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## THE GREAT SCAFFOLDS OF THE CONGRESSIONAL LIBRARY, WASHINGTON, D. C.

Washington, the capital of the United States, is rapidly, in its memorials of art and technology, becoming what it should be, a representative city of the United States. At one time it was little more than a conglomeration of comparatively poor buildings, with a few magnificent specimens of architecture scattered over its area. At present it is losing this character and the fine buildings are becoming more and more numerous, crowding away the poorer ones. This applies as well to the private as to the public buildings, including some beautiful residential structures in the more fashionable quarters of the city. Meanwhile, the federal and district government are adding to the architectural adornment of the city. First among the new erections

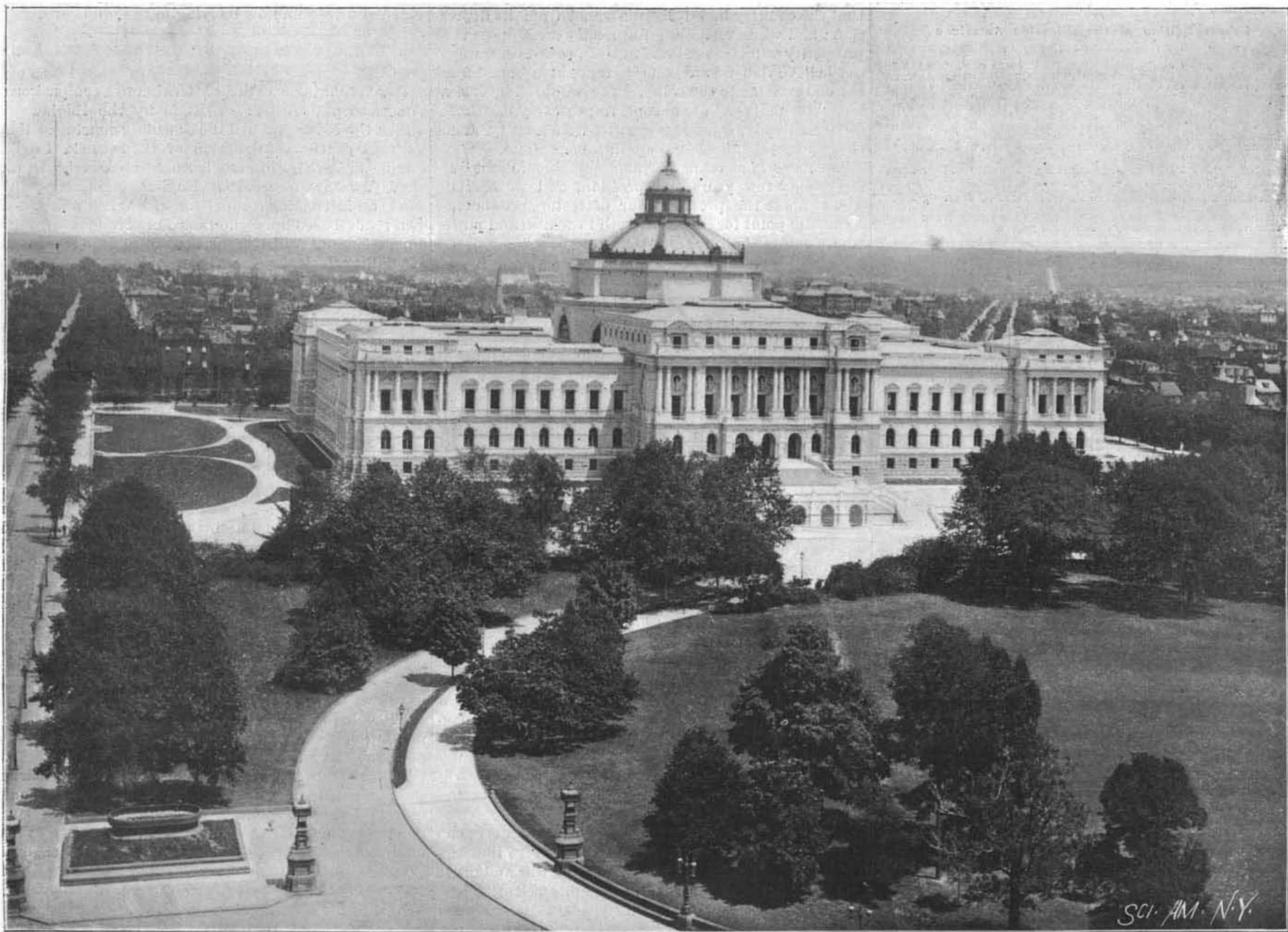
is the best lighted library in the world, having nearly 2,000 windows. Of fireproof construction, with the most modern lighting, heating, and ventilating equipment, it represents as much a sample of modern engineering as it does of architecture.

