

THE DECISIONS
OF THE
SUPREME COURT OF THE UNITED STATES,
AT
DECEMBER TERM, 1850.

THE STATE OF MISSOURI, COMPLAINANT, *v.* THE STATE OF IOWA, RESPONDENT.—*Original Bill.*

THE STATE OF IOWA, COMPLAINANT, *v.* THE STATE OF MISSOURI, RESPONDENT.—*Cross Bill.*

The report of the commissioners appointed by this court in 7 How., 660, to run and mark the line dividing the States of Missouri and Iowa, adopted and confirmed, and the boundary line finally established.

THE commissioners appointed by this court to run and mark the boundary line between said states, according to our decree of the December term, 1848, having performed that duty, and reported to the court at this term the manner in which said work had been performed: and it appearing that two surveyors had been employed by said commissioners to aid them in doing the work in the field; and that other assistants had been employed, and that various expenses had been incurred in running and marking said line: now, in order that the parties to said controversy may be informed of the amount of means necessary to be provided to pay for said services, and also for other costs and charges, incident to the suit, it is ordered that the clerk of this court do examine witnesses, and resort to other evidence, for the purpose of ascertaining what is the proper compensation to be allowed to said commissioners and the surveyors they employed; and also what compensation is due to the Hon. Robert W. Wells for such services as he may have performed as commissioner before he resigned. And said clerk will also ascertain the amount of expenses, of every description, incurred by said commissioners, besides the compensation to themselves and

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said surveyors, together with the costs and charges incurred in this court in carrying on the *controversy here. All of *2] which he will include in a detailed account, and report the same to this court at an early day, for its final action thereon.

And in taking said account, the report of said commissioners will be taken as *prima facie* true.

Said clerk will also ascertain and report the amount of moneys already advanced to said commissioners by the states of Missouri and Iowa respectively; and the manner in which said moneys have been expended.

12 December, 1850.

And now, on this third day of January, A. D. 1851, this cause came on for further order and decree therein, when it appeared to the court that at the December term, 1848, thereof, Henry B. Hendershott and Joseph C. Brown were appointed commissioners to run and mark the line in controversy between the states of Missouri and Iowa; and the said Brown having died, the Hon. Robert W. Wells was appointed in room and stead of said Brown by the Chief Justice of this court, in vacation. And said Wells having resigned his appointment, William G. Minor was appointed commissioner in room and stead of said Wells, by this court, at its last December term of 1849; and at which term the time for running and marking said line was extended to this present term of December, 1850, for the reasons stated in the report of said Wells and Hendershott, made to the last term; and which is hereinafter embodied. And the present commissioners, Henry B. Hendershott and William G. Minor, have made their report in the premises to this term; and which report is as follows:—

TO THE HONORABLE THE SUPREME COURT OF THE UNITED STATES.

The undersigned, appointed commissioners by this honorable court, in the above cases, to establish the boundary line between the aforesaid states, respectively report, that, for the purpose of arranging the operations in the field so as to combine economy with speed, we met in the city of St. Louis, in March last, and there, after consulting experienced surveyors as to the time that might be consumed in running the line, the probable amount of expense to be incurred, the necessary force to be employed, and the proper outfit, we determined a plan of operations, and agreed to meet at the supposed site of Sullivan's "northwest corner," between the 1st and 20th

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of April last. While in St. Louis, we obtained from Major M. L. Clark, Surveyor-General of the States of Missouri and Illinois, a copy of the field notes of the survey made by John C. *Sullivan, in the year 1816, of a line beginning on the east bank of the Missouri River, opposite the middle of the mouth of the Kansas River, and extending north one hundred miles, where he made a corner, and also of the line run by him in an easterly course to the Des Moines River. We were also furnished by Major Clark with several charts, diagrams, and copies of surveys which had at various times been made of portions of Sullivan's line, and which were of much service in the prosecution of the work.

The surveyors severally appointed by us were William Dewey, Esq., of Iowa, and Robert Walker, Esq., of Missouri. Both these gentlemen had been connected with the public works of their respective states, and enjoy a high professional reputation.

According to our agreement, we left our respective homes on the 10th of April last, and soon after reaching the point of meeting, in view of increased prices of transportation, provisions, &c., caused by the immense emigration through Southern Iowa and Northern Missouri to California, we altered our plan of work and reduced our force.

No precise trace of the "old northwest corner" remained,—the witness-trees to it were on the margin of a vast prairie, and had apparently been destroyed by fire years ago. Consequently its exact position could not be ascertained. Yet from the running of many experimental lines, diligently examining the evidences before us, together with the reports of the surveyors, we became satisfied of its proper position, and accordingly established it.

Its latitude taken resulted as follows:—

40° 34' 40" N.

At the corner so determined we planted a large, solid cast-iron pillar, weighing between fifteen and sixteen hundred pounds, four feet six inches long, squaring twelve inches at its base and eight inches at its top. This pillar was deeply and legibly marked with the words (strongly cast into the iron) "Missouri" on its south side, "Iowa," on its north side, and "State Line" on the east.

From the monument so planted at the "northwest corner" aforesaid, in the said latitude, the survey of the line was commenced, running due west on said parallel of latitude to the Missouri River, as directed by this honorable court, and at its terminus, as near the bank of said Missouri River as the per-

ishable nature of the soil would admit, we planted a monument similar in figure, weight, dimension, and inscription to the one planted at the "northwest corner," the words "State Line" facing the east.

*4] Unexpected delays, arising from a condition of the weather which prevented the surveyors from making reliable astronomical observations, together with the fact, that, to a great extent, in the vicinity of said line there were no roads, and the settlements distant and sparse, compelling us to open a track for the transportation of the monuments and baggage of the corps, and also to construct necessary bridges and grade fords, greatly retarded the work.

Returning to the "northwest corner," the survey of the line was commenced, extending eastwardly from said "corner" to the Des Moines River, as run and marked by said Sullivan, in 1816, from said corner to said river. On this line, by close examination, we discovered abundant blazes and many witness-trees, which enabled us to find and re-mark the said line, as directed by this honorable court.

The survey of this portion of the line, more than one hundred and fifty miles in length, was commenced on the 13th day of August, and finished on the 18th of September.

Near the bank of the Des Moines River where the line terminated, we planted a cast-iron pillar, similar in weight, figure, dimensions, and inscriptions to those planted at the "northwest corner," and near the bank of the Missouri River, the words "State Line" facing the west.

Solid pillars of cast-iron, weighing each between three and four hundred pounds, and minutely described as to figure and inscriptions in the report heretofore made to this honorable court by Messrs. Wells and Hendershott, commissioners, we caused to be planted at every ten miles, in the due west line extending from said "northwest corner" to the Missouri River, and also at every ten miles in the line extending east from the "northwest corner" aforesaid to the Des Moines River.

No iron monument was planted at mile 150 in the line running east, because between it and the point where the large one is planted on the bank of the Des Moines River there existed but a small fraction of ten miles, being only fifty-one chains.

For a fuller account of the said survey we respectively refer to the report of the surveyors made to us, marked A, and to the following exhibits herewith transmitted —

Field notes of said survey, accompanied by a map of the line (marked B:)

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Tabular statement of the costs and charges incurred in said survey (marked C.)

All of which is most respectfully submitted.

HENRY B. HENDERSHOTT, *Comm'r, &c., Iowa.*

W. G. MINOR, *Commissioner, Mo.*

*And the report of the surveyors employed by the commissioners, and above referred to as part of said commissioners' report, is in the words and figures following:—

Keokuk, September 30, 1850.

MESSRS. HENDERSHOTT AND MINOR, *Commissioners of the Boundary Commission.*

Gentlemen.—Having been appointed by you, on the part of the states of Iowa and Missouri severally, to locate and survey the boundary between those states, under the decree of the Supreme Court of the United States, we met according to your appointment, on the 28th of April last, near the supposed site of the old northwest corner, for the purpose of commencing operations in the field.

We proceeded to search for the old corner, which was to be the basis of our future operations. Having a certified copy of Sullivan's field notes, from the Surveyor-General's office at St. Louis, we knew that the corner had been originally located in timber, and designated by two witness-trees. Aided by a view of the topography of the locality,—as indicated in the notes, and especially by the manner in which Sullivan's north line crossed the Platte River near its terminus,—we were able to determine the locality of the corner approximately; and an inspection of the ground satisfied us that every evidence of its *exact* position had long since disappeared. Time, and the fires that annually spread over the prairies, had destroyed the witness-trees and every trace of both lines near the corner.

This point, known familiarly as the "old northwest corner," was the termination of the line surveyed by Sullivan, in 1816, from the mouth of the Kansas River north one hundred miles, and was the point at which he turned east, in running to the Des Moines River, his miles being numbered north from the Kansas, and east beginning again at the corner.

Having no *direct* evidence of the exact site of the required point, it became necessary to find determinate points in the two lines as near the corner as possible. Prolonging the lines severally from such points, their intersection would be the point to be assumed as the corner, and, if Sullivan's measure-

ment were correct, would be the precise spot where he established it.

Near the supposed locality of the 99th mile corner on the north line, we found a decayed tree and a stump, which correspond in course, distance, and description with the witness-trees to that corner, and cutting into the tree we saw what we supposed to be the remains of an old blaze, upon which was preserved a part, apparently, of the letter M. This sup-
*6] position *was verified by measuring south two miles to a point, which we found to be Suliivan's 97th mile corner from one witness-tree, which was perfectly sound. The marks upon it, two or three inches beneath the bark, were plain and legible.

On the east line we found the witness-tree to the 3d mile corner. The wood upon which the marks had been described was decayed, but their reversed impression appeared upon the new growth which covered the old blaze, and which was cut out in a solid block.

Prolonging the lines three miles each from the points thus determined, their intersection was assumed as the required corner, and at that point was planned the monument specified in the decree. By measurement made from the surveyed lines, we found the corner to be in the northeast quarter of section 35, township 67 north, range 33 west. Its exact position with reference to those lines can be seen in the diagram in the field notes. See *post*, *15.

The latitude of the corner, determined by a series of observations taken on the ground, we found to be $40^{\circ} 34' 40''$ north. While employed upon these observations, we were delayed by unfavorable weather, and it was not till the 24th of May that we were in readiness to commence the survey of the west line from the corner to the Missouri River.

This portion of the boundary, being required to be a parallel of latitude, was run with Burt's solar compass, the use of which requires the longitude of the place of observation to be at least approximately known. Not having the requisite means of ascertaining the longitude of the corner, we calculated it from maps to be about $94^{\circ} 30'$ west from Greenwich, which was sufficiently accurate for the purpose. The instrument used being an untried one, some delay was experienced in its adjustment. To insure accuracy in the work, a telescope was attached to it.

The principles upon which this line was run involve a mathematical investigation, which will be found in Note A, accompanying this report, but the mode of running it will be briefly described here. Each successive mile was prolonged

in the plane of the prime vertical passing through its beginning. The direction indicated by the instrument stationed at the beginning of a mile is in the plane of the prime vertical passing through that point, and that direction was continued through the mile by means of fore and back sights. At the end of the mile, an offset north was made to compensate for the sphericity of the earth. This offset, it will be seen by the note, is 6.855 inches for one mile. The instrument being moved at the end of the mile the proper distance north, and a new direction *given and continued as before, the parallel [*7 passing through the initial point was continued through- out the line. In some instances, however, it became convenient, whenever the nature of the ground admitted of it, instead of offsetting, to continue the same direction through several miles. It will be seen by the note, that the offsets increase as the squares of the distances, being for one mile 6.855 inches, for two miles, four times that distance, &c.

Thus it appears that the offsets rapidly increase with the distance run, and that, by continuing the direction of the prime vertical from the corner to the terminus, the southing would have been over 2,000 feet.

At the western terminus of the line, the observations for latitude were repeated. Having established that point, we returned to the northwest corner and commenced retracing Sullivan's east line on the 13th of August.

It is thirty-four years since this line was run, and every vestige of the mounds and pits established in the prairie has disappeared. Much of the country through which it passes consists of brushy barrens, or high rolling prairies, dotted with detached groves, or covered with a thin growth of dwarf timber. Much of this description of timber has been destroyed by fire, forming in some instances prairie, and in others brushy barrens, destitute of trees; while in some places an entirely new growth of young timber, principally hickory, has sprung up. In all such cases the witness-trees and other marks mentioned in Sullivan's field notes were gone, and thus it occurred that we frequently were several miles without finding any traces of the line. But in heavy bodies of timber no difficulty was experienced in discovering evidences of the precise location of the line, not only by blazes, but by line and witness-trees, many of which are sound, and the marks in good preservation. The general topography of the country, and especially the crossings of the streams, greatly facilitated us in following the line, and in some instances, when confirmed by the old blazes, enabled us to establish it with sufficient certainty. In the absence of any traces of the line between two known

points, distant from each other more than one mile, we assumed the line to be straight between such points, and established our posts accordingly. This was done by running a random line from the last found corner, in a direction as near that pursued by Sullivan as we could determine, until another point was found, and then correcting back. No notice, however, is taken of these random lines in the field notes, which relates to the true line only.

