clogged by the wedging of very hard substances between the stationary and rotary crushing elements. With the present improved construction such clogging may readily be relieved by opening, or slightly opening, both of the casing arts, and this is permitted by the fact that said parts are both hinged to a separate supporting post or standard rising from the base of the mill. If only one casing part were hinged so as to be swung aside the clogging could not always be readily relieved, and it is therefore better to hinge both casing parts so that they may be swung aside or opened. Also by swinging aside two hinged casing parts the larger lower rotating crushing elements may readily be removed, when necessary, and this cannot be conveniently done when only one hinged casing part is provided.

It will be seen by reference to the drawings that the waist of the improved mill is contracted by contracting the central or middle portions of the hinged casing parts, and that the larger lower rotating crushing elements or shells, 34 and 35, flare outward

downwardly so that they are much larger in diameter than the chamber of the mill within the casing at its waist or middle portion; and thus if only one casing part were hinged so that it could be swung aside these larger rotating shells or cones (which are strung loosely on the vertical driving shaft 22) could not be removed, by lifting them upward over the top of said shaft. But by hinging the two casing parts to an independent support or post, so that both casing parts may be swung aside or opened out at the same time, they will not obstruct the removal of the larger rotating crushing elements when this is desirable or necessary; and all of the rotary crushing elements may, with this improved construction, be removed from the mill, without necessitating the removal of the vertical driving shaft, when the casing parts are both opened out.

Having thus described our invention, we claim and desire to secure by Letters Patent:

1. In a vertical crushing and grinding mill, the combination with a suitable base, of a vertical post or standard, a casing comprising two parts which are vertically hinged to said post or standard and which rest on and are secured to said base when in closed or working position, said casing parts being formed independent of said post or standard and being thus adapted to be loosened or swung aside horizontally and simultaneously to relieve clogging of the mill or when access to the chamber of the mill is desired, normally stationary or non-rotary crushing elements mounted on said hinged casing parts, a vertical shaft within said casing, and rotating crushing elements mounted on said shaft and which may be removed from said shaft, without taking the latter out of the mill, when said casing parts are swung aside.

2. In a vertical crushing or grinding mill, the combination with a suitable base, of a vertical post or standard supported by said base, one or more casing parts carrying normally stationary crushing or grinding elements and vertically hinged or pivoted to said post or standard, so as to be adapted to be swung aside horizontally like a door or doors when access to the interior of the mill is desired, means for positively lifting said casing part or parts from the said base to avoid heavy frictional contact with the base when horizontal movement of the said casing part or parts is necessary, a vertical shaft within the casing, and rotating crushing elements carried by said shaft.

3. In a vertical crushing or grinding mill, the combination with a suitable base, of a vertical post or standard supported by said base, one or more casing parts hinged or pivoted to said post or standard, so as to be adapted to be swung aside horizontally like a door or doors when access to the interior of the mill is desired, a vertical rod which serves

as the hinge or pivot for said casing part or parts, ears on the said part or parts encircling said rod, means for changing the vertical position of the said rod when the said part or parts are to be adjusted vertically, a vertical shaft within the casing, and rotating crushing elements carried by said shaft.

4. In a crushing or grinding mill, the combination with a base, of a casing comprising two vertically hinged casing parts normally resting on said base and carrying normally stationary crushing elements, positive means for simultaneously raising both of said casing parts away from said base, so that the said casing parts may both be readily swung aside horizontally when desired, and rotating crushing elements within the said casing.

5. In a crushing or grinding mill, the combination with a base, of a vertical post or standard supported by said base, a plurality of casing parts normally resting on said base and carrying normally stationary crushing or grinding elements and both vertically hinged at two separated points to said post or standard, rotary crushing elements within the chamber of the casing, and means for positively and simultaneously raising both of said casing parts away from said base to permit them to be easily swung horizontally.

6. In a crushing or grinding mill, the combination with a base, of one or more hinged casing parts normally resting on said base and carrying normally stationary crushing elements, means for positively lifting said casing part or parts out of engagement with said base when the casing is to be opened for access to the chamber of the mill, a vertical rotating shaft carrying rotating crushing elements within said chamber, and a vertical post provided with a pintle for said casing part or parts.