The sculpture of the building is at once emblematic and instructive, the keystones of many of the window arches carrying carvings of human heads—types of thirty-three races of men, made from drawings now in the National Museum.

The roofing throughout is of sheet copper and the exterior of the dome is gilded with pure gold leaf, the latter costing about \$3,800; gold leaf is used on the dome not only for decorative purposes, but also to provide a more durable covering than painting and to avoid the necessity for frequent renewal.

rotating template. At the apex of the dome was established a pin or journal carried by a massive scaffolding of 8 inches by 10 inches and 10 inches by 1 inch beams. This pin was  $3\frac{3}{4}$  inches in diameter and represented the pivot about which the scaffold rotates. This took care of its upper end. Its lower end carried two rollers or wheels 18 inches in diameter tread measure and about 15 feet 3 inches apart. The axes of the rollers were set horizontally and radially normal to the base circle of the dome. They were connected rigidly by a 6 inch by 6 inch angle iron. From the central pin to the rollers two trusses were carried, each a truss, therefore, lying in a separate meridian plane of the dome. One section shows the elevation of one of these trusses.

These two trusses, whose horizontal projection would



THE NEW CONGRESSIONAL LIBRARY, WASHINGTON, D. C.

is the Congressional Library, a veritable literary palace, a building of whose beauties much has been written and which is now to a great extent the lion of Washington. In it we have a beautiful Italian Renaissance building of granite, of a most substantial description, 470 feet by 340 feet in area, and, therefore, covering about  $3\frac{1}{2}$  acres of ground, with all four sides fronting on streets, and making it, what is somewhat of a rarity under the conditions of modern civilization in our cities, a building with all sides architecturally treated. We reproduce a beautiful photograph of the library taken from the direction of the Capitol, which shows the general character of the building. It is constructed of granite for the exterior, with the most lavish use of various marbles for the interior and with the most elaborate system of sculpture and decoration. It is impossible to give an adequate idea of the building within the limits of our space. It is three stories in height, with four interior courts, comprising extensive stack rooms, as well as reading and assembly rooms.

The main feature of the interior is justly described as the reading room, which is a nearly circular hall one hundred feet in diameter and one hundred and twenty-five feet high, surmounted by the dome. Here Tennessee, Numidian and Siena marbles are used for the columns carrying the dome.

Our principal cuts show the method adopted for giving access to the interior surface of the dome. The concave portion is enriched with architectural stucco work in high relief, including cherubs, birds, rosettes, flowers, faces and geometrical designs, while near its top are paintings by the famous American artist, Edwin H. Blashfield. Two special revolving scaffolds were constructed for the use of the artists, decorators and workmen.

To provide the scaffold for the treatment of this area involved a somewhat difficult problem, which was met most satisfactorily by the structures, one of which is shown in our illustration.

Each scaffold approximated to what may be termed a

represent, therefore, a triangle, were rigidly braced together; the wheels at the bottom rested on a circular railway carried around at the base of the dome, so that the entire great structure could be pulled around by simple tackle, operated by workmen. The two trusses were built of angle iron, riveted to splice plates; the lower chord is of a  $\frac{1}{2}$  inch angle iron,  $3\frac{1}{2}$  inch  $\times$   $3\frac{1}{2}$  inch; the upper chord of  $\frac{3}{8}$  inch angle iron, 6 inch  $\times$  6 inch. The space between the upper and lower chords, besides the braces, was crossed by horizontal angle irons which acted as floor beams and were planked over. This gave five separate floor spaces, 6 feet apart. To the upper chords and to the protruding end of the floor beams, slotted plates were secured by bolts which carried a scribing guide of angle iron bent to the arc of a circle 49 feet 2 inches in diameter, which gave the template of the profile of the dome.

The main rollers on which the scaffold was partly carried rolled upon a circular track. A circle of iron  
(Continued on page 364.)