We soon satisfied ourselves that the line run by Sullivan *8] was not only not a due east line, but that it was not straight. That more or less northing should have been made in the old line was to have been expected from the fact that Sullivan ran the whole line with one variation of the needle, and that variation too great. This would account for the fact that the northing increases as he progressed east. But there are great irregularities in the course of the line, for which it is difficult to find a cause. Sudden deviations amounting to from one to three degrees frequently occur, and it rarely happens that any two consecutive miles pursue the same direction.

A resurvey of the line between the 91st and 134th miles was made in the year 1845, and we found the witness-trees on that part of the line defaced, and others substituted. We succeeded, however, in identifying Sullivan's trees, and we destroyed the marks of that survey as far as they related to the old line. In all instances where a corner on Sullivan's line is mentioned in our field notes, one or both witness-trees were found to identify it and we did not always think it necessary to repeat the fact in the notes.

Accompanying this report are the field notes and map of the boundary, the former of which are sufficiently explained in the note prefixed to them.

On the west line the monuments every ten miles were deemed sufficient. On the east line mile posts are established, marked, and witnessed as described in the field notes.

It will be perceived that the measurement of this line as run by us exceeds that of Sullivan by $11\frac{80}{100}$ chains, and that this increase, although gradual, is not regular. Some portions of the old line agree very nearly with our measurement, while others differ materially, and the greatest gain is generally made in brushy and broken land.

For the convenience of estimating distances, and that the true length of the line might be indicated by the mile posts, they were established by our measurement, taking care in every instance to note the distance of the posts set by us from the corresponding corners in the old line whenever found.

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The different courses being extended from one known point to another, the line was not altered at those points, being made to pass through them, but only its length corrected.

The length of the entire line is 211 miles and $32\frac{80}{100}$ chains, embracing $4^{\circ} 1' 7''.29$ of longitude. The length of a second of longitude is calculated in Note C, and the longitude of any point of the line being known, that of any other point can be deduced.

The map is platted from the field notes on a scale of half an inch to the mile, and is only intended to represent the general *features in the topography of the line. The scale upon which it is made is much too small to show the angles in the east line, to do which would require it to be extended to a length that would render it inconvenient. All the purposes for which it can be used will be attained by its present form.

WM. DEWEY,

Surveyor on the part of Iowa.

R. WALKER,

Surveyor on the part of Missouri.

NOTE A.

Put a = semi-equatorial axis of the earth.

c = semi-polar axis.

x = absciss
 y = ordinate } to a point S on the terrestrial meridian.

e = eccentricity.

l = latitude of S .

r = radius of curvature at S .

Then considering the centre as the origin of the co-ordinates, we have

$$y^2 = \frac{c^2 (a^2 - x^2)}{a^2}$$

and, differentiating,

$$d y = - \frac{c^2 x d x}{a^2 y};$$

whence,

$$d x^2 + d y^2 = \frac{(a^4 y^2 + c^4 x^2) d x^2}{a^4 y^2} (1.)$$

Differentiating again, we find

$$d^2 y = - \frac{(a^2 c^2 y^2 + c^4 x^2) d x^2}{a^4 y^3} (2.)$$

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Substitute these values (1 and 2) in the general equation

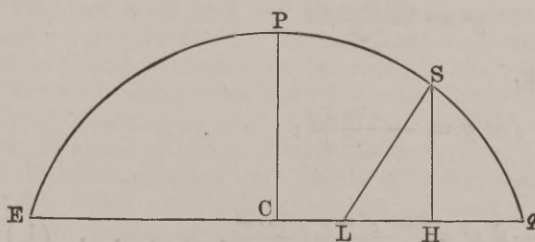
$$r = - \frac{(dx^2 + dy^2)^{\frac{3}{2}}}{a x d^2 y},$$

and we have

$$\begin{aligned} r &= - \left(\frac{(a^4 y^2 + c^4 x^2) dx^2}{a^4 y^2} \right)^{\frac{3}{2}} \times - \frac{a^4 y^3}{(a^2 c^2 y^2 + c^4 x^2) dx^3} \\ &= \frac{\left[a^4 \left(\frac{c^2 (a^2 - x^2)}{a^2} \right) + x^2 (a^2 - e^2)^2 \right]^{\frac{3}{2}} a^4 y^3 dx^2}{a^6 y^3 (a^2 c^2 \frac{c^2 (a^2 - x^2)}{a^2} + c^4 x^3) dx^3} \\ &= \frac{(a^4 c^2 - a^2 c^2 x^2 + (a^2 - e^2)^2 x^2)^{\frac{3}{2}}}{a^4 c^4} \\ &= \frac{(a^6 - a^4 e^2 - a^4 x^2 + a^2 e^2 x^2 + a^4 x^2 - 2 a^2 e^2 x^2 + e^4 x^2)^{\frac{3}{2}}}{a^4 c^4} \\ &= \frac{(a^6 - a^4 e^2 - a^2 e^2 x^2 + e^4 x^2)^{\frac{3}{2}}}{a^4 c^4} = \frac{[(a^4 - e^2 x^2) (a^2 - e^2)]^{\frac{3}{2}}}{a^4 c^4} \\ &= \frac{[(a^4 - e^2 x^2) c^2]^{\frac{3}{2}}}{a^4 c^4} = \frac{(a^4 - e^2 x^2)^{\frac{3}{2}} c^3}{a^4 c^4}; \end{aligned}$$

and, finally,
$$r = \frac{(a^4 - e^2 x^2)^{\frac{3}{2}}}{a^4 c} \dots \dots \dots (3.)$$

The foregoing equation (3) is the proper expression for the radius of curvature when the value of x is known; but as, in the present case, the value of this quantity is unascertained, it will be better to deduce an equivalent expression involving only quantities which must, from the nature of the question, necessarily be known.



Let $E q$ represent the equatorial axis of the earth; $C P$, the semi-polar axis; P , the pole; S , a point on the terrestrial meridian at which the radius of curvature

is required, and whose latitude $S L H = l$ is known; then, retaining the notation hitherto adopted, $C q = a$; $C P = c$; $C H = x$; and $S H = y$. $S L$ is normal to the meridian at

S , and is, consequently, a part of r , the radius of curvature. In the right-angled triangle SHL , $LH : SH :: \cos. l : \sin. l$, and, from the properties of the ellipse, $\overline{Cq}^2 : \overline{CP}^2 :: \overline{CH} : \overline{LH}$; whence $LH = \overline{CP} \times \frac{\overline{CH}}{\overline{Cq}^2} = \frac{c^2 x}{a^2}$.

And the first analogy becomes

$$\frac{c^2 x}{a^2} : y :: \cos. l : \sin. l,$$

or, since $y = \frac{c}{a} (a^2 - x^2)^{\frac{1}{2}}$,

$$\frac{c^2 x}{a^2} : \frac{c}{a} (a^2 - x^2)^{\frac{1}{2}} :: \cos. l : \sin. l;$$

whence,

$$\frac{c^2 x \sin. l}{a^2} = \frac{c}{a} (a^2 - x^2)^{\frac{1}{2}} \cos. l,$$

and, dividing by $\frac{c}{a}$,

$$c x \sin. l = a (a^2 - x^2)^{\frac{1}{2}} \cos. l.$$

Squaring, we find

$$c^2 x^2 \sin.^2 l = a^2 (a^2 - x^2) \cos.^2 l = a^4 \cos.^2 l - a^2 x^2 \cos.^2 l.$$

Hence, since $c^2 = a^2 - e^2$,

$$(a^2 - e^2) x^2 \sin.^2 l = a^2 x^2 \sin.^2 l - e^2 x^2 \sin.^2 l = a^4 \cos.^2 l - a^2 x^2 \cos.^2 l;$$

and transposing,

$$\begin{aligned} a^2 x^2 \sin.^2 l + a^2 x^2 \cos.^2 l - e^2 x^2 \sin.^2 l &= a^2 x^2 (\sin.^2 l + \cos.^2 l) \\ &- e^2 x^2 \sin.^2 l = (\text{since } \sin.^2 l + \cos.^2 l = 1) a^2 x^2 - e^2 x^2 \sin.^2 l \\ &= x^2 (a^2 - e^2 \sin.^2 l) = a^4 \cos.^2 l. \end{aligned}$$

Whence we deduce

$$x^2 = \frac{a^4 \cos.^2 l}{a^2 - e^2 \sin.^2 l} \dots \dots \dots (4.)$$

If now, in equation (3), we substitute for x^2 its value just found, we have

$$\begin{aligned} r &= \frac{\left(a^4 - e^2 \frac{a^4 \cos.^2 l}{a^2 - e^2 \sin.^2 l} \right)^{\frac{3}{2}}}{a^4 c} = \frac{\left(a^4 \left[\frac{a^2 - e^2 \sin.^2 l - e^2 \cos.^2 l}{a^2 - e^2 \sin.^2 l} \right] \right)^{\frac{3}{2}}}{a^4 c} \\ &= \frac{a^6 \left(\frac{a^2 - a^2}{a^2 - e^2 \sin.^2 l} \right)^{\frac{3}{2}}}{a^4 c} \end{aligned}$$

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$$= \frac{a^2}{c} \left(\frac{c^2}{a^2 - e^2 \sin.^2 l} \right)^{\frac{3}{2}} = \frac{a^2 c^3}{c} \left(\frac{1}{a^2 - e^2 \sin.^2 l} \right)^{\frac{3}{2}}$$

whence, at last, we find

$$r = \frac{a^2 c^2}{(a^2 - e^2 \sin.^2 l)^{\frac{3}{2}}}, \quad \dots \quad (5.)$$

which is a general expression for the radius of curvature at any point on the elliptic meridian.

The determination by Bessel of the equatorial and polar diameters of the earth, may be regarded as more accurate than that of any other geometer. His results, deduced from a consideration of the most accurately measured arcs of the meridian in various latitudes, are therefore adopted.

We have, then,

$$a = 20,923,596 \text{ feet.}$$

$$c = 20,853,662 \text{ "}$$

Hence, if we express the other quantities in terms of a , we shall have, after a good deal of troublesome computation,

$$\begin{array}{rcl} a & \cdot & = 1.000000000 \\ c^2 & \cdot & = 0.993326469 \\ l^2 & \cdot & = 0.006673531 \\ \sin.^2 l = \sin.^2 40^\circ 34' 40'' & \cdot & = 0.4231238233 \end{array}$$

and, substituting these values in equation (5), we have

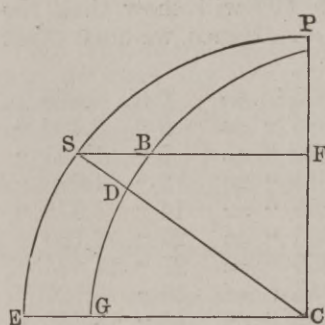
$$\begin{aligned} r &= \frac{.993326469}{(1 - 0.006673531 \times .4231238233)^{\frac{3}{2}}} = \frac{.993326469}{.99717627} \\ &= \frac{.993326469}{.995767396} = .997548697, \quad \dots \quad (6.) \end{aligned}$$

or, resuming the foot as a unit,

$$r = 20,923,596 \times .997548697 = 20,872,306 \text{ feet.} \quad (7.)$$

A line traced upon the earth's surface in an east or west direction, and accurately prolonged by means of fore and back sights, will always remain in the plane of the prime vertical passing through its beginning; and consequently will gradually tend southward, according to a certain law. Hence, in running the line from Sullivan's corner to the Missouri River, it was necessary to apply certain corrections in order to regain the parallel of latitude passing through the initial point. These corrections may be ascertained in the following manner:--

We may, without sensible error, consider that part of the earth's surface on which we have been operating as a portion of the surface of a sphere whose radius is equal to the radius of curvature, as above ascertained.



Let EC, PC , represent the equatorial and polar radii, respectively, and $EC\hat{S} = CS\hat{F} = l$, the latitude of S . CS and FS represent, and are in the planes of, the prime vertical and the circle of latitude.

It is evident that these planes intersect each other at S , and that the line of intersection is tangential to the earth at that point. If, then, a line be traced from S , at right angles to the meridian PE , it will intersect any other meridian PG at D . But the parallel intersects the same meridian at B . Hence, DB is the required correction.