7. In a crushing or grinding mill, two vertically hinged casing parts capable of opening outward horizontally, said casing parts being apertured or recessed at their tops to afford a vertical support or bearing, combined with a vertical shaft having its upper bearing in said recess.

8. In a crushing or grinding mill, two vertically hinged casing parts capable of opening outward horizontally, said casing parts having complementary apertures or recesses at their tops, a sleeve received by said apertures or recesses and clamped in place by said casing parts, combined with a vertical shaft having its bearing in said sleeve.

9. In a crushing or grinding mill, two vertically hinged casing parts capable of opening outward horizontally, and a divided hopper the two parts of which are surmounted on and carried by the said casing parts, said hopper parts being apertured or recessed to afford a vertical support or bearing, combined with a vertical shaft having its upper bearing at said hopper parts.

10. In a crushing or grinding mill, two vertically hinged casing parts capable of opening horizontally at the same time, and a divided hopper the two parts of which are surmounted on and carried by the said casing parts, said hopper parts being apertured or recessed, a sleeve received by the said apertured or recessed portions of said hopper parts, and clamped in place thereby when the latter are secured together, combined with a vertical shaft having its bearing in said sleeve.

11. In a crushing or grinding mill, two vertically hinged casing parts capable of opening horizontally at the same time, and carrying normally stationary crushing elements, and a divided hopper the two parts of which are surmounted on and carried by the said casing parts, said hopper parts being apertured or recessed to afford a bearing, combined with a vertical shaft having its upper bearing at said hopper parts, and an oil box or lubricator carried by one of said hopper parts.

12. In a crushing or grinding mill, the combination with a base, of a vertical post or standard, a rod or pintle supported by said post or standard, one or more casing parts independent of said post or standard and normally resting on and supported by said base and which are hinged to said rod or pintle and carry normally stationary crushing elements, means for positively lifting said rod or pintle which is provided with means to raise the said casing part or parts from the said base when access to the chamber of the mill is desired, and rotating crushing elements within the mill chamber.

13. In a crushing or grinding mill, the combination with a base, of a vertical post or standard, a rod or pintle supported by said post or standard, one or more casing parts independent of said post or standard and normally resting on and supported by said base and which are hinged to said rod or pintle and carry normally stationary crushing elements, means for positively lifting said rod or pintle which is provided with means to raise the said casing part or parts from the said base when access to the chamber of the mill is desired, rotating crushing elements within the mill chamber, a vertical shaft carrying said rotating crushing elements, and a hopper surmounting said casing part or parts and affording an upper bearing for said shaft.

14. In a crushing or grinding mill, the combination with a base, a post or support rising from said base, two casing parts hinged to said post or support so that both may be swung aside at the same time, normally stationary crushing elements carried by said casing parts, means for simultaneously lifting both of said casing parts from said base when they are to be swung aside, and rotary crushing elements within the mill chamber and which are accessible when said casing parts are swung aside.

15. In a crushing or grinding mill, the combination with a base, of a post or standard, a casing composed of two parts hinged to said post or standard and having contracted middle portions at the waist of the mill, normally stationary crushing elements carried by said hinged casing parts, a vertical shaft within the chamber of the mill, rotating crushing elements carried by said shaft and the lowermost of which is of larger diameter than the chamber of the mill at its waist; whereby, when the said hinged casing parts are both swung aside all the said rotary crushing elements, including the larger lowermost ones, may be removed without removing the said shaft from the mill, and whereby also entire unclogging of the mill may be effected by loosening or opening out said hinged casing parts.

16. In a vertical crushing and grinding mill, the combination with a suitable base, of a vertical post or standard, a casing comprising two parts which are vertically hinged to said post or standard, said casing parts being formed independent of said post or standard and being thus adapted to be loosened or swung aside horizontally and simultaneously to relieve clogging of the mill or when access to the chamber of the mill is desired, normally stationary or non-rotary crushing elements mounted on said hinged casing parts, a vertical shaft within said casing, and rotating crushing elements mounted on said shaft, and which may be removed from said shaft, without taking the latter out of the mill, when said casing parts are swung aside.

In testimony whereof we affix our signatures, in presence of two witnesses.

THOMAS LEGGETT STURTEVANT.

THOMAS JOSEPH STURTEVANT.

Witnesses:

W. H. ELLIS,

L. H. STURTEVANT.