to the meridian half, will then be the zenith, or right up, and is equal distance from all parts of the horizon. Observe the part of the meridian that cuts the brazen meridian in forty degrees ten minutes, and you have then the position of the inhabitants in Madrid; and turning the globe till Madrid comes to the meridian, you will find it in the zenith, or top of the globe, under forty degrees ten minutes. Note. If it were required, to rectify the globe for North latitude, then you must elevate the North pole to the given latitude, instead of the south pole; but the next problem will better explain this.

Prob. 2. *The latitude and longitude of any place given, to find the place.*] You are first to observe whether the longitude be reckoned from London, or from the first meridian; for on some globes the first meridian touches seventy-three degrees, on others twenty degrees, and on Senex's globe sixteen degrees west of London; but if you know where the first meridian is on the globe, it is very easy to know the difference from the meridian of London.

Prob. 3. *The latitude of any place given, to call all those places that have the same latitude.*] Direction: All those places that have the same latitude have the days and nights of the same length, at the same time of the year. Rule. Bring the given place, or places, to the meridian (suppose London fifty-one degrees thirty-two minutes, and Madrid forty degrees ten minutes north); then turn the globe, and all those places that pass under forty degrees ten minutes have the same latitude as Madrid, which you will find to be Pekin nearly for one, and many other places.

Prob. 4. *To tell the difference of the latitude of places.*] There are two variations, or rules.—First, If the latitudes be both north or both south, then subtract the less from the greater latitude, and the remainder is the difference, or answer. Thus between London and Madrid is twelve degrees thirty-two minutes, the first being fifty degrees thirty-two minutes, and the other forty degrees. And between Candy and Stockholm is fifty-five degrees thirty minutes, for Stockholm is sixty-five degrees thirty minutes north, and Candy seven degrees thirty minutes north. Secondly, If one be on the south, and the other on the north side of the equator, (that is to say, if one be north and the other south latitude) then add them all together, and their sum is the difference of the latitude required.—Thus, Copenhagen is fifty-five degrees forty minutes north, and the island of Madagascar is nineteen degrees thirty minutes south; those added together make seventy-five degrees ten minutes, the difference of longitude required in the problem.

Prob. 5. *The longitude of any place given from any meridian, to call those places, having the same longitude.*] This is done after the same manner as the other; only here the answer will be on the equator, in others were on the meridian. I would know what places have the same longitude as London, and the same longitude as Moscow? The rule is, bring London to the meridian, then all those places on the globe (from the north pole to the south part of the horizon) that lie under the edge of the meridian, have the same longitude as London: thus Port Nassau, and Port Mina, in Guinea, have the same, or very nearly the same longitude as London. And Moscow, has very nearly the same longitude as Aleppo, in Syria; also Scanderoon, Antioch, and Tripoli, in Syria, have the same longitude, viz. thirty-seven degrees thirty minutes from London.

Prob. 6. *To tell the difference of longitude of places.*] Rule. There are two variations. First, If the places lie both east, or both west, of the first meridian, or where you reckon the longitude from, viz. if they both be east, or both be west longitude, then subtract one from the other, you have the difference. Thus I find Jerusalem has thirty-six degrees fifteen minutes east longitude from London, and Pekin one hundred and ten degrees fifty-two minutes east longitude; therefore subtract thirty-six degrees fifteen minutes from one hundred and ten degrees fifty-two minutes, and there remains seventy-four degrees thirty-seven minutes difference of longitude east or west; that is, Pekin is seventy-four degrees, thirty-seven minutes east longitude of Jerusalem, or Jerusalem is seventy-four degrees thirty-seven minutes west longitude of Pekin. Secondly, If one place be east, and the other west longitude of the first meridian, (suppose London, or any other meridian) then add their longitudes together, and the sum is the difference of longitude required.

Prob. 7. *The day of the month given to find the sun's place in the ecliptic.*] Rule. The day of the month being given, look on the inner calendar on the new globes, and you have the sign, and the degree of that sign that the sun is in for that day, according to the new style. If it be upon old globes, look on the outer calendar, you have the sign, and degree of the sign. N. B. You may further observe, that the calendar used throughout Europe is the calendar for new style, viz. new style is always known from the other, because it has the saints days, and several other things inscribed on the horizon.

Prob. 8. *The sun's place given to find the day of the month.*] This is only the reverse of the former problem; for having the sun's place given, seek it in the circle among the signs, then against that degree in the calendar, new style, you have the day of the month required. Example. I would know what time of the year the sun is in one degree of Gemini; as also when he enters Aries, Cancer, Libra, and Capricorn. Proceed according to the rule, and you will find the day to be May 21, June 21, September 22, and December 21, as in the last.

Prob. 9. *The latitude and day of the month given, to find the sun's place in the ecliptic, and rectify the globe for ever.*] Rule. Find the sun's place on the horizon by problem the seventh; and having noted what degree he is in, look upon the ecliptic on the globe, and find the same sign and degree as you did on the horizon; then bring this degree of the ecliptic very carefully to the graduate edge of the brazen meridian, and holding the globe steady, turn the index exactly to the upper twelve (which represents twelve at noon,) and thus is the globe rectified for that day, and the degree of the ecliptic that lies under the equator represents the sun's place at noon, or twelve o'clock that day. Note, The astronomer's day is reckoned from, or begins at, twelve o'clock; and if you fix the quadrant of altitude to the latitude in the zenith, the globe will be completely rectified.