It thus appears that the planes represented by SC, SF , intersecting the plane of the second meridian, will form, externally to the earth, a figure which may be represented by $SD\hat{B}$; and, the arc DB being very small, this figure may be treated as a plane triangle, right-angled at D . The angle S , when projected upon the plane of the second meridian, will, of course, undergo a diminution; but when (as is the case here) the inclination of the two meridians is small, this diminution becomes almost infinitesimal in amount, and may be disregarded. If, therefore, we put $u = SD$, and $v = BD$, we shall have

$$v = u \tan. l. \quad . \quad . \quad . \quad . \quad . \quad (8.)$$

But, making d = the distance along the line between the meridians, we have from the properties of the circle

$$2r + u : d :: d : u;$$

whence, $u(2r + u) = d^2$, and $u = \frac{d^2}{2r + u}$; and the quantity u , in the divisor of the second number, being so minute, when compared with $2r$, as to have no effect upon the result within the limits we have adopted, this expression becomes,

$$u = \frac{d^2}{2r},$$

and, substituting this value in equation (8), we have

$$v = \frac{d^2 \tan. l}{2r} \quad . \quad . \quad . \quad . \quad . \quad (9.)$$

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If now, in this expression, we make $d = 1$ mile, and substitute for the letters their numerical values, we shall have

$$v = 6.855 \text{ inches.}$$

A simple inspection of equation (9) will show that, the latitude being constant, v varies as d^2 . Hence, we must offset north as follows:—

When $d = 1$ mile,	$v = 1 \times 6.855 \text{ in.} =$	0 ft. 6.855 in.
“ “ = 2 miles,	$v = 4 \times 6.885 \text{ “} =$	2 “ 3.420 “
“ “ = 3 “	$v = 9 \times 6.875 \text{ “} =$	5 “ 1.695 “
“ “ = 4 “	$v = 16 \times 6.855 \text{ “} =$	9 “ 1.680 “
“ “ = 5 “	$v = 25 \times 6.855 \text{ “} =$	14 “ 3.375 “
“ “ = 6 “	$v = 36 \times 6.855 \text{ “} =$	20 “ 6.780 “
“ “ = 7 “	$v = 49 \times 6.855 \text{ “} =$	27 “ 11.895 “
“ “ = 8 “	$v = 64 \times 6.855 \text{ “} =$	36 “ 6.720 “
“ “ = 9 “	$v = 81 \times 6.855 \text{ “} =$	46 “ 3.255 “
“ “ = 10 “	$v = 100 \times 6.855 \text{ “} =$	57 “ 1.500 “
“ “ = 60 “	$v = 3600 \times 6.855 \text{ “} =$	2056 “ 6.000 “

NOTE B.

In note A, equation (7), we find 20,872,306 feet to be the length of the radius of curvature of the terrestrial meridian at the parallel of $40^\circ 34' 40''$; and as this value may be considered constant for a short distance north or south of that parallel, and as radius, expressed in seconds, is equal to 206,264,806'', we have, for the length of a second of longitude on either side of the line, for a few miles,

$$1'' = \frac{20,872,306}{206,264,806} = 101.2 \text{ feet.}$$

NOTE C.

It is plain that the absciss x is equal to the radius of the circle of latitude passing through S .

In note A, equation (4), we have

$$x^2 = \frac{a^4 \cos.^2 l}{a^2 - e^2 \sin.^2 l};$$

whence,

$$x = \frac{a^2 \cos. l}{(a^2 - e^2 \sin.^2 l)^{\frac{1}{2}}};$$

or, using a as a unit, and substituting the numerical values,

$$\begin{aligned} x &= \frac{.75953361}{(1 - .006673531 \times .4231238233)^{\frac{1}{2}}} = \frac{.75953361}{.99717627} \\ &= \frac{.75953361}{.998587137} = .76060824; \text{ and, resuming the foot as a unit,} \\ x &= 29,923,596 \times .76060824 = 15,914,660 \text{ feet,} \\ &14 \end{aligned}$$

Hence, along (or near) the parallel of $40^{\circ} 34' 40''$, we have for the length of a second of longitude,

$$1'' = \frac{15,914,660}{206,264,806} = 77.1564 \text{ feet.}$$

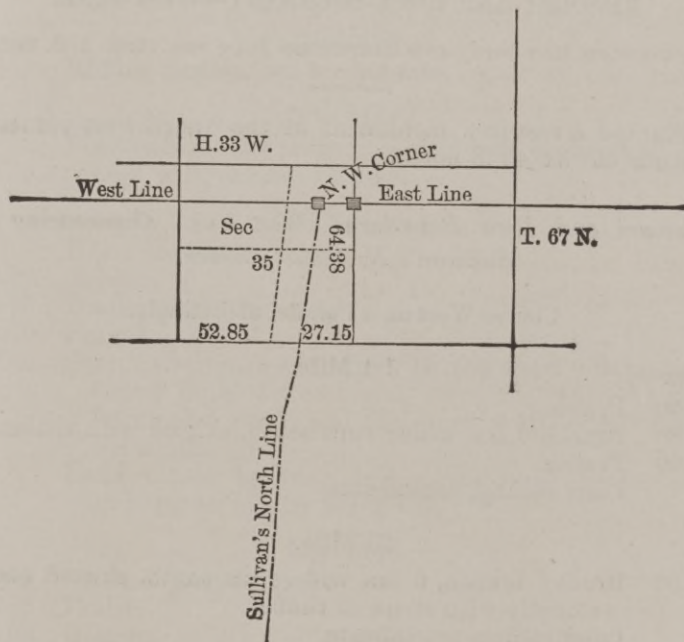
We may, therefore, easily ascertain the difference of longitude between any two points in the line; and consequently, whenever the longitude at any one of these points shall have been determined, it will become known for all the others.

The following is a statement of the differences of longitude between the principal points in the line, viz. :—

Between Sullivan's corner and monument near the Missouri River,	$1^{\circ} 8' 25.94''$
“ “ “ “ “ Des Moines,	$2^{\circ} 51' 48.49''$
“ the extreme monuments,	<u>$4^{\circ} 0' 14.43''$</u>

And since the line extends west of the monument near the Missouri River 61 chains, and east of the monument near the Des Moines 80 links, we see that the whole extent of longitude embraced by the line is $4^{\circ} 1' 7.29''$.

Diagram showing the situation of the corner.



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And the field notes referred to by the said surveyors, Walker and Dewey, as part of their report, are in the words and figures shown in the diagram on the preceding page.

NOTE.

The field notes relate to the true line, as established on the ground. No notice is taken of random lines. The distances are reckoned in chains and links from the beginning of each mile.

When a post is noted as set in a mound, the pit is invariably nine links west, to designate it from other surveys. In the prairie the posts are marked with the letters "B. L." facing the east, the letter "I." facing the north, and the letter "M." facing the south, and the number of the mile marked on the west face of the post. In timber the number of the mile is marked on the witness-trees, with the letter appropriate to each state, there being one tree marked on each side of the line whenever *possible. The foot of each witness-tree *16] is marked with the letters "B. L."

MISSOURI AND IOWA BOUNDARY—WEST LINE.

COMMENCED MAY 24TH, AND COMPLETED JULY THE 12TH, A. D. 1850.

Planted a cast-iron monument at the "northwest corner," latitude $40^{\circ} 34' 40''.3$ north.

Missouri and Iowa Boundary. West line. Commencing at Sullivan's Northwest Corner.

Course West on a Parallel of Latitude.

Dist.	1st Mile.
5.00	Prairie.
18.30	Branch 6 lks. wide; runs south, skirted with timber.
27.00	Prairie.
	Land rolling, second-rate.
	2d Mile.
33.90	Brushy branch, 6 lks. wide, runs south, skirted occasionally with strips of timber.
	Land rolling, second-rate.

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- Dist. 3d Mile.
 78.00 Timber.
 Land rolling, soil second-rate.
- 4th Mile.
 75.00 Honey Creek, 25 lks. wide, runs south.
 78.00 Prairie.
 Land rolling and second-rate, timber ordinary, black
 and burr-oak, elm, hickory and walnut, and under-
 growth brush of same.
- 5th Mile.
 Second-rate rolling prairie.
- 6th Mile.
 Second-rate rolling prairie.
- 7th Mile.
 30.00 A small branch runs southwest.
 74.00 Branch 4 links wide, runs south.
 These branches unite about 10 chains below the line,
 and at their junction commences an extensive grove
 extending south.
 Land rolling, soil second-rate.
- 8th Mile.
 Rolling prairie, soil second-rate.
- *9th Mile. [*17
 First half rolling prairie; second half broken and cov-
 ered with patches of hazel.
- 10th Mile.
 Hazel continues.
- 50.00 Timber.
 58.00 Drain runs northwest.
 71.00 Prairie.
 80.00 Set a cast-iron monument with the word "Boundary"
 facing both the east and west, the word "Iowa"
 facing the north, and the word "Missouri" facing
 the south.
 Land rather broken; soil second-rate; timber poor
 and sparse, mostly black oak
- 11th Mile.
 4.50 Timber (a small grove).
 6.25 Prairie.
 13.00 Bottom.

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Dist.

21.00 East Fork, of 102.40 links wide, runs southwest.

27.00 Prairie.

Land rolling; second-rate. Prairie interspersed with hazel thickets. Timber tolerable; elm, lind hickory, walnut, &c. The ridges are covered with hazel and scrub oak.

12th Mile.

54.50 Timber.

56.50 Middle Fork, of 102.25 links wide, runs south.

61.50 Prairie with patches of hazel.

Land rolling, soil second-rate. Bottom on the creek level and rich; timber indifferent.

13th Mile.

• 69.00 Timber.

74.50 West Fork, of 102.50 links wide, runs south, skirted with a narrow belt of sparse timber.

Land rolling, second-rate. Bottom rather wet.

14th Mile.

Rolling, second-rate prairie.

15th Mile.

Prairie, rather broken, second-rate. Patches of hazel and small groves of sparse timber.

16th Mile.

Same as last mile.

*18]

*17th Mile.

31.00 Timber.

31.25 Small branch runs northwest. Northeast corner of Mr. Short's field 300 links S. 45° W.

50.00 Northwest corner of Short's field 200 links south.

64.00 Clear Creek, 10 links wide, runs southwest.

Land rolling; second-rate. Timber tolerable, black and burr-oak, elm and walnut, &c., with undergrowth.

18th Mile.

1.50 Prairie. Land rolling, second-rate.

19th Mile.

Rolling, second-rate prairie.

20th Mile.

5.00 Drain runs northwest. Grove short distance north.

39.00 Cut off southwest corner of Davidson's field.

Missouri v. Iowa.

Dist.	
67.00	Drain northwest.
80.00	Set cast-iron monument facing as before. Land rather broken ; soil second-rate.
	21st Mile.
	Rolling, second-rate prairie.
	22d Mile.
	Mostly bottom prairie, level and rich.
	23d Mile.
7.30	Nodaway River, 100 links wide, runs south, muddy channel, narrow belt of timber on the banks. The first half is rather wet bottom prairie. Last quarter of the mile brushy, and the end in a dense thicket.
	24th Mile.
	First quarter brushy, with thickets of hazel, &c. Balance prairie, rolling, second-rate.
	25th Mile.
	Upland prairie, rolling, second-rate.
	26th Mile.
	Same as last mile.
	27th Mile.
	Rolling, second-rate prairie.
	28th Mile.
29.50	Sparse timber.
34.00	Brushy prairie.
49.50	Drain southwest.
57.00	Timber.
65.00	Bottom.
68.50	Thicket of dense brush.
72.00	Branch, 6 links wide, runs southeast.
73.50	Prairie. Land rolling, soil second-rate. Timber poor.
	*29th Mile.
5.00	Left bottom.
19.50	Small grove.
25.50	Left same. Prairie.
35.00	Bottom.
38.00	Timber.
43.00	Mill Creek, 15 links wide, runs south.
45.50	Prairie.
53.00	Left bottom (same as last mile).

[*19]

Missouri v. Iowa.

Dist.	30th Mile.
16.40	Small branch runs northeast, hazel on the banks.
80.00	Set cast-iron monument in a swale, facing as before. Land very rolling, second-rate.
	31st Mile.
	Rolling upland prairie.
	32d Mile.
	Same.
	33d Mile.
	Same.
	34th Mile.
13.60	East Taskio, 80 links wide, runs south, banks steep, channel muddy, narrow belt of timber on the banks, occasionally spreading out into considerable groves. Upland rolling, second-rate. Bottom about $\frac{3}{4}$ mile wide, level and rich.
	35th Mile.
	Rolling upland prairie.
	36th Mile.
	The same.
	37th Mile.
	The same.
	38th Mile.
9.90	Middle Taskio, 6 links wide, runs south. Same as last mile.
	39th Mile.
7.50	A wet swale.
17.00	Left swale.
50.00	East edge of a grove about 5 chains south, extending west.
	40th Mile.
29.00	Timber.
69.25	West Taskio, 60 links wide, runs southwest. Prairie.
80.00	Set cast-iron monument, facing same as above. Upland rolling, second-rate; bottom rich. Timber, burr-oak, hickory, elm, &c.
*20]	*41st Mile.
	Upland rolling prairie.
	42d Mile.
	The same.