### THE GREAT SCAFFOLDS OF THE CONGRESSIONAL LIBRARY, WASHINGTON, D. C.

(Continued from first page.)

beams, 9 inches high, was carried around the dome, and projecting from it was a 1½ inch plate, which acted as a rail. The rollers were flanged, so they could not, under any circumstances, run off the track; and, in addition to the flange, in order to secure the utmost accuracy of movement, two horizontal guide wheels, 8 inches in diameter, were provided, which bore against the inner side of the circular track. Thus the rotation of the great structure was effected with almost mathematical accuracy, enabling the dome to be verified at every point, in addition to providing most perfect scaffolding for building. A vertical scaffolding was built up in the center of the hall and dome, reaching well up to the apex, so as to give a convenient access to the top.

Our thanks are due to Mr. Bernard Green, superintendent of construction and engineer, for courtesies received in connection with this subject. The two rotating scaffolds, while in use, proved all that could be desired, and were one of the most interesting features of the constructive operations.

#### Color Screen Making.

Color screens are now indispensable in advanced photographic work, and F. E. Ives, of Philadelphia (Photographic Journal, xx, 315), recently gave a useful practical demonstration of the making and testing of such screens before the Royal Photographic Society. The best method, he thinks, is to coat patent plate glass with gelatin and, when the film is dry, immerse the plate in an aqueous solution of the dyestuff until a sufficient quantity is absorbed, then dry again and cement to another piece of patent plate glass by means of Canada balsam, so as to protect the film from dust and injury. Unless special facilities are available, however, it is easier to prepare the screens with collodion films. The patent plate glass selected should have plane surfaces as near parallel as possible. This may be "flowed" with plain collodion, then with an alcoholic solution of the dyestuff, drained on blotting paper and allowed to dry spontaneously. Or better, the dyestuff (such as brilliant yellow or "uranine") may be dissolved in the collodion before coating the glass. To make eight ounces of the colored collodion, take four ounces of a clear alcohol solution of the dyestuff and forty grains of "cotton." Shake together until the "cotton" is thoroughly soaked, then add an equal quantity of ether. Coat two pieces of glass with this collodion and, when dry, cement them face to face with Canada balsam with the thick edge of one film opposite the thin edge of the other. The effect of this precaution is to keep the depth of color in the screen more uniform. The application over the films, before cementing them together, of a thick varnish made by dissolving mastic in benzol is useful in preventing punctures by dust or grit. After the excess of balsam has drained out and been cleaned off the edges with paper dipped in methylated spirit, the edges should be bound with strips of gummed paper, as in the case of lantern slides.

#### Cross Lighting.

Some traditions die hard, being accepted without examination by nine persons out of ten and by all who are in or under authority, and, like officials generally, opposed to or suspicious of innovation. Among these is the belief in the hurtfulness of cross lighting. This method of lighting would seem only to be held injurious in schools, for in our own houses we are only too pleased if we can have windows on two or more sides of a room. Even in Germany, where statistics and experimental investigation pervade every department of administration, and where in each detail the executive is guided by an order in council somewhat inappropriately called an "Erlaß," find we cross or double lighting still expressly condemned. Yet Cohn and Förster, Javal and Ferrand, Rumbold and a royal commission

on school construction have urged the groundless nature of the prejudice.

Provided always that the eyes are not dazzled and that no shadow falls on the reading or writing, it is impossible to have too much diffused daylight or its artificial equivalent. The loss of intensity with increasing obliquity of the rays of light is acutely felt in wide rooms, especially when not high in proportion, on the side opposite the windows; whereas if there be windows or lights on each side, the intensity of illumination is equalized and its total amount doubled. It is only necessary that that coming from the right should be naturally or artificially the weaker, as by

having the windows north and south or by filling those on the right with clouded glass. Windows in front are always objectionable, but light from behind, if not so strong as to cast a shadow, can but serve to increase the illumination derived from the proper quarter. As Cohn and Förster long since pointed out, reading or other work demanding clear but effortless vision is in the open air, when the sky is overcast, a real luxury. Under these circumstances the light is ample but shadowless; it comes from everywhere, but from no one quarter more than from another. The most perfect artificial illumination conceivable is that obtained by Hrabowski's arrangement of hemispherical milk glass reflectors with prisms and mirrors by which the light of an electric arc lamp is diffused equally throughout the building, though the source is hidden from view. The light is photometrically equal to that of a clear summer day and as free from color; it is almost shadowless and is, in fact, superior to daylight in not being liable to fluctuations, although its intensity can be regulated at will.—The Lancet.

