

Lacquering and Plating in the Laboratories

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THE importance of the finish of metals in the telephone plant is apparent from the extent to which it is found. Affecting both appearance and function, finish of one or another sort is almost universally applied to metal telephone apparatus. Materials for finishing purposes are investigated, sometimes developed, and specified to the Western Electric Company, by these Laboratories.

To meet the needs of the Laboratories for finishes which would be the equal of those produced by the Manufacturing Department at Hawthorne, and for a means of applying special metal coatings to models of new telephone apparatus and equipment con-

structed in the Shop from engineering sketches, the Laboratories' metal-finishing facilities were reconstructed in 1919. The room and the equipment constituted what was at that time a model layout for plating, with the recognized cleaning, plating and drying features generally used by industrial firms and with added refinements in structural details and in the excellent quality of the equipment.

Plans for the room were developed by engineers of the Plant Department. Walls were lined to the height of six feet with acid-resisting tile and floors were covered with acid-proof brick, on top of concrete; the whole was made water-tight with an asphaltic filling. Suitable drains were built in

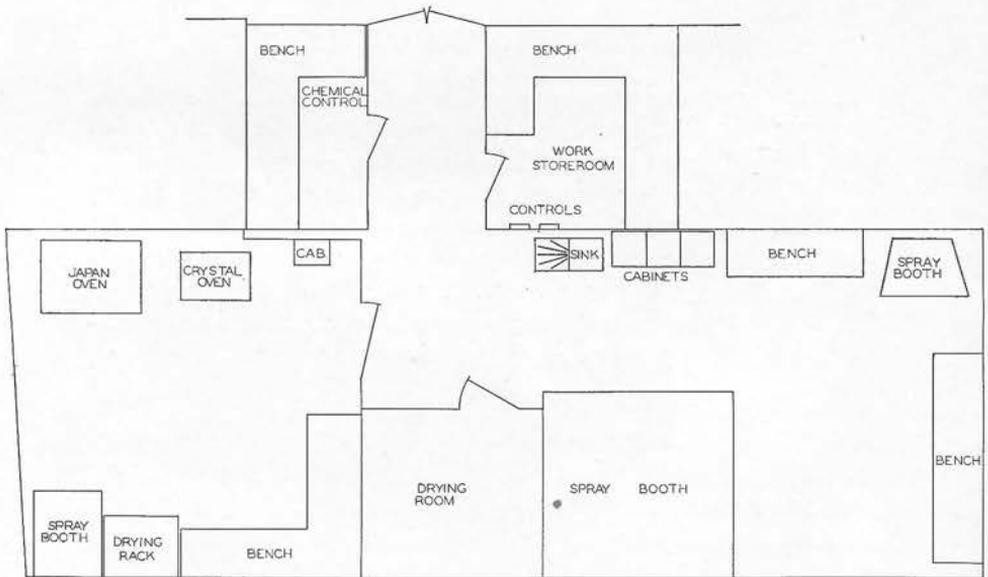


Fig. 1—The lacquer and japan finishing rooms are located in section 3-E

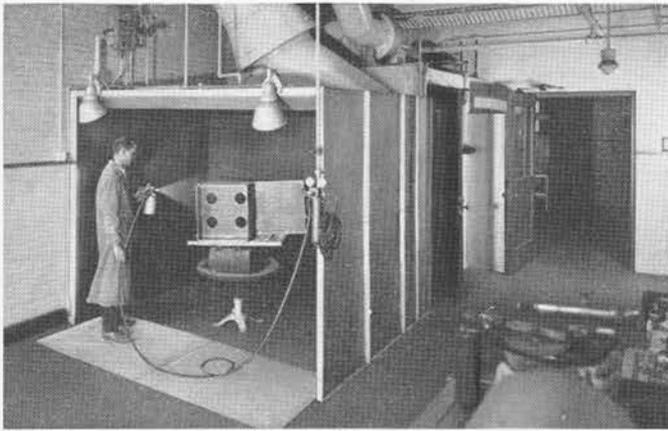


Fig. 2—Mounted on a turntable in the large power-ventilated spray booth, big apparatus is sprayed by Thomas Cassidy. The apparatus is later dried in the oven directly behind the booth

at several points. That the job was thorough is attested by the fact that after ten years the floor and walls are still in excellent condition.

The plating solutions heretofore most largely used in finishing telephone apparatus were copper, nickel and zinc; these three metals were applied to more than ninety-nine per cent of all parts receiving a metal finish. A limited demand for baking japan and lacquer finishes was taken care of by the installation of a small spraying unit and a baking oven in one end of the plating room.

For the past several years, however, it has been recognized that the available facilities were inadequate for carrying on some of the various types of work which were constantly

being requested by the engineers. There was also a demand for a somewhat more careful control of finishes, particularly of their weight and character, since in many cases close tolerances limited the amount of metal that should be applied. Furthermore it was desired to have the same facilities and technique available at West Street as at Hawthorne for producing standard finishes.