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		43d Mile.	
	The same.		
		44th Mile.	
	The same.		
		45th Mile.	
	The same.		
		46th Mile.	
	The same.		
		47th Mile.	
26.40	High Creek, 5 links wide, runs southwest.		
	The same.		
		48th Mile.	
	The same.		
		49th Mile.	
	The same.		
		50th Mile.	
80.00	Set cast-iron monument in a low, wet swale, facing as before.		
	Land same as last mile.		
		51st Mile.	
44.90	Field fence north and south.		
69.30	Fence north and south.		
71.00	Timber.		
	Land as before.		
		52d Mile.	
4.70	Left field fence north and south.	Timber.	
51.25	Branch, 4 links wide, runs north.		
79.00	Road north and south.	Prairie.	
79.50	Touched the northwest corner of a field.		
	Land as usual. Timber tolerable, oak, hickory, elm, &c.		
		53d Mile.	
7.75	Timber.		
28.00	Field fence north and south.		
40.10	Left field fence north and south.	Prairie.	
45.50	Timber.		
64.75	Small branch runs south.		
66.80	Field fence north and south (Sager's).	Left timber.	
	Land broken, soil second-rate. Timber, oak, hickory, elm, &c.		
		*54th Mile.	[*21
00.60	Fence north and south, dividing Sager and Sebo.		
7.50	Left field north and south.		

Missouri v. Iowa.

Dist.

10.00 Open burr-oak timber.

45.75 Spring branch southwest.

59.50 Road north and south.

60.00 Field fence north and south. Prairie.

Land broken, second-rate. Timber, burr-oak, hickory, &c. The 51st, 52d, 53d, 54th, and 55th miles run through what is known as McKissock's Grove, embracing a fine farming country.

55th Mile.

2.50 Left field.

5.10 Top of steep bluff, sparse timber on the slope.

9.50 Bottom prairie.

30.00 Timber.

33.50 Nishnebotone River, 150 links wide, runs southwest. The bottom is level and rich, affording fine pasturage. There is a narrow strip of timber on the river.

56th Mile.

Level, rich bottom.

57th Mile.

22.80 Slough runs south.

Land the same.

58th Mile.

The same.

59th Mile.

The same.

60th Mile.

80.09 Set cast-iron monument, the words "State Line" facing the east, and the word "Iowa" facing the north, and the word "Missouri" facing the south. The ground here is high, affording a much more appropriate site for the monument than the terminus on the bank of the Missouri River, where the land is extremely liable to wash, and is frequently overflowed.

61st Mile.

9.50 Road north and south. The ground begins to become lower from this point.

15.75 Field fence north and south.

24.00 Left field fence north and south. Timber.

57.50 A cottonwood, 30 inches diam., notched on the east and west sides, and marked with the letter "I." on the north, and "M." on the south.

Missouri v. Iowa.

Dist.	
61.00	Set a post on the bank of the Missouri River.
	Bearings, { Cottonwood, 10 in diam., S. 67° E. 6 lks.
	{ " " " " N. 21° W. 12 "
	Rich bottom land, heavy body of timber, principally cottonwood and elm.

Missouri and Iowa Boundary. East Line from Sullivan's Northwest Corner.

Course S. 89° 24' E.

1st Mile.—Var. of needle 11° E.

4.00	Small branch, runs southwest.
10.50	Prairie.
23.50	Drain south. Brushy prairie.
65.00	Touched south point of a grove.
80.00	Set post in mound.
	Land very rolling, soil second-rate.

2d Mile.

10.50	Small branch runs southeast; bottom sparse timber.
16.00	Branch, 25 links wide, runs south.
27.00	Bottom prairie.
61.20	Branch, 25 links wide, runs southeast. Narrow skirt of timber on the banks.
75.00	Bushy upland prairie. Barrens.
80.00	Set 2d mile post in mound.

3d Mile.

59.50	Sparse timber.
77.00	Prairie.
80.00	Sullivan's 3d mile corner found by one witness-tree.
	Set 3d mile post in mound. 2d and 3d miles very rolling, with sparse timber and barrens.

Course N. 89° 45' E.

4th Mile.

19.00	Bottom prairie.
50.50	Platt River, 75 links wide, runs south-southeast. Narrow skirt of timber, Sullivan's blazes.
58.50	South point of a sharp bend in the river; the line enters the river a short distance.
66.00	Prairie.
72.00	Upland.
80.00	Set post in mound.
	Land rolling, second-rate. Timber poor, hickory, elm, burr-oak, &c.

 Missouri v. Iowa.

*5th Mile.

Dist.

80.00 Set post in mound.
Rolling upland prairie.

6th Mile.

80.00 Set 6th mile post in mound.
Land as last mile.

7th Mile.

13.50 Branch, 20 links wide, runs southwest. Timber
14.25 " " " " " north.
16.00 " " " " " southwest.

Found Sullivan's blazes on the line.

35.60 Prairie.

51.50 Bottom.

80.00 Set 7th mile post in mound.
Upland broken, brushy barrens; bottom rich.

8th Mile.

40.00 West fork of Grand River, 100 links, runs south.
Timber.

61.50 Prairie.

80.00 Set 8th mile post in mound.
Land level and rich. Timber good, hickory, elm,
black walnut, &c.

9th Mile.

28.00 Brushy upland prairie; sparse scrub-oak on the ridges.
54.50 Small branch runs southwest.
80.00 Set 9th mile post in mound.
Upland broken and brushy.

10th Mile.

42.50 Road northeast; open prairie.
80.00 Set cast-iron monument with the word "Boundary"
facing both the east and the west, and the word
"Iowa" facing the north, and the word "Missouri"
facing the south. First half-mile broken and brushy,
second half open prairie.

11th Mile.

80.00 Set 11th mile post in mound.
Land broken and brushy.

12th Mile.

25.00 Sparse timber, land broken.
29.00 Branch, 10 links wide, runs east-southeast.

Missouri v. Iowa.

Dist.	
31.00	Prairie.
80.00	Set 12th mile post in mound near a small branch. Land rolling, second-rate.
	*13th Mile. [*24
0.05	Small branch runs south, scattering trees and brush on each side.
59.00	Timber. Creek a few links south.
71.00	Creek, 50 links wide, runs south.
73.00	" " " " northwest.
78.50	" " " " south.
	This creek is very crooked, and has probably changed its channel since Sullivan run his line. The line is on his blazes.
80.00	Set 13th mile post.
	Bearings, { Burr-oak, 18 in. diam., S. 20° E. 41 links. Elm, 20 " " N. 20° W. 57 "
	Land rolling, second-rate. Timber, elm, burr-oak, hickory lind, &c.
	14th Mile.
1.40	Sullivan's 13th mile corner found by one witness-tree still standing.
	Course N. 89° 43' E.
40.20	Field. Left timber. The line is on Sullivan's blazes, through this timber.
50.75	Left field. Prairie.
80.00	Set 14th mile post in mound.
	Land rolling, second-rate. Timber good, white and burr oak, elm, hickory, &c.
	15th Mile.
80.00	Set 15th mile post in mound.
	Land rolling prairie.
	16th Mile.—Var. 10° 30' E.
39.00	Small branch runs southeast.
46.00	Branch, 12 links wide, runs south-southwest.
	Narrow belt of timber on bank. Sullivan's blazes.
55.00	Sparse timber.
69.00	Prairie.
80.00	Set 16th mile post in mound.
	Land rolling, second-rate.
	17th Mile.
80.00	Set 17th mile post in mound.
	Land same.

Missouri v. Iowa.

18th Mile.

- Dist.
 30.00 Bottom.
 80.00 Set 18th mile post in mound.
 Upland rolling. Bottom rich.

*25]

*19th Mile.

[*25

- 13.50 Branch, 10 links wide, runs south; narrow belt of
 timber on the branch.
 30.00 Timber (Lot's Grove).
 32.50 Creek, 25 links wide, runs southwest.
 80.00 Set 19th mile post.

Bearings, { White oak, 10 in. diam., N. 20° W. 129½ lks.
 " " 14 " " S. 8° W. 85 " "

Land rolling, second-rate. Timber good, white, black,
 and burr oak, elm, hickory, &c.

20th Mile.

- 2.15 Sullivan's 19th mile corner found by both witness-trees.

Course S. 89° 47' E.

- 6.50 Small branch runs northwest. Prairie.
 30.50 Small branch runs northwest.
 80.00 Set cast-iron monument, facing as before.
 Land broken and brushy; a few trees on east end of
 mile.

21st Mile.

- 67.50 Drain runs southwest.
 80.00 Set post 21st mile.
 Bearings, { Burr oak, 14 in. diam., S. 61° E. 181 links.
 " " " " " N. 35° E. 74 " "
 Land broken and brushy.

22d Mile.—Var. 10° 10' E.

- 1.00 Sullivan's 21st mile corner found by both witness-trees.

Course N. 89° 29' E.

- 6.00 Small branch, west-southwest, a few trees.
 12.50 A small branch runs southwest.
 80.00 Set 22d mile post in a mound.
 Land broken and brushy. Barrens.

23d Mile.

- 5.00 Small branch runs north.
 27.50 Small branch runs southwest.
 80.00 Set 23d mile post in mound.
 Land very rolling, with patches of hazel.

Missouri v. Iowa.

24th Mile.

- Dist.
 23.00 Creek, 50 links wide, runs southwest. Timber.
 26.09 " " " " northwest.
 33.50 " " " " southwest.
 35.00 Prairie.
 80.00 Set 24th mile post in a mound.
 Land rolling, second-rate. Timber indifferent, elm,
 hickory, and burr-oak.

*25th Mile.—Var. 9° 54' E.

[*26

- 67.50 Small branch runs northwest. Sparse timber.
 80.00 Set 25th mile post.
 Bearings, { Black oak, 20 in. diam., S. 31° W. 190 lks.
 { " " 20 " " N. 41° W. 262 "
 Rolling, brushy prairie. Timber poor, black and burr-
 oak, and hickory.

26th Mile.

- 2.00 Prairie.
 14.50 Road northeast.
 66.25 Small branch runs south. Grove 206 links south.
 80.00 Set 26th mile post in a mound.
 Land rolling, second-rate.

27th Mile.

- 80.00 Set 27th mile post in a mound.
 Land same as last mile.

28th Mile.

- 22.00 Creek, 20 links wide, runs south. Timber.
 27.84 Red oak, 36 in. diam., Sullivan's line tree. Noted by
 him as 26 chains.
 80.00 Set 28th mile post on Sullivan's blazes.
 Bearings, { Elm, 10 in. diam., S. 50° E. 60 links.
 { Black oak, 14 " " N. 5° E. 352 "
 Land rolling. Timber good, white, burr, and red oak,
 elm, hickory, &c.

Course N. 89° 4' E.

29th Mile.

- 3.00 Prairie.
 60.00 A few trees and brush.
 80.00 Set 29th mile post in mound.
 Rolling prairie.

Missouri v. Iowa.

30th Mile.

Dist.	
12.00	Small branch runs southeast.
80.00	Set cast-iron monument, facing as before. Rolling prairie; rather brushy.

Course N. 88° 20' E.

31st Mile.

11.50	Timber.
16.00	Creek, 50 links wide, runs southeast.
22.00	Prairie.
80.00	Set 31st mile post in mound. Land same as before.

32d Mile.

80.00	Set 32d mile post in mound. Rolling prairie.
-------	---

*27]

*33d Mile.

20.50	Creek 25 links wide, runs southeast. Timber.
22.50	Prairie.
36.75	Stream, 10 links wide, runs south.
80.00	Set 33d mile post in mound. Land same.

34th Mile.

69.83	Stream, 35 links wide, runs southeast. Timber.
78.50	Prairie.
80.00	Set 34th mile post. Bearings, { Elm, 10 in. diam., N. 75° W. 63 links. { " 9 " " S. 45° W. 148 " Land rolling; soil second-rate.

35th Mile.

3.67	Sullivan's 34th mile corner found by one witness-tree.
------	--

Course N. 88° 53' E.

80.00	Set 35th mile post in mound. Land rolling.
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36th Mile.

40.75	Stream, 25 links wide, runs south; few trees on banks.
54.00	Timber.
78.50	Prairie.
80.00	Set 36th mile post in mound. Rolling prairie.

37th Mile.

80.00	Set 37th mile post in mound. Rolling prairie.
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Missouri v. Iowa.

