KINKS

Contributions Published in This Department are Paid For at a Rate of \$2 to \$8 Each, Depending Upon Their Usefulness, Illustrations, Length, etc.

## Nickel Plating of Signal Apparatus

By E. T. Ambach

Assistant Signal Engineer, Baltimore & Ohio Cincinnati, Ohio

A WELL-EQUIPPED signal repair shop should include a small nickel-plating outfit. The following is a description of such equipment and the method of operation which has proved convenient. The outfit described is for small articles only, as it is not economical to go into the proposition on an extensive scale owing to the fact that there are commercial companies handling metal plating of large articles. However, for small articles such as nuts and terminal posts of relays, and even parts of interlocking machines, such as the handles of levers of power interlocking machines, this equipment will suffice.

A 10-ft. by 10-ft. floor space, as indicated in the illustration, is large enough. The space assigned should be well lighted by windows and ventilated by a shaft to the outside air. The various vats are made of  $1\frac{3}{4}$ -in. white pine or cypress lumber surfaced and jointed, using white lead to make them water-tight. The size should be 24 in. by 36 in. by 24 in. by 40 in., or of such other dimensions as may be most convenient for the amount of work to be done.

The plating operation is as follows:

- 1. Cleanse article in potash bath A
- 2. Wash in clear cold water B
- 3. Place in acid solution C
- 4. Clean and dry in saw-dust vat D
- 5. Nickel plate in the jar E
- $\delta$ . Clean in saw-dust vat F

While ordinarily the nickel solution is placed in a wood tank or vat, it is more convenient to use a 20gallon vitreous crock or jar, which can be secured from any dealer in stoneware. A frame made of angle iron placed over the jar is used to suspend the articles to be plated in the solution. A six-cell 500-a.h. caustic-soda battery is used. The negative side of the battery is attached to the frame suspending the articles, and the positive is secured to the nickel electrode in the solution.

The plating solution consists of

double sulphate of nickel and ammonia (pure), with 12 to 14 ounces to each gallon of water. The 20gallon jar should not be more than two-thirds full. The nickel salts are placed into the jar and hot water, at 5 volts diminishing to approximately 1.5 to 2 volts. This depends entirely on the brilliancy or thickness of the plating required. It is necessary also to check the time of plating, which depends upon the operators to a certain extent, and also the temperature of the solution.

If it is so desired, the nickel-plated article can be burnished to a mirror finish by using a burnishing brush and tripoli abrasive which can be secured from any manufacturer of such articles.

All the articles used can be made except the caustic-soda batteries, the chemicals and the vitreous jars or



Plan of plating room and vat details

about 150 deg. F., is poured on until the salts are dissolved, this being hastened by stirring with a clean wooden paddle.

The solution is neutral and has no power to remove oxide (rust) from the surface of the metal to be plated, hence the metal must be thoroughly cleaned. For removing grease, dirt, etc., dip the article into a hot potash bath made by dissolving  $\frac{1}{2}$  lb. of caustic potash into two gallons of clean water. The bath must be kept hot while in use. The strength of this solution decreases with use, so that longer time is required for cleaning an article in a bath that has been used for some time. On removal from the bath, the article should be well scoured with rotten pumice stone, rinsed with water, and dried with saw-dust.

Copper articles should then be dipped for a few seconds into a solution of  $\frac{1}{2}$  lb. of cyanide of potassium per gallon of water; steel or iron articles require a solution of  $\frac{1}{2}$  lb. of hydrochloric acid per gallon of water, using the wood tank to hold the solution.

The recommended current densities for electro-plating range from 0.5 to 1.5 amp. per 100 sq. in. For nickel on iron, steel or copper, with a nickel anode, the deposit may be started with crocks, which are easily secured from ordinary sources. The nickel salts are prepared and are ready for mixing with water. Nickel electrodes should be 98 per cent pure nickel. The cost of plating materials for about 2,400 relays is about \$0.0038 for each relay.

## Handy Trouble Light

By Jas. E. MacKeen Signal Maintainer, Canadian National Morrisburg, Ont.

OFTEN, WHEN a maintainer is looking for trouble at night, he is handicapped by a light that will not function properly, such as a flashlight with a weak battery or a carbide lamp, which will freeze in cold weather. A very handy and compact trouble light can be made from an unused flashlight.

In making the light, a  $\frac{3}{8}$ -in. hole is drilled in the bottom of the flashlight case and a  $\frac{3}{4}$ -in. fiber bushing from an electric light socket is inserted and locked with a suitable nut. One wire of a 6 or 8 ft. lamp cord is then passed through the bushing to the base of the lamp socket and sol-

(Continued on page 376)