#### Fuse Wires.

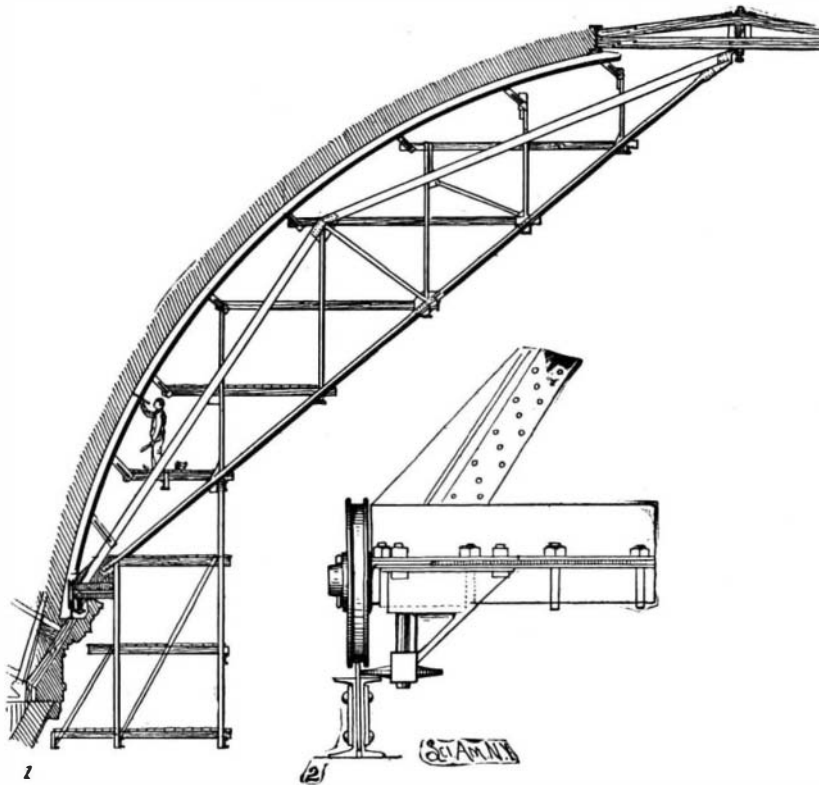
Prof. W. M. Stine, in a summary (American Electrician) of practical conclusions on the subject of fuse wires, gives the following:

1. Covered fuses are more sensitive than open ones.
2. A fuse wire should be rated for its carrying capacity for the ordinary lengths employed.
3. On important circuits fuses should be frequently renewed.
4. Fuses up to five amperes should be at least one and one-half inches long, one-half inch to be added for each increment of five amperes capacity.
5. Round fuse wires should not be employed in excess of thirty amperes capacity. For higher currents flat ribbons of four inches and upward should be used.