38th Mile.

- Dist.
80.00 Set 38th mile post in mound.
Rolling prairie.

39th Mile.

- 31.00 Grove of young timber, hickory.
32.50 Prairie.
44.00 Grove of young hickory.
46.50 Prairie.
60.00 Timber.
62.60 Stream, 25 links wide, runs south; dry at present.
66.50 Small prairie, surrounded with timber.
76.50 Timber.
80.00 Set 39th mile post.
Bearings, { Burr oak, 9 in. diam., N. 20° E. 39 links.
 { Black oak, 12 " " S. 30° E. 22 "
Land rolling. Timber, burr and black oak, &c.

40th Mile.

- 5.50 Sullivan's 39th mile corner found by one witness-tree.
9.50 Prairie.
80.00 Set a cast-iron monument, facing as above, on the
slope of a hill in the prairie.
Rolling prairie.

41st Mile.

[*28]

- 80.00 Set 41st mile post in mound.
Land as above.

42d Mile.

- 10.00 River bottom.
60.00 Timber.
76.00 Sullivan's line tree (an elm).
80.00 Set 42d mile post.
Bearings, { Cottonwood, 18 in. diam., S. 20° E. 17 links.
 { Maple, 9 " " S. 35° W. 1½ "
Land bottom and rich. Timber cottonwood, elm,
maple, walnut, &c.

43d Mile.

- 0.50 Grand River, 200 links wide, runs southeast.
6.50 Sullivan's mile corner.

Course N. 89° 6' E.—Var. 9°. 6' E.

- 11.50 Prairie bottom.
79.50 Upland and timber.
80.00 Set 43d mile post.

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Dist.

Bearings, { Elm, 10 in. diam., N. 8° W. 79 links.
 { White oak, 10 " " S. 60° W. 158 "
 Level, rich land.

44th Mile.

6.73 Sullivan's 43d mile corner found by one witness-tree.

Course N. 89° 47' E.

61.00 Prairie.

73.00 Timber.

76.00 Prairie.

80.00 Set 44th mile post.

Bearings, { Pin oak, 15 in. diam., S. 82° W. 390 links.
 { " " " N. 63° W. 342 "
 Land rolling. Timber oak and hickory.

45th Mile.

7.00 Sullivan's 44th mile corner found by one witness-tree.
 Timber.

Course N. 89° 9' E.

22.00 Prairie.

80.00 Set 45th mile post in mound.

Land as usual.

46th Mile.

73.00 Timber with thick undergrowth.

80.00 Set 46th mile post in mound. Barrens.

*29] *47th Mile.

80.00 Set 47th mile post in mound.
 Brushy barrens.

48th Mile.

53.00 Stream, 12 links wide, runs south.

80.00 Set 48th mile post in mound.
 Brushy barrens.

49th Mile.

52.50 Timber.

60.50 Little River (a fork of Grand River), 60 links, runs S. E.

66.50 Same stream runs north.

71.50 " " " south.

80.00 Set 49th mile post.

Bearings, { White oak, 36 in. diam., S. 76° E. 39 lks.
 { " " 18 " " N. 63° E. 27 "
 Land first-rate.

50th Mile.

6.20 Sullivan's 49th mile corner found by one witness-tree.

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Dist.

Course N. 80° 16' E.

- 10.00 Brushy prairie.
80.00 Set cast-iron monument facing as before. Barrens.

51st Mile.

- 80.00 Set 51st mile post in mound.
Rolling prairie.

52d Mile.

- 12.00 Timber.
25.00 River bottom.
28.50 East Grand River, 150 links wide, runs southwest.
38.50 " " " " " north.
52.30 " " " " " south.
80.00 Set 52d mile post.
Bearings, { Elm, 18 in. diam., N. 87 $\frac{1}{4}$ ° E. 10 $\frac{1}{2}$ lks.
{ Burr oak, 12 " " N. 22 $\frac{3}{4}$ ° W. 38 "
Mostly rich bottom. White & burr oak, elm, hickory, &c.

53d Mile.

Course N. 88° 47' E.

- 0.30 A pond, 250 lks. wide; direction of its length N. and S.
5.00 Prairie.
15.00 Timber.
30.00 Field (Stokes) fence nearly north and south.
57.50 Left field. Brushy prairie.
80.00 Set 53d mile post.
Bearings, { Black oak, 8 in. diam., S. 53° E. 15 links.
{ " " 6 " " N. 53° E. 64 "
Land rolling. Timber, oak and hickory, with undergrowth.

54th Mile.

[*30]

- 1.50 A small prairie surrounded by timber.
9.00 Timber and dense undergrowth of thorn, oak, &c.
80.00 Set 54th mile post.
Bearings, { Black oak, 12 in. diam., N. 55° W. 73 lks.
{ " " 14 " " S. 9° W. 124 "
Growth of small timber and dense underbrush.

55th Mile.

- 4.07 Sullivan's 54th mile corner found by both witness-trees.

Course N. 89° 2' E.

- 32.70 Branch 10 links wide, runs south.
42.50 " " " " " northwest.
62.75 Prairie (small and surrounded with timber).

Missouri v. Iowa.

Dist.

- 71.00 Alexander's field fence nearly north and south.
 80.00 Set 55th mile post in a field; first-rate upland.

56th Mile.

- 7.00 Fence nearly north and south.
 9.00 Fence runs a little south of east.
 11.00 Brushy thicket; plum, scrub-oak, sumac, &c.
 20.00 Timber.
 31.00 Prairie.
 75.00 Fence about N. 65° E. (Hodges.)
 80.00 Set 56th mile post in mound.
 Land same as before.

57th Mile.

- 8.50 Fence about N. 25° W.
 47.50 Road north and south.
 80.00 Set 57th Mile post in mound.
 Rolling prairie.

58th Mile.

- 31.00 Timber with dense undergrowth.
 31.35 Stream, 10 links wide, runs northeast.
 31.80 Same; runs east.
 32.25 Same; runs northeast.
 49.75 Same; runs south.
 53.00 Prairie.
 57.50 Brushy prairie.
 58.75 Prairie.
 60.50 Brushy thicket.
 65.00 Timber, with dense undergrowth.
 75.90 Sullivan's line tree (elm).
 80.00 Set 58th mile post.
 Bearings, { Pin oak, 8 in. diam., S. 77° E. 43 links.
 { " " 6 " " N. 11° E. 41½ "
 Land rolling; soil good. Timber small, with a dense
 undergrowth.

*31]

*59th Mile.

- 2.53 Sullivan's 58th mile-corner found by both witness-
 trees.

Course N. 89° 27' E.

- 3.65 West fork of Muddy Creek, 25 links wide, runs south.
 55.00 Middle fork of Muddy Creek, 25 links wide runs south-
 east.
 79.00 Prairie.
 80.00 Set 59th mile post, in mound.
 Land same as before.

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- Dist. 60th Mile.
- 0.45 Field Sullivan's fence north and south.
 12.45 Fence north and south. Prairie.
 35.25 Field (Sullivan's and Lochlin's) fence about S. 25° W.
 45.20 Fence about S. 65° E.
 80.00 Set cast-iron monument facing as before.
 Land good.

- 61st Mile.
- 19.80 East fork of Muddy Creek, runs south; very little
 timber on banks.
 80.00 Set post to 61st mile in mound.
 Land good.

- 62d Mile.
- 80.00 Set 62d mile post in mound.
 Rolling prairie.

- 63d Mile.
- 80.00 Set 63d mile post in mound.
 Rolling prairie.

- 64th Mile.
- Set 64th mile post in mound.
 Same.

- 65th Mile.
- 7.00 Timber.
 11.00 Prairie.
 19.65 West fork Medicine Creek, 40 links, runs south.
 Timber.
 22.50 Field fence north and south.
 33.25 Left field fence north and south.
 47.50 Prairie.
 80.00 Set 65th mile post in mound.
 Land good. Timber indifferent.

- 66th Mile.
- 62.50 Timber.
 80.00 Set 66th Mile post.
 Bearings, { White oak, 16 in. diam., N. 63° E. 14 lks.
 " " 16 " " S. 55° W. 20 "
 Rich land.

- *67th Mile. [*32
- 4.50 Sullivan's 66th mile-corner found by one witness-tree.
 Course N. 89° 42' E.

- 9.20 Middle Medicine Creek, 25 links wide, runs southeast.
 13.40 Same; runs northeast.

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Dist.

16.20 Same; runs southeast.

18.00 Prairie.

44.50 Timber.

45.21 Big Medicine Creek, 60 links wide, runs southeast.

80.00 Set 67th mile post.

Bearings, { White oak, 10 in diam., S. 47° E. 48 lks.
" " 8 " " N. 40° W. 25 "

Broken, second-rate land.

68th Mile.

4.62 Sullivan's 67 mile-corner found by both trees.

Course N. 89° 35' E.

25.48 Sullivan's line tree (a white oak).

31.30 Collins's field; fence nearly north and south.

41.25 Left field fence nearly north and south.

61.50 Timber.

72.50 Prairie.

80.00 Set 68th mile post in mound.

(Corrected this mile from the line tree.) /

Land second-rate.

Course N. 89° 21' E.

69th Mile.

8.00 East Medicine Creek, 30 links wide, runs southeast.

Timber on the bank.

17.00 Timber open white oak.

47.50 Prairie.

80.00 Set 69th mile post in mound. Land rolling.

Timber white oak, elm, and hickory.

Land second-rate.

70th Mile.

80.00 Set cast-iron monument facing as before.

Same. Rolling prairie.

71st Mile.

80.00 Set 71st mile post in mound.

Same.

72d Mile.

80.00 Set 72d mile post in mound.

Same.

73d Mile.

80.00 Set 73d mile post in mound.

Same.

Missouri v. Iowa.

	*74th Mile.
Dist.	
41.00	Stream, 15 links wide, runs south. Timber.
47.50	Prairie.
60.10	Stream, 10 links wide, runs southwest. Narrow strip of timber on banks.
80.00	Set 74th mile post in mound. Land same.
	75th Mile.
80.00	Set 75th mile post in mound. Same.
	76th Mile.
80.00	Set 76th mile post in mound. Same.
	77th Mile.
66.30	Stream, 50 links wide, runs southwest. Timber.
80.00	Set 77th mile post.
	Bearings, { Bell oak, 15 in. diam., S. 23° W. 30 links.
	“ “ 15 “ “ N. 44° E. 20 “
	Broken, second-rate land.
	78th Mile.
9.20	Sullivan's 77th mile corner found by both witness-trees.
	Course N. 89° 45' E.
47.00	Prairie.
55.75	Smith's field fence north and south.
58.40	Timber.
64.50	Prairie.
74.00	Field fence north and south.
80.00	Set 78th mile post in a field. Land rolling, soil second-rate. Timber, oak and hickory.
	79th Mile.
9.00	Left field fence north and south. Prairie.
49.50	Timber generally small, with underbrush.
59.20	Stream, 10 links wide, runs south.
77.50	Small prairie.
80.00	Set 79th mile post in mound. Same.
	80th Mile.
2.50	Timber.
14.60	Stream, 10 links wide, runs south.
41.50	Prairie.
80.00	Set cast-iron monument, facing as before. Same.

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Dist.	81st Mile.
40.50	Mormon trace north and south.
80.00	Set 81st mile post in mound. Rolling prairie.
*34]	*82d Mile.
4.50	Stream, 10 links wide, runs south. Timber on the banks.
80.00	Set 82d mile post in mound.
	Same.
	83d Mile.
80.00	Set 83d mile post in mound.
	Same.
	84th Mile.
80.00	Set 84th mile post in mound.
	Rolling prairie.
	85th Mile.
80.00	Set 85th mile post in mound.
	Same.
	86th Mile.
29.50	Benner's house, about 150 links north.
80.00	Set 86th mile post in mound.
	Prairie, with clumps of oak.
	87th Mile.
80.00	Set 87th mile post in mound.
	Land same.
	88th Mile.
38.50	Timber.
80.00	Set 88th mile post in mound.
	Prairie, with scattering trees. Sparse timber.
	89th Mile.
13.34	Sullivan's 88th mile corner found by one witness-tree.
	Course N. 89° 12' E.
33.75	Stream, 50 links wide, runs southeast.
65.28	Sullivan's line tree (a white oak).
	Course S. 89° 15' E.
80.00	Set 89th mile post.
	Bearings, { White oak, 24 in. diam., N. 15° W. 65 links.
	{ " " 24 " " S. 13° W. 82 "
	Poor, broken land.
	90th Mile.
3.50	Small prairie, surrounded by timber.
12.82	Sullivan's 89th mile corner.

