PERMALLOY FILINGS FOR MAPPING MAGNETIC FIELDS

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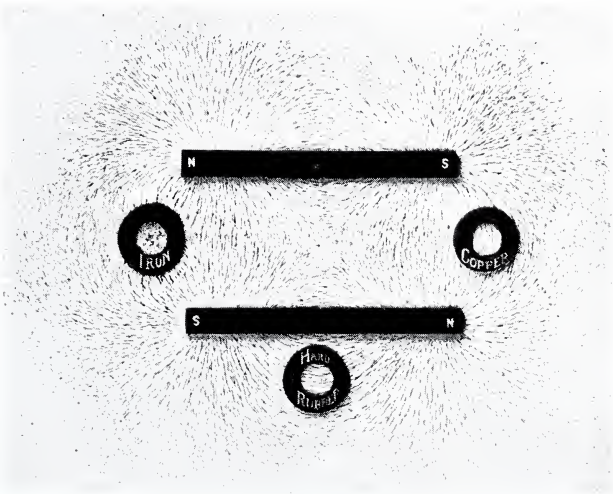
In mapping magnetic fields by means of iron filings the field