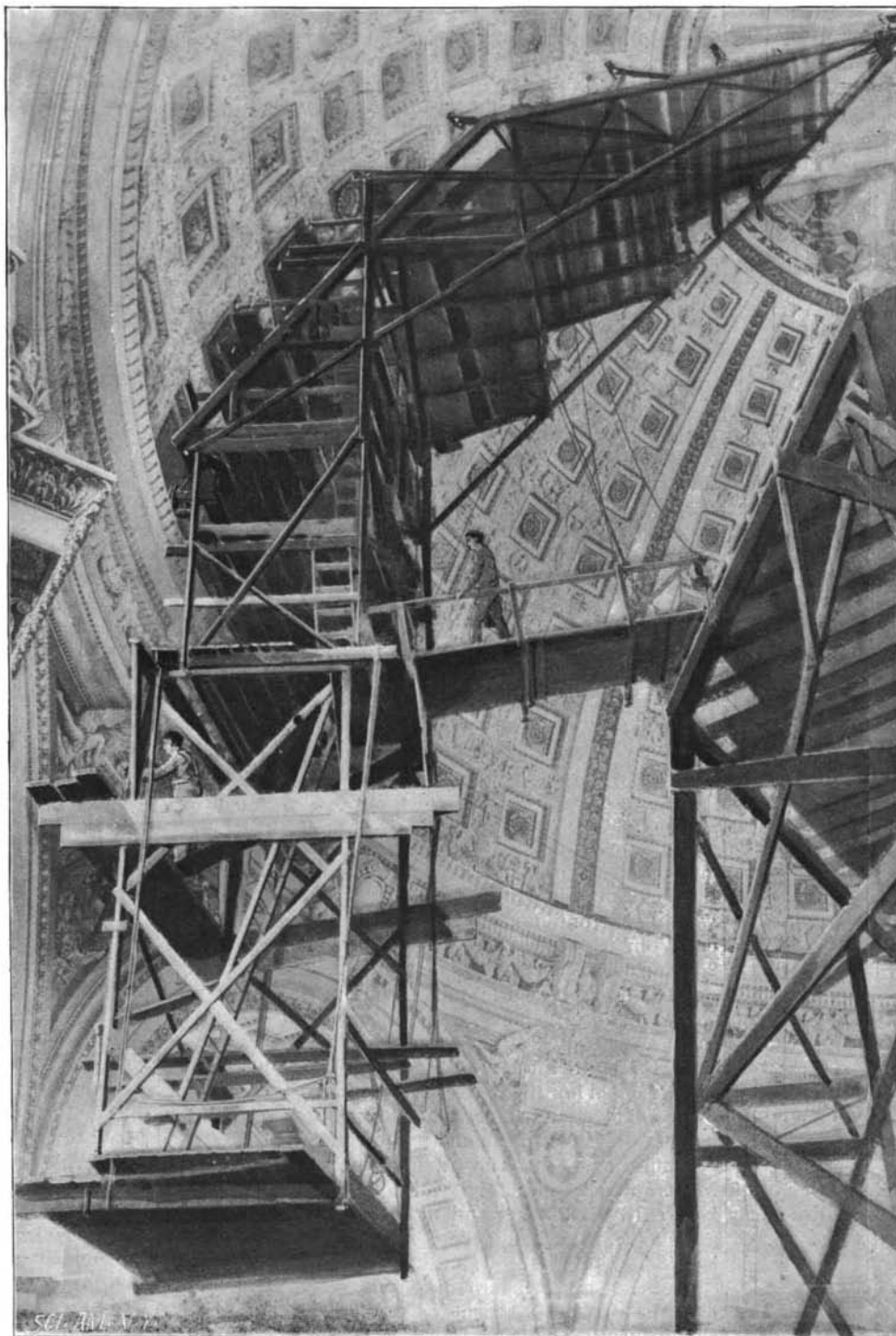
His experiments have shown that for large fuses a multiple fuse is more sensitive than a single one. A one hundred ampere fuse may be made by taking four wires of twenty-five amperes capacity. Too much emphasis has been doubtless placed on the position of a fuse. Unless it be long and quite heavy, its carrying capacity is practically the same, whether it be placed vertically or horizontally.

Experience seems to show that the best alloy is one of lead and tin, the lead being considerably in excess. If too much lead is used, the fuses deteriorate rapidly and coat with the white film. A leading question now is the automatic circuit breaker versus the fuse wire. Both these devices are excellent in themselves, but each requires judgment in selection and use. The automatic circuit breaker is to be preferred for switchboard, use and motor service. Large fuses should be avoided, as they are both filthy and dangerous. Relegated to the back of the switchboard, the flying molten metal fouls the bus bars and connections, besides coating the board with a sooty deposit. A circuit breaker placed in plain sight on the front of the board is to be preferred in all cases. For lighting circuits it is doubtful if any simpler and better device than the fuse wire can be used. In spite of all that has been said against it, when properly used and taken care of, it leaves little or nothing to be desired; yet there is nothing about the plant that is more dangerous when ignorantly or carelessly used.

AN explosion of acetylene gas occurred September 12, in a restaurant at Lyons, France, causing a great amount of damage to the building and the neighboring buildings, while five persons were injured. The fire underwriters submitted a report on the case to an expert, who gave the opinion that the acetylene system may be accepted if an additional premium is charged, and the apparatus installed outside the building or in an unoccupied and well ventilated place.



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ROTATING SCAFFOLD FOR THE DOME OF THE CONGRESSIONAL LIBRARY.