The general rapid growth of the Laboratories made apparent the necessity of providing facilities for future as well as for present requirements, and plans were drawn up to this end. Space limitations prevented a full realization of the contemplated enlargements, but the new departments, which have re-

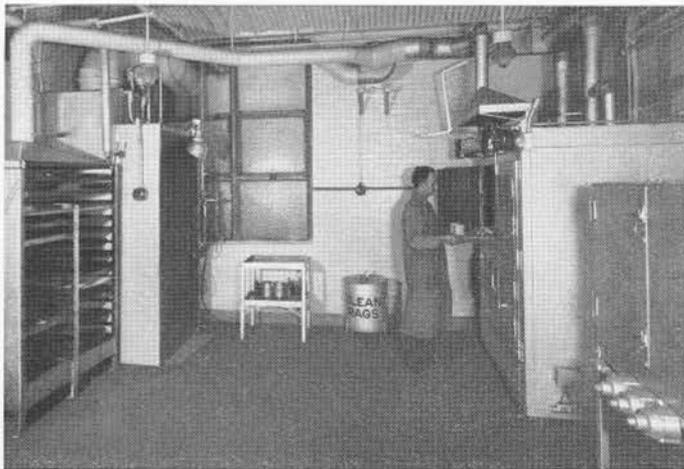


Fig. 3—The japan room. Left to right: drying rack, small spray booth, baking oven (into which Charles Stone is placing equipment he has just sprayed), and crystalizing oven. Exhaust systems are coupled to all these units

cently been completed, are expected to take care of the requirements for some time to come. The new Finishing Department is divided into two main sections; one is used for the application of japans, lacquers, paints, varnishes and enamels, and the other for metal plating, facilitating a considerably increased diversity and refinement of finishing.

The japan and lacquer section is located on the third floor, in section "E," and is divided into two large rooms with a fire wall between them. Of two more small adjoining rooms, one is used to take care of all incoming work and finished outgoing work, and the other for a laboratory where chemical control analyses are made.

In one of the large rooms, used for the application and baking of japan and varnish coatings, there is a three-by-three-by-seven foot DeVilbiss spray booth, with a direct exhaust system removing spray fumes at the rate of about 1000 cubic feet per minute. Next to this booth is a steam-heated drying oven which is used for semi-

drying the freshly applied films. There are also two electrically heated ovens for baking japan and crystalline varnish or lacquer films. The three ovens are connected with a small central blower which removes the fumes from these units at a gentle rate, thus preventing the accumulation of excessive amounts of volatile solvents. Metal containers with self-closing doors are used for storing cans of paint and lacquer materials; safety cans contain solvent thinners and cleaning solutions. Ample bench space assists the operator to handle all incoming apparatus.

In the adjoining room, somewhat larger in size and used mainly for lacquer spraying, there are two spray booths, eight-by-seven-by-seven and three-by-three-by-two feet. The larger is equipped with an indirect exhaust system of the latest type: an outlet flue, free of fans and motor shafts, removing about 5000 cubic feet of air per minute. This booth meets a long-felt need by enabling the operator to spray very large apparatus and frame-

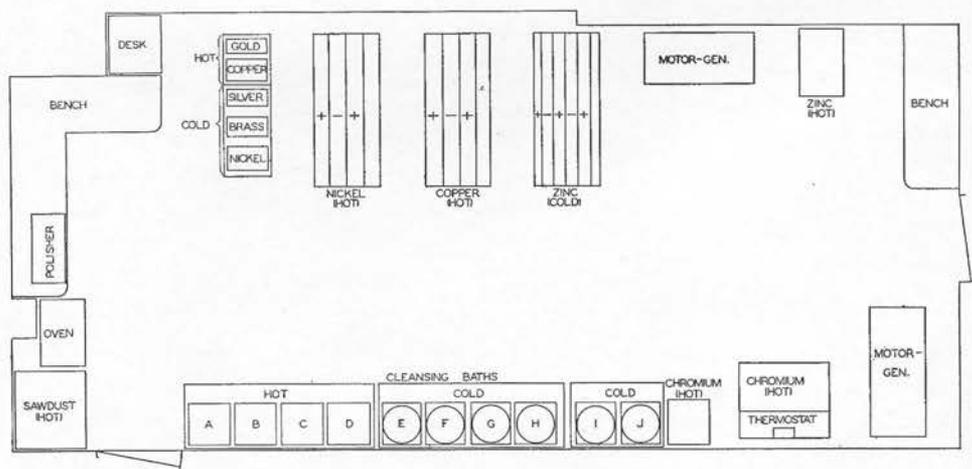


Fig. 4—The plating room is located in section 3-B. The cleansing baths are: A—clean water; B—soap solution; C—preliminary wash water; D—alkaline electrolytic cleaner; E—bright acid dip; F and G—hydrochloric acid pickels for (F) steels and (G) brasses; I—cyanide dip; H and J—clean running water

work parts without the danger of lacquer spray blowing around in the room. The smaller booth copies the Western Electric Company's design for repair shops, with a series of built-in baffles to remove solids and pigments from the excess lacquer spray before it passes into the outer air.