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- Dist. Course N. $88^{\circ} 57'$ E.
- 15.00 Timber.
- 80.00 Set cast-iron monument facing as before. Timber
white and black oak, with undergrowth.
Land rolling.
- 91st Mile. Var. $9^{\circ} 36'$ E.
- 12.71 Sullivan's 90th mile corner.
- Course N. $89^{\circ} 5'$ E.
- 38.40 Small branch runs southeast.
- 80.00 Set 91st mile post.
- Bearings, { White oak, 24 in. diam., S. $2\frac{1}{2}^{\circ}$ E. 49 links.
" " 20 " " N. $18\frac{1}{2}^{\circ}$ E. 89 "
- Land broken, third-rate. Timber, white and black
oak, &c.
- *92d Mile. [*35
- 8.55 Corner to intersection of supposed Sullivan's line with
range-line between ranges 17 and 18 (Iowa sur.).
- 12.19 Sullivan's 91st mile corner.
- Course N. $89^{\circ} 12'$ E.
- 34.05 Corner to intersection of supposed Sullivan's line with
range-line between ranges 17 and 18 (Mo. sur.).
- 43.00 Prairie.
- 46.50 Cut off the southeast corner of a field.
- 49.10 Left field.
- 52.00 Timber.
- 54.70 West fork of Chasiton, 100 links wide, runs southeast.
- 80.00 Set 92d mile post.
- Bearings, { White oak, 14 in. diam., S. $4\frac{1}{2}^{\circ}$ E. 41 links.
" " 14 " " North 41 "
- Upland broken, third-rate; narrow bottom on the river,
first-rate. Timber, white and black oak, &c.
- 93d Mile.
- 12.36 Sullivan's 92d mile corner.
- 15.00 Small branch runs northwest.
- 19.33 Sullivan's line tree.
- 80.00 Set 93d mile post.
- Bearings, { White oak, 12 in. diam., N. 23° W. 30 links.
" " 6 " " S. 4° E. 40 "
- Land broken, third-rate. White and black oak, hick
ory, &c.
- 94th Mile.
- 12.20 Sullivan's 93d mile corner.
- Course N. 89° E.

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- Dist.
 25.00 Prairie.
 80.00 Set 94th mile post in mound.
 Land broken, second-rate soil.
 95th Mile.
- 0.30 Road northeast and southwest.
 80.00 Set 95th mile post (in the brush) in a mound.
 Land broken, second-rate. Brushy, a few trees.
 96th Mile.
- 63.00 Jack-oak grove.
 68.50 Small prairie, surrounded by timber.
 75.75 Small branch runs northeast.
 80.00 Set 96th mile post.
 Bearings, Burr oak, 14 in. diam., N. 11° E. 235 links.
 Land broken, second-rate. Scrub-oak, crab, thorn, &c.
 *36] *97th Mile.
- 71.80 Sullivan's 96th mile corner found by his elm tree.
 Course N. 88° 33' E.
- 22.00 Heavy timber, more open.
 35.00 Sparse, open timber.
 53.00 Thicket of scrub-oak, crab, thorn, &c.
 80.50 Set 97th mile post.
 Bearings, { Black oak, 6 in. diam., N. 40° E. 12 links.
 " { Pin " 12 " " S. 29° E. 126 "
 Land broken, second-rate. Timber poor.
 98th Mile.
- 11.84 Sullivan's 97th mile corner, witness-trees defaced.
 Course N. 89° 3' E.
- 26.50 Small branch runs north.
 29.50 Barren, brushy prairie.
 42.00 Sparse timber.
 56.58 Sullivan's line tree (black oak, 24 inches diameter.)
 Course N. 88° 53' E.
- 78.00 Bottom prairie.
 80.00 Set 98th mile post in mound.
 Land rolling, soil second-rate.
 99th Mile.
- 19.85 Field fence north and south; north side of field 25 links
 north of line and parallel with it.
 35.35 Left field.
 37.00 Thicket and sparse timber.
 42.00 Bottom prairie, level and wet.
 38

Missouri v. Iowa.

Dist.

- 80.00 Set 99th mile post in mound.
Upland is good soil.

100th Mile.

- 7.50 Timber.
12.06 Sullivan's 99th mile corner, witness-trees defaced.

Course N. $88^{\circ} 57'$ E.

- 14.00 Right bank of Chariton, 150 links, runs southwest.
17.25 Left bank of river (by triangulation); left bottom.
80.00 Set cast-iron monument, facing as before.
Land rolling, second-rate. Timber good, white and black oak, hickory, &c.

101st Mile.—Var. $9^{\circ} 30'$ E.

- 9.00 Timber.
12.77 Sullivan's 100 mile corner.

*Course N. $89^{\circ} 2'$ E.

[37*

- 20.29 Sullivan's line tree.
34.00 Low, wet prairie. Land rolling, to this point.
63.00 Timber, upland.
80.00 Set 101st mile post.
Bearings, { Black oak, 14 in. diam., S. 38° E. 62 $\frac{1}{2}$ lks.
 { White " " " " N. $10\frac{3}{4}^{\circ}$ E. 119 "
Timber good, white and black oak, hickory, &c.

102d Mile.

- 12.78 Sullivan's 101st mile corner. Trees defaced.

Course N. $88^{\circ} 47'$ E.

- 54.80 Road north and south.
80.00 Set 102d mile post.
Bearings, { Hickory, 14 in. diam., S. 4° E. 88 lks.
 { White oak, 12 " " " N. $58\frac{3}{4}^{\circ}$ W. 61 $\frac{1}{2}$ "
Land rather broken. Timber good, white and black oak.

103d Mile.

- 6.00 Small branch runs north.
12.40 Sullivan's 102d mile corner.

Course N. $88^{\circ} 56'$ E.

- 43.60 Road nearly north and south. House 500 links south.
64.00 Prairie.
77.50 Timber.
80.00 Set 103d mile post.
Bearings, { Elm, 20 in. diam., N. 12° E. 46 links.
 { " 20 " " " S. 22° W. 46 "
Land rolling, second-rate. Timber indifferent, brush.

Missouri v. Iowa.

Dist.	104th Mile. Var. 8° 45' E.
11.96	Sullivan's 103d mile corner, one witness [tree] standing. Course N. 88° E.
12.00	Prairie.
17.20	Field (Veach) fence north and south.
48.20	Left field fence north and south.
80.00	Set 104th mile post in mound. Land rolling; soil second-rate.
	105th Mile.
80.00	Set 105th mile post in mound. Same.
	106th Mile.
52.00	Small grove and thicket.
65.75	Small branch, runs south.
69.50	Prairie.
80.00	Set 106th mile post in mound. Land same.
	*38] *107th Mile.
45.00	Grove and thicket.
80.00	Set 107th mile post.
	Bearings, { Black oak, 12 in. diam., S. 20° E. 43 links. " " 12 " " N. 8° W. 7 "
	Land rolling, second-rate. Brushy, timber poor.
	108th Mile.
12.69	Sullivan's 107th mile corner.
	Course N. 87° 39' E.
20.00	Small prairie.
26.00	Timber.
30.20	Small branch runs south.
64.50	Prairie.
80.00	Set 108th mile post in mound. Timber poor.
	109th Mile.
80.00	Set 109th mile post in mound. Rolling prairie.
	110th Mile.
11.40	Field fence north and south (Wright).
20.00	Left field.
70.00	Timber and patches of brush.
75.00	House 200 links north of line (Baker).
80.00	Set cast-iron monument, facing as before. Land rolling. Timber poor and sparse.

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- Dist. 111th Mile.
- 12.34 Sullivan's 110th mile corner.
Course N. $86^{\circ} 7' E$.
- 80.00 Set 111th mile post in mound. In small prairie, surrounded by dense thickets.
Land broken, second-rate. Scrub timber and small prairies.
- 112th Mile.
- 3.00 Heavy timber.
- 11.50 Sullivan's 111th mile corner.
Course N. $87^{\circ} 56' E$.
- 14.50 Small branch, general course east; the line runs down it, crossing it several times.
- 41.50 Left branch, course northeast.
- 73.00 Same branch runs south.
- 76.00 " " " northeast.
- 80.00 Set 112th mile post on Sullivan's blazes.
Bearings, { White oak, 20 in. diam., N. $3^{\circ} E$. 119 links.
" " 14 " " S. $15\frac{1}{3}^{\circ} W$. 155 "
Land good. Timber, white, black, and burr-oak, hickory, elm, &c.
- *113th Mile. [*39]
- 11.09 Sullivan's 112th mile corner.
Course N. $88^{\circ} 21' E$.
- 60.50 Field fence north and south.
- 74.75 Left same.
- 76.50 Bottom prairie.
- 80.00 Set 113th mile post in prairie.
Bearings, Burr oak, 20 in. diam., N. $15\frac{1}{2}^{\circ} E$. 268 links.
Land and timber as last mile.
- 114th Mile.
- 25.00 Timber.
- 33.00 Fabius River (west fork), 50 links, runs southeast.
- 50.72 Sullivan's line tree.
- 65.00 Barrens.
- 80.00 Set 114th mile post.
Bearings, { Black oak, 12 in. diam., N. $42\frac{1}{3}^{\circ} W$. 177 lks.
" " 6 " " S. $29\frac{1}{2}^{\circ} E$. 40 "
Land good. Timber, hickory, black oak, elm, &c.
- 115th Mile.
- 7.70 Field fence north and south. Prairie.

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Dist.	
34.00	Left field fence north and south.
80.00	Set 115th mile post in mound.
	Rolling prairie.
	116th Mile.
36.00	Scrub-oak thicket.
48.00	Prairie.
75.00	McAtee's field fence north and south.
80.00	Set 116th mile post in field.
	Same.
	117th Mile.
15.50	Left field fence north and south.
40.00	Timber on Sullivan's blazes.
75.15	East fork of Fabius, 50 links wide, runs south.
80.00	Set 117th mile post.
	Bearings, { Hickory, 12 in. diam., S. 31° E. 73 links.
	{ " " 20 " " N. 14° W. 91 "
	Land good. Timber hickory, elm, white and black oak, &c.
	118th Mile.
	Course N. 88° 17' E.
65.00	Prairie.
80.00	Set 118th mile post in mound.
	Land good. Timber, burr and black oak, hickory, &c. and brush.
	119th Mile.
9.25	Field fence north and south.
19.40	Left field near southeast corner. Thicket.
53.50	Hickory branch, 15 links wide, runs east-southeast.
80.00	Set 119th mile post in black-oak thicket.
	Bearings, { Black oak, 8 in. diam., S. 38° W. $15\frac{1}{2}$ links.
	{ " " 5 " " N. 5° E. $14\frac{1}{2}$ "
	Land second-rate. Timber poor, black oak and hickory.
*40]	*120th Mile.
2.00	Prairie.
80.00	Set cast-iron monument, facing as before.
	Rolling prairie.
	121st Mile.
80.00	Set 121st mile post in mound, edge of thicket.
	Same.
	122d Mile.
13.00	Branch, 10 links wide, runs south. Timber thicket.
17.55	Range-line between ranges 12 and 13.

Missouri v. Iowa.

- Dist.
 29.50 Prairie.
 40.00 Jack-oak thicket.
 80.00 Set 122d mile post.
 Bearings, Jack-oak, 6 in. diam., S. 12° E. 47 links.
 Land second-rate. Timber poor.
- 123d Mile.
- 15.04 Sullivan's line tree (a black oak, noted as a hickory).
 Course N. 88° 12' E.
 20.00 House 300 links south (J. N. Bish).
 23.00 Touched northeast corner of field.
 31.50 Small low, wet prairie, extending south.
 45.00 Timber.
 53.20 Wyacondah Creek, 40 links wide, runs southeast.
 56.20 Enter creek, running east.
 59.70 Left same creek, running southeast.
 67.00 Cut off south corner of field.
 69.00 Brushy prairie.
 80.00 Set 123d mile post
 Bearings, White-oak, 24 in. diam., S. 28½° W. 54 links.
 Land brushy, timber poor.
- 124th mile.
- 1.50 Prairie.
 15.00 Thicket and a few trees.
 29.50 Open prairie. House 300 links south.
 33.00 Touched northwest corner of a field.
 80.00 Set 124th mile post in mound.
 Land rolling. Timber poor, with undergrowth.
- 125th Mile
- 80.00 Set 125th mile post in mound.
 Rolling prairie.
- *126th Mile. [*41
- 46.00 Timber.
 47.00 Branch, 25 links wide, runs south-southeast.
 52.00 Prairie.
 63.50 Thicket of black and jack oak.
 71.00 Prairie.
 80.00 Set 126th mile post in mound.
 Land as usual.
- 127th Mile.
- 29.00 Drain runs southeast.
 80.00 Set 127th mile post in mound.
 Rolling prairie.