Prob. 10. *To tell the declination of the sun on any day of the year.* Rule. Having found the sun's place in the ecliptic for the given day, bring it to the brazen meridian, and observe what degree of the meridian it lies under, and whether it be on the north or on the south side of the equator, for that is the declination accordingly. Thus, on April 21, the sun has eleven degrees thirty minutes north declination, and on May 21, he has twenty degrees thirty minutes declination, but on October 27, he has twelve degrees thirty minutes south declination.

Prob. 11. *The latitude and day of the month given, to tell the sun's meridian altitude, viz. his height at noon.*] Rule. Bring the sun's place to the meridian, and observe what degree of the meridian the sun's place is under: for those degrees on the meridian that are intercepted, or lie between the south verge of the horizon and the degree, which is over the sun's place on the meridian, (counted on the meridian) is the sun's meridian altitude required. Thus I find his meridian altitude at London, May the 21st, to be fifty-nine degrees, but on November the 6th, he has but twenty-three degrees thirty minutes altitude.

Prob. 12. *The latitude and day of the month given, to tell the sun's altitude at any time.*] Example. On May the 21st, at nine in the morning, and at five in the afternoon, at London, I would know the sun's altitude, or height? Rule. Rectify the globe for the latitude, and bring the sun's place (one degree gemini) to the meridian, and the index to the upper twelve on the dial-plate; then screw the quadrant of altitude on the zenith, viz. the left edge of the out must be fixed on the meridian, at fifty-one degrees thirty minutes, then turn the globe till the index points to the hour, viz. nine in the morning; this done, fix the globe by thrusting a quill between it and the horizon: lastly, turn the quadrant about till the graduated or figured edge touch the sun's place, (viz. one degree gemini) and the degrees on the quadrant, counted from the horizon upwards on the quadrant, is his height at that time, viz. forty-three degrees thirty minutes. Then turn the globe till the index points at five in the afternoon; and also turn the quadrant on the west-side (without unscrewing it) till it touches the sun's place, and you have about twenty-four degrees on the quadrant, his altitude at that time. N. B. At North cape, (north latitude, seventy-two degrees at nine in the morning) May the 21st, he will not be but about thirty-two degrees high.

Prob. 13. *The latitude given, to tell the rising and setting of the sun, and length of the day and night, at any time of the year in any place.*] Rule. Rectify the globe, (viz. elevate it for the latitude; bring the sun's place to the meridian, and index to the upper twelve); then turn it till the sun's place comes even with, or lies right against the inner verge, on the east-side of the horizon, then the index will shew you the time of the sun's rising; turn it to the west-side, or verge of the horizon, and the index will shew you the setting. Or thus: having got the hour the sun rises, count how many it wants of twelve, for so many hours will it set after. Thus, if the index points to four in the morning at rising, it will of course be at eight at night, &c. Proceed thus, and you will find the sun, on May the 26th, at London, to rise about four in the morning, and sets at eight at night. Now double what he wants of twelve at rising, viz. eight hours, and it gives the length of that day at London, viz. sixteen hours.

Prob. 14. *To tell the sun's right ascension.*] Bring the sun's place to the brazen meridian, and note what degree of the equator is cut by the meridian, for that is his right ascension required. I would know the sun's right ascension on March the 21st, June the 21st, September the 22d, and December the 21st? I find the sun's place for those different days, and bring it to the meridian; I find the meridian cuts the equator in (0), in (90), in (180), and in (270 degrees) his right ascension require. Note. When the sun enters Aries, March the 21st, he has no right ascension, because it is counted from, or begins at Aries; therefore, on March the 30th, he must have his greatest right ascension, viz. three hundred and fifty-nine degrees.

Prob. 15. *To find the sun's oblique ascension and declination at the time, and in any latitude.*] Rule. Rectify the globe for the latitude, and bring the sun's place down to the eastern verge of the horizon; then observe what degree the horizon cuts the equator in, for that is the oblique ascension required. Thus on March the 21st, June the 21st, September the 22d, and December the 21st, viz. when the sun enters Aries, Cancer, Libra, and Capricorn, you will find his oblique ascension at London to be (0), (56), (180), and (304). And on the same days his oblique descension will be (0), (123,) (180), and (037) and a half.

Prob. 16. *The latitude and day of the month given, to tell the sun's ascensional difference, viz. how much he rises, or sets, before and after six; and consequently to tell the length of the days, supposing there were no index to the globe.*] Rule. By the last problem find the sun's right, and oblique ascension; then subtract the oblique from the right ascension, or the contrary, and the remainder is the ascensional difference required; which divide by fifteen, the degrees of the equator that past through the meridian of one hour, (or seven and a half for half an hour) gives the answer in time, that the sun rises and sets before and after six. Thus, on May 26, I find the sun's degrees of Gemini, and his right ascension is sixty-four degrees and on the same day, his oblique ascension is thirty-four degrees; now thirty-four degrees from sixty-four degrees there remains thirty degrees, his ascensional difference; which divide by fifteen gives two hours, the time that he rises before, or sets after six.

Prob. 17. *The latitude and day of the month given, to tell the sun's Amplitude, viz. his distance from the east and west points of the compass he rises and sets upon.*] Rule. The globe being rectified, bring the sun's place to the eastern verge of the horizon, (which shews his rising) then the degree upon the innermost circle of the horizon, counted from the true east point to the place where the sun's place lies against on the horizon, shews you the sun's amplitude. Proceed according to the rule, you will find the sun's amplitude at London, (May 21,) at rising, to be about thirty-four degrees from the east to the north, and at setting thirty-four degrees from the west to the north; and the point he rises upon is north-east