A particularly excellent feature of the Lacquer Department is a built-in concrete drying room (eight-by-ten-by-seven feet) with steam heat controlled by a motor valve. Thermostatic control actuates the motor valve and permits very careful regulation of the temperature. Like the baking ovens of the japan section, this oven has a blower for removing volatile fumes.

For protection against fire or explosion, lights and light switches are provided with vapor-proof covers, and power switches and relays for the ovens are installed in an outer room.

The plating room has been greatly altered and, like the japan and lacquer rooms, is considered a model of its type. The equipment includes apparatus and machinery for preparing and plating the surfaces of articles in a variety of ways.

Since the best plate can be secured only upon surfaces that are chemically clean and free from rust or tarnish, every effort has been taken to provide the necessary tanks and materials for cleaning metal surfaces. Acid, alkali and steam fumes are removed

through a new type of exhaust system designed and built by engineers of the Plant Department. It is constructed of a special alloy to prevent corrosion, and draws all fumes away from the operator so as to free him to work



Fig. 5—In the plating room, of which G. E. Wenzel (right) is foreman, current for the large plating baths is controlled from individual switchboards, at one of which is A. B. Celner. Current for the smaller baths is controlled at the switchboard in the foreground

over the tanks without discomfort.

Replacing the old plating solutions which have been modified or discarded for newer types, the Department now has available a selection which includes almost every metal that is in commercial use today. The solutions available are: nickel for ferrous and non-ferrous metals; zinc (acid and cyanide); copper (acid and cyanide); chromium; silver; tin; gold; cadmium; brass. Steam heat has been installed for heating those solutions which practice has shown to operate better when warm.

The electric equipment consists of two motor-generator sets, each designed to give six or twelve volts.

One generator is rated at 500 amperes capacity and the other at 2000 amperes capacity. The latter is used exclusively for chromium plating.

To keep the cleaning and plating solutions in good working condition, frequent chemical tests are made. In the case of the gold plating solution, for instance, which involves a high in-

good chromium deposit. For removing the fumes generated during chromium plating operations considerable care has been used in designing an exhaust hood which will be effective yet in no way interfere with the operator's access to the tank.

The magnitude and variety of work constantly passing through the new Finishing Department is great: practically every unit is in constant use, and during many weekly periods about 20,000 parts are given a finish of one kind or another. In many cases the parts to be finished require two or three separate metal coatings and in other cases five or six coats of japan or lacquer.

The Finishing Department cooperates with engineers of the Laboratories in applying finishes to parts used in the assembly of special apparatus

and of finishes which are employed for comparative test purposes. Every care is used in applying special finishes in accordance with the wishes of the engineer or with standard practice. In producing many finishes, the data gathered from the work carried on by the Finishing Department has been useful as a basis for formulating specifications issued to the Manufacturing Department or the Repair Shops of the Western Electric Company.

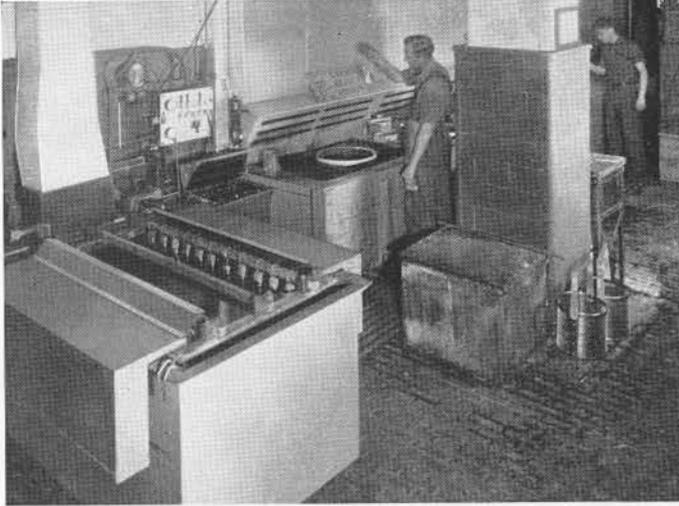


Fig. 6—The large and small chromium baths are supplied with current from a special motor-generator out of the picture to the left. At the cleansing baths are W. Frees (left) and P. Ferrarotto

vestment, tests for free sodium cyanide and for gold are made almost daily. This frequent testing is necessitated by the great quantity of work which is plated in a bath of such small proportions: sometimes as many as a thousand parts are plated weekly.

Chromium plating requires especial attention,—the temperature of the solution and the "current density" used for depositing the metal must be carefully controlled. Special "racking" of parts also aids in securing a