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- Dist. 128th Mile.
- 30.20 Small branch runs southeast. Small grove.
- 80.00 Set 128th mile post in mound.
Rolling prairie. 129th Mile.
- 10.84 Sullivan's 128th mile corner.
Course N. $87^{\circ} 58' E$.
- 13.00 North point of a grove.
- 80.00 Set 129th mile post in mound.
Same. 130th Mile.
- 80.00 Set cast-iron monument, facing as before.
Same. 131st Mile.
- 53.50 Small branch runs southeast. Timber on banks.
- 80.00 Set 131st mile post in mound.
Same. 132d Mile.
- 80.00 Set 132d mile post in mound.
Same. 133d Mile.
- 13.00 Branch, 10 links wide, runs southeast. Timber.
- 13.50 Sullivan's 132d mile corner.
Course N. $87^{\circ} 50' E$.
- 80.00 Set 133d mile post in mound.
Same. 134th Mile.
- 16.50 Field fence nearly north and south.
- 28.40 Left field. Thicket and sparse timber.
- 54.50 Small wet prairie.
- 59.25 Timber. Thicket.
- 61.50 Creek 15 links north of line.
- 63.50 Little Fork Creek, 40 links wide, runs south.
- 67.80 Sullivan's line tree.
- 80.00 Set 134th mile post.
- Bearings, { Burr oak, 10 in. diam., N. $35^{\circ} E$. 69 links.
 { Hickory, 14 " " S. $46^{\circ} E$. 89 "
- Land good. Timber poor. Dense undergrowth.
Course N. $88^{\circ} E$.
- *42] *135th Mile.
- 35.00 Brushy prairie.
- 46.10 Field fence north and south. Thicket. Field is waste
ground.
- 57.50 Left field. Thicket.

Missouri v. Iowa.

Dist.

- 58.00 House 250 links south (Circles).
 60.85 Small branch runs south. Brushy prairie.
 62.00 Road to Keozanqua, north and south.
 80.00 Set 135th mile post in mound.
 Prairie, with brush and thickets.

136th Mile.

- 5.00 Road to Farmington a little north of east.
 11.50 Touched northwest corner of a field in a lane.
 30.75 Touched southeast corner of another field. Prairie.
 60.00 Northeast corner of a field, 12.00 south.
 80.00 Set 136th mile post in mound.
 Rolling prairie.

137th Mile.

- 22.00 Road to Farmington east-northeast.
 60.00 Brushy barrens.
 80.00 Set 137th mile post in mound.
 Same.

138th Mile.

- 27.50 Prairie.
 30.00 A small drain runs northwest.
 42.00 A field fence north and south.
 71.60 Left field fence north and south. Prairie.
 80.00 Set 138th mile post in mound.
 Same.

139th Mile.

- 21.00 Timber.
 25.00 Small stream runs north.
 26.50 Prairie.
 66.00 Road northeast and southwest.
 80.00 Set 139th mile post in mound.
 Rather level, second rate.

140th Mile.

- 6.50 Sparse timber and barrens.
 14.83 Sullivan's 139th mile corner.

Course N. $87^{\circ} 24'$ E.

- 15.00 Heavy timber.
 80.00 Set cast-iron monument, facing as before.
 Land rolling. Timber, black and white oak, hickory,
 and dense undergrowth of same, with crab, &c.

*141st Mile.

[*43]

- 14.54 Sullivan's 140th mile corner.

Course N. $87^{\circ} 56'$ E.

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- Dist.
 38.76 Big Fox River, 50 links, runs a little east of south.
 49.84 Same, runs north.
 56.50 Same, runs east-southeast.
 59.25 Same, runs north.
 77.00 Enter river, runs southeast.
 80.00 Left same, and set 141st mile post on the bank.
 Bearings, { Birch, 22 in. diam., N. 55° E. 128 links.
 { Elm, 24 " " S. 15° W. 58 "
 Land on river level; other, same as last.
- 142d Mile.
- 8.20 Fox River runs south.
 13.85 Sullivan's 141st mile corner.
 Course N. 88° 9' E.
- 23.00 Fox River runs north.
 25.00 Same, " south.
 35.00 Enter river, " east.
 40.70 Left " " southeast.
 43.00 Prairie.
 75.00 Timber. Upland.
 80.00 Set 142d mile post.
 Bearings, { Black oak, 30 in. diam., N. 81° E. 115 lks.
 { " " 20 " " S. 69 "
 Land level, second-rate. Timber poor; dense undergrowth.
- 143d Mile.
- 49.50 Road to Churchville runs southeast.
 80.00 Set 143d mile post in mound (in the brush).
 This is exceedingly brushy; scrub oak, &c.
- 144th Mile.
- 11.80 Sullivan's 143d mile corner.
 Course N. 87° 15' E.
- 80.00 Set 144th mile post.
 Bearings, { White oak, 10 in. diam., S. 10° W. 28 links.
 { " " 10 " " N. 29° E. 81 "
 This mile is brushy; barrens.
 *44] *145th Mile.
- 2.50 Prairie. Barrens.
 43.00 Brushy barrens.
 80.00 Set 145th mile post in brush.
 Bearings, { Burr oak, 14 in. diam., South 75 links.
 { " 18 " " North 34 "
 Barrens.
 46

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- Dist. 146th Mile.
- 12.00 Sullivan's 145th mile corner.
Course N. $87^{\circ} 38'$ E.
- 29.50 Prairie.
- 46.50 Touched northwest corner of a field, a lane runs parallel with and 25 links north of the line.
- 57.50 House 50 links north (William Hatton).
- 67.50 Lane turns south, field fence north and south.
- 74.00 Left field fence north and south. Prairie.
- 80.00 Set 146th mile post in mound.
Land as before.
- 147th Mile.
- 12.00 Thicket.
- 42.00 Prairie.
- 69.00 Thicket.
- 80.00 Set 147th mile post in thicket.
Bearings, Red oak, 30 in. diam., S. 46° E. 256 links.
Barrens.
- 148th Mile.
- 3.00 Branch, 6 links wide, runs north.
- 30.00 Prairie.
- 58.50 Field fence north and south.
- 61.00 Road to Churchville north and south.
- 80.00 Set 148th mile post in a field.
Prairie, with brushy barrens.
- 149th Mile.
- 3.90 Left field fence north and south.
- 30.00 Brush and timber.
- 59.00 Road north and south.
- 80.00 Set 149th mile post in edge of a small prairie.
Bearings, Burr oak, 12 in. diam., S. $1\frac{1}{2}^{\circ}$ E. 172 links.
Land good. Timber indifferent, burr and black oak, hickory, elm, &c., with a dense undergrowth.
- 150th Mile.
- 3.50 Timber.
- 80.00 Set 150th mile post.
Bearings, { White oak, 10 in. diam., N. 27° W. 93 links.
" 20 " " S. $30\frac{1}{2}^{\circ}$ E. 90 "
Land broken, second-rate. Timber, white and black oak, hickory, &c., underbrush.
- *151st Mile. [$\ast 45$
- 4.90 A small saltpetre cave, noted by Sullivan.
- 41.50 River bottom.

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Dist.

- 51.00 Set a cast-iron monument on the bank of the Des Moines River, with the words "State Line" facing the west, and the word "Missouri" facing the south, and the word "Iowa" facing the north.
- 51.80 Sullivan's terminus on the lower bank found by one witness-tree still standing. River bottom rich. Timber, white and black oak, hickory, lind, elm, &c.

September, 18, 1850.

Keokuk, September 30, 1850.

We certify the foregoing to be the correct field notes of the survey of the boundary between Iowa and Missouri, as run by us.

R. WALKER,
Surveyor on the part of Missouri.
WM. DEWEY,
Surveyor on the part of Iowa.

And the report of the Hon. Robert W. Wells and Henry B. Hendershott, which is above referred to, and which was made to the last term of this court, is as follows:—

TO THE HONORABLE THE SUPREME COURT OF THE UNITED STATES.

The undersigned, appointed by this honorable court commissioners in the above cases, to establish the boundary line between the states of Missouri and Iowa, respectively report that upon being furnished with copies of the decree, they, in compliance therewith, addressed letters to the chief magistrates of those states, through their Secretaries of State, respectfully requesting the coöperation and assistance of the state authorities in the performance of the duties imposed on the commissioners by said decree; and they received assurances, in answer to their letters, of all the aid and assistance within their power.

The Governor of the state of Missouri consented to consider an appropriation of two thousand dollars, made by the *46] General *Assembly for the purpose of conducting the suits, as applicable to the establishment of the boundary by the commissioners; and agreed to place that sum at their disposal for that object.

The Governor of the state of Iowa entertained the opinion, it is understood, that no appropriation had been made by the

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Legislature of that state, applicable to the survey of the boundary, but endeavored to obtain the necessary funds from other sources; and, as the undersigned are advised, obtained them. But the commissioners were not informed of this until about the 23d of October last,—then too late to procure the necessary assistants, fit out an expedition, travel to the place of commencing operations and complete the work in the field, before the weather would, in all probability, become too inclement in the vast and high prairies through which the line will pass. As the grass in the prairies is burned in October, there would also be some difficulty, after that, in procuring provender for the teams necessary for the transportation of the baggage, provisions, and monuments.

For these reasons, and others with which it is unnecessary to trouble the court, the commissioners resolved not to attempt the work in the field until the opening of the spring.

The commissioners have procured all the monuments necessary for the line. Three are of the size and description directed in the decree. Nineteen other cast-iron monuments, six of which are four feet long, eight inches square at the base, and five inches square at the top, to be placed at intervals of thirty miles; and thirteen of which are seven inches square at the base, and four inches square at the top, and four feet long. These nineteen monuments each have the word "Missouri" on one side, and "Iowa" on the opposite side, and the word "Boundary" on the other opposite sides, strongly cast into the metal. All the monuments are cast *solid*; and will weigh about 13,000 pounds, and cost three cents per pound.

A drawing of the largest sized monument is annexed. [See page 47.] The others are similar in form, except as herein before mentioned.

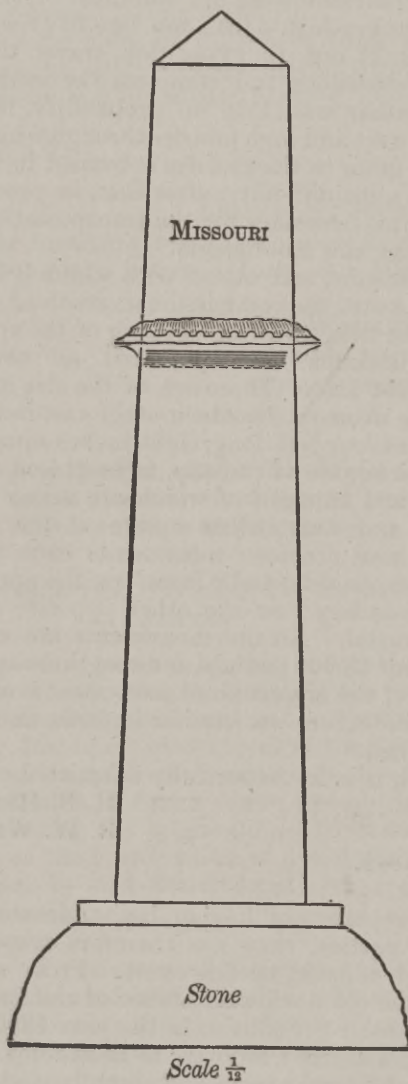
All of which is most respectfully submitted.

H. B. HENDERSHOTT,
R. W. WELLS.

November, 1849.

*And said reports not having been excepted to by either of the parties, they are therefore respectively confirmed and adopted by this court. From said reports, it appears that the old northwest corner of the Indian boundary line, made by John C. Sullivan in the year 1816 (and referred to in our former decree), is found to be at forty degrees thirty-four minutes and forty seconds of north latitude, and at about ninety-four degrees thirty minutes of west longitude from Greenwich; that at said "northwest corner" was planted a large cast-iron monument, weighing between fifteen and six-

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teen hundred pounds, four feet six inches long, squaring twelve inches at its base, and eight inches at its top. This monument is deeply and legibly marked with the words (strongly cast into the iron) "Missouri" on its south side, and "Iowa" on its north side, and "State Line" on the east.

And this court doth adjudge and decree, that said monument doth mark and witness the true northwest corner of the Indian boundary lines, as run by John C. Sullivan, in 1816. And the precise corner is hereby established and declared to be in the center of the top of said monument.

Said reports further show, that from the monument a line was run due west, on a parallel of latitude, to the eastern bank of the Missouri River; which line appears, by the field notes accompanying the reports, to be sixty miles and sixty-one chains in length. And it further appears, by the reports and field notes, that the commissioners caused to be planted cast-iron pillars in the line running west from the old northwest corner, at intervals of ten miles apart, with the word "Boundary" cast in the iron, on the east side and on the west side of said pillars; and the word "Iowa" facing on the north; and the word "Missouri" facing on the south. That in running west, one such pillar was planted at the end of ten miles from the old northwest corner; another at the end of twenty miles; a third at the end of thirty miles; a fourth at the end of forty miles; and a fifth at the end of fifty miles. And at the end of sixty miles was planted a monument similar to that erected at the old northwest corner, marked "Missouri" on its south side, "Iowa" on its north side, and "State Line" on the east. This monument stands sixty-one chains east of the eastern bank of the Missouri River, on firm ground, the bottom lands beyond being soft and subject to overflow; for which reason the monument was planted so far east of the river. From this last monument, the line runs due west, on a parallel of latitude, through a cottonwood-tree thirty inches in diameter, notched on the east and west sides, and marked with the letter "I." on the north, and the letter "M." on the south. And on *the bank of the Missouri River, sixty-one chains west of the iron monument last planted, [*49 a wooden post is set in the ground, with two cottonwood pointers,—one of ten inches diameter standing S. 67° E. 6 links; and the other at N. 21° W. 12 links from the wooden post. And said line having been run and marked according to our former decree, it is therefore now adjudged and decreed, that the true and proper boundary line between the states of Missouri and Iowa, extending west from the centre of the monument standing at Sullivan's old northwest corner,

runs through the centre of the five iron pillars and the monument near the Missouri River; and through the cottonwood-tree above described; and through the centre of the wooden post planted by the commissioners on the eastern bank of the river; and then due west on a parallel of latitude to the middle of the Missouri River.

And it further appears from the report of said commissioners, that, pursuant to our former decree, they had ascertained and re-marked Sullivan's line, as run and marked by him in 1816, extending eastwardly from the old "northwest corner," above described and established. Sullivan's line, as run and marked in 1816, from said corner east, to the Des Moines River, was found not to be a due east line; but that more or less northing should have been made in the old line. Nor is it a straight line, as sudden deviations amounting to from one to three degrees frequently occur; and it rarely happens that any two consecutive miles pursue the same direction. It also appears, that, if the whole line was reduced throughout to a straight line, its southing would be about two degrees from a due east line.

The length of this line is one hundred and fifty miles fifty-one chains and eighty links, from the old northwest corner to the western bank of the Des Moines River. At the end of each intermediate space of ten miles, on tracing Sullivan's line from the old northwest corner eastwardly, cast-iron pillars were planted, of a similar description to those erected in the western part of the line between the old northwest corner and the monument near the Missouri River. These pillars were planted in Sullivan's line as found at the particular point; but as the line was bending in the ten mile spaces between the pillars, it was found necessary to erect wooden posts, at the termination of each mile, in order to mark the line with more accuracy. In the prairies the mile posts are marked with the letters "B. L." facing the east, the letter "I." facing the north, and the letter "M." facing the south; and the number of the mile is marked on the west face of the *50] post. Where timber *exists, the number of the mile is marked on witness-trees or pointers, with the letter appropriate to each state; there being one tree marked on each side of the line, whenever it was possible so to do. The foot of each witness-tree is marked with the letters B. L.

In all cases where posts are set in mounds, the pit is invariably nine links west, to designate it from other surveys.

At the end of the one hundred and fiftieth mile, no iron pillar was planted, because at fifty-one chains west of this point, the Des Moines River was reached; and there, accord-

ing to our former decree, a large monument was planted, of similar description to that placed at the old northwest corner, with the words "state line" facing the west, the word "Missouri" facing the south, and the word "Iowa" facing the north.

And the re-marking of Sullivan's line as above set forth, partly with wooden posts at the termination of each mile, having been submitted to the counsel of the parties, it was by them deemed sufficient, because the public surveys of the lands of the United States are to be governed and closed on said line as run by the commissioners; and therefore private titles will be established on both sides, the state line being the dividing boundary of such private rights. And in these views of the counsel the court concurs. It is therefore adjudged and decreed, that Sullivan's line is established to run through the wooden mile posts and the cast-iron pillars planted ten miles apart on said line; and that the true and proper dividing line between the states of Missouri and Iowa, east of the monument erected at the "old northwest corner," begins at the centre of said monument, and runs eastwardly, (southing about two degrees of a true east line,) through the centre of each wooden post and iron pillar, to the centre of the monument erected on the bank of the Des Moines River. And it is further adjudged and decreed, that a straight line from one mile post to another, and from a mile post to a pillar, and from the last mile post to the monument on the bank of the Des Moines River, is the true and proper line, and that such straight line shall conclude all other marks. And it is further adjudged and decreed, that a line extended north eighty-seven degrees thirty-eight minutes east, from the centre of the monument erected on the bank of the Des Moines River to the middle of said river, is the true and proper boundary line between the states of Missouri and Iowa west of said monument.

And this court having had submitted to its consideration what amount of compensation should be allowed to the different commissioners, and to the surveyors employed by them, for services performed in running and marking the line in controversy; *and also the amount of expenses incurred in performing the duties imposed on said commissioners by our former decree; and these matters having been referred to the clerk of the court to ascertain the proper compensation and charges, and he having reported thereon; and also on other costs and charges incident to the suit; and said report not being excepted to, is in all things

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confirmed, and which report is in the words and figures following, to wit:—

TO THE HONORABLE CHIEF JUSTICE AND ASSOCIATE JUSTICES OF THE SUPREME COURT OF THE UNITED STATES.

Pursuant to an order of this honorable court made the 12th instant, in the case of the state of Missouri and the state of Iowa, now pending on bill and cross bill, the undersigned, after a careful examination of witnesses and all the sources of information within his reach, respectfully reports:—

1. That the \$8 per diem, which the commissioners agreed to pay each of the surveyors in the field, is a fair and reasonable compensation for their labors.

2. That \$10 per day to each of the three commissioners while engaged in this duty is a fair and reasonable compensation for their services;—and that a further per diem of \$2 to each of the two commissioners engaged in the field would be a reasonable and proper allowance on account of their personal expenses.

3. That the statement of the expenditures by the commissioners, and of their purchases, appears to be very moderate and reasonable.

4. That the whole expense of the survey amounted to \$10,880.41.

5. That each of the said states advanced \$2,000.

6. That the commissioners realized from sales of camp furniture \$13.15.

7. That the instruments purchased by the commissioners for the survey (which cost \$247.22) have been retained by them for safe keeping, subject to the order of this court.

8. That the fees now due to the clerk of this court, and up to this term, by both parties in this case, amount to \$48.67.

Lastly. That in a detailed account, stated upon the preceding basis and hereto appended, each of the said states is charged with \$3,457.96½, being a moiety of the balance (\$6,867.26) due on the survey, and a moiety of the fees (48.67) now due the clerk of this court.

All of which is respectfully submitted by

WM. THOS. CARROLL,

Clerk of Supreme Court, U. S.

17 December, 1850.

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**The States of Missouri and Iowa, in Account with the Adjustment of the Boundary Line between them. Dr.*

To 22 cast-iron monuments,	\$ 386.95
" Freight, transportation, and expenses on same,	246.40
" Camp furniture, provisions, expenses in going to and returning from the line, and upon the line, postage, stationery, hire of horses, expenses in going to and returning from Iowa City, Jefferson City, and St. Louis,	826.92
" Wages to hands in the field,	1,718.92
" Wm. Dewey, surveyor, for 184 days, at \$8 per day,	1,472.00
" Robt. Walker, surveyor, for 183 days, at \$8 per day,	1,464.00
" Robert W. Wells, commissioner, for 15 days, at \$10 per day,	150.00
" William G. Minor, commissioner, for 177 days at 12 per day,	2,124.00
" Henry B. Hendershott, commissioner, for 187 days, at \$12 per day,	2,124.00
" Sextant, barometer and thermometer, solar compass, and other instruments necessary for the survey,	2,244.00
" Fees now due the clerk in the case pending in Supreme Court of U. S.,	247.22
	48.67
	<hr/>
	\$10,929.08

*Contra.**Cr.*

By Cash received from State of Missouri,	\$2,000.00
" Cash received from State of Iowa,	2,000.00
" Proceeds from sale of camp equipage,	13.15
" Balance, of which \$3,457.96½ is due by the State of Missouri, and \$3,457.96½ is due by the State of Iowa,	6,915.93
	<hr/>
	\$10,929.08

And it appearing to the court here, that there will be due to the clerk of this court, for the duties devolved on him by this decree, and for the services performed by him at this term, the further sum of sixty-three dollars and sixty cents, in addition to the forty-eight dollars and sixty-seven cents stated in his report to be now due him; and it also appearing to the court, that the said clerk should be allowed, for making his

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report, for carrying on the correspondence incident to this *53] cause and paying *the expense thereof, and also in consideration of any future service to be performed by him in the progress of this cause, the further sum of fifty dollars; it is thereupon ordered and decreed, that said commissioners Hendershott and Minor, do pay to the clerk of this court, in full discharge of all costs and charges that have now accrued or that may hereafter accrue for any service done or to be performed by the said clerk, in the progress of this cause, the sum of \$162.27 out of the first moneys received by them under this decree.

And it appearing that certain advances had been made by the states of Missouri and Iowa, respectively, to the commissioners, and said advances having been credited, it now appears that the state of Missouri is bound to pay the further sum of \$3,514.76 $\frac{1}{2}$; and that the state of Iowa is bound to pay the further sum of \$3,514.76 $\frac{1}{2}$ of the charges and costs of the controversy.

And it is ordered and decreed, that the state of Missouri pay over the said sum of \$3,514.76 $\frac{1}{2}$, and that the state of Iowa pay over the said sum of \$3,514.76 $\frac{1}{2}$, to the commissioners, Henry B. Hendershott and William G. Minor, in final and full discharge of their portions, respectively, of said costs and charges.

And it is further ordered and adjudged, that said commissioners receive the several sums of money, and distribute and pay over the same to those entitled thereto, according to the report of the clerk of this court.

And it also appearing that certain instruments purchased by the said commissioners are retained by them, subject to the order of this court, it is further ordered that the commissioners dispose of the said instruments at such times and places, and on such terms, as to them may seem most advantageous for the interests of the parties to this suit; and that they pay the proceeds of the sales into the treasuries of the said states of Missouri and Iowa, respectively, that is to say, one half of the proceeds into each treasury, and take receipts from the proper officers for the moneys paid.

And it is further ordered, that said commissioners, Hendershott and Minor, report to the next term of this court the manner in which they have executed the duties hereby imposed upon them; and to which end this cause is kept open.

And it is ordered, that the clerk of this court do forthwith transmit to his Excellency, the Governor of the state of Iowa, a copy of this decree (including the reports of the commissioners, surveyors, and clerk, together with a copy of the field

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notes of said surveyors), duly authenticated under the seal of this court.

*And it is further ordered, that a similar copy in all respects be by said clerk forwarded to his Excellency, the Governor of the state of Missouri. [*54

And it is further ordered, that the clerk forward a copy to each of said commissioners, Hendershott and Minor, of the order referring the matter of costs and charges, the clerk's report thereon, and so much of the foregoing decree as respects the costs and charges, for the guidance of said commissioners in the performance of their duties in this respect.

HENRY WEBSTER, PLAINTIFF v. PETER COOPER.

Where it appears that the whole case has been certified *pro forma*, in order to take the opinion of this court, without any actual division of opinion in the Circuit Court, the practice is irregular, and the case must be remanded to the Circuit Court to be proceeded in according to law.¹
The decision of this court in the case of *Nesmith and others v. Sheldon*, (6 How., 41,) affirmed.²

THIS case came up on a certificate of division of opinion, *pro forma*, between the judges of the Circuit Court of the United States for the District of Maine.

It was a real action, in which the plaintiff demanded a certain parcel of land situated in Pittston, in the county of Kennebec and state of Maine, and claimed title under the will of one Florentius Vassal, made in England in 1777.

Most of the points of division certified arose upon the construction of this will, and the remainder were upon the right of the plaintiff to maintain the action, and the rule of estimation as to improvements; covering in fact the whole case.

The cause was argued by *Mr. Dexter* and *Mr. E. H. Davis*, for the plaintiff, and *Mr. Allen*, for the defendant; but as no decision was had upon the merits, the arguments of counsel are omitted.

Mr. Chief Justice TANEY delivered the opinion of the court.

This case has been argued at the bar upon points certified as upon a division of opinion in the Circuit Court. But it appears by the record that the whole case has been divided

¹ FOLLOWED. *Dennistoun v. Stewart*, 18 How., 569. RELIED ON in dissenting opinion, *Steamer Oregon v. Rocca*, 18 How., 576.

² See note to *Nesmith v. Sheldon*.