case, the grooved pulleys are turned on their universal joints so as to be horizontal; but such a cut is rarely required.

Blocks up to 25 tons are hauled up the incline of one in seven from the bottom of the quarry to the surface by means of a three-speeded winch, driven by the 30-horse power engine, which provides the whole motive power. They are then, if desired, further sub-divided, or sawn into slabs, always by wire cord; but the diameter of the cord decreases, while its speed increases, inversely with the length of cut. The diameter of cord for sawing a block into slabs is 5-32 in., and several cuts are made simultaneously. In this case the cords are passed over pairs of grooved pulleys, adjustable on their axis, the tension of each cord being independent of the other, on account of possible inequalities of hardness in the stone. The cords are in all cases kept at a proper tension by a weighted truck on an incline.

While the sub-division of a large mass at the bottom of the quarry requires generally 2-horse power, a frame of ten wires for sawing a block into slabs absorbs from 4-horse power to 5-horse power. A cord 100 to 300 yards long will, on an average, make a depth of 69 ft. to 15 ft. cuts, or produce 487 square feet of sawn surface, before wearing too smooth to carry along the sand. It will then have become reduced to nearly the diameter of one of the wires originally composing it, and may be used for various other purposes, such as fencing.

Marble slabs, sawn by the ordinary blades, have a tolerably smooth surface, owing to considerable attrition by the sand adhering to the sides of the blades; but this is of little advantage, as such slabs are rarely true, so that the finish is generally removed in the process of trueing. On the other hand, slabs sawn by wire cord are quite true, but not so smooth as the others. The surface is true because the cords are kept at a considerable tension; but it is not smooth because the cord sways a little vertically, producing a succession of grooves like the "traverse marks" in an iron surface produced by the successive cuts in a planing machine. The absence of smoothness is, however, a small matter, because any amount of finish is readily put on by a machine like that used for polishing plate glass, in which a flat head is made to travel all over the surface while at the same time revolving. In the stone polishing machine the head is made to revolve at a very rapid rate, the speed not being limited by the centrifugal tendency of any polishing powder, while a third motion is given by making the carriage travel backwards and forwards automatically. The polishing medium consists of emery and metal amalgams suitably prepared—emery and iron being used for marble. By uniting the emery with various metals in fusion, advantage is taken of the efficient polishing power of the former substance, while the difficulty of using it in the natural state or in powder is removed.—*Industries.*

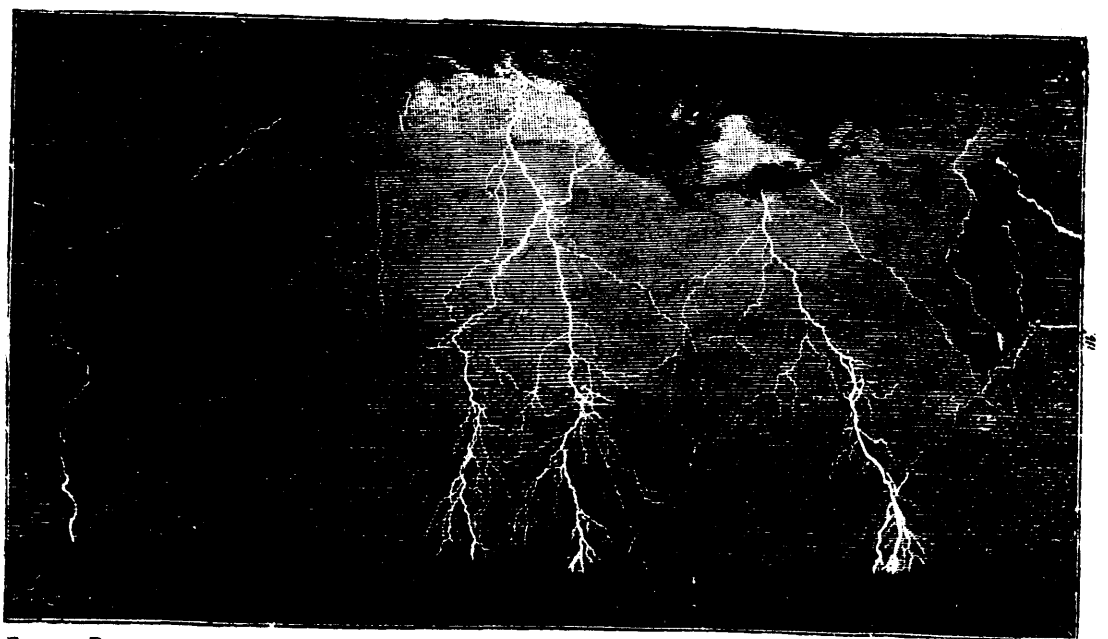

FIG 1.—PHOTOGRAPH OF LIGHTNING, TAKEN BY A. H. BINDEN, AT WAKEFIELD, MASS., JUNE 23, 1888.

PHOTOGRAPHS OF THE LIGHTNING.

One of the most interesting applications of photography since the production of plates of extraordinary sensitiveness has become possible, is shown in the remarkable pictures accompanying this article. No more convincing proof of the wonderful advance made of late years in the production of light-sensitive pictures could be imagined than is afforded by the fact that they are capable of catching and retaining the evanescent lightning-flash, the duration of which is such an infinitesimally-minute fraction of time that the most refined instruments of precision are unable to determine it with certainty. The most curious and interesting fact exhibited by the photographs of the lightning, is that the flash which to the human eye exhibits the appearance of a single forked or zigzag line of light, records itself on the infinitely more sensitive photographic plate as quite destitute of the forked or zigzag characteristic, and as divided by innumerable ramifications, proving that the stereotyped mode of indicating the appearance of a lightning flash by a sharply angular series of deviations, is erroneous. This fact was first noticed by W. N. Jennings, of Philadelphia, one of the earliest and most successful experimenters in this direction—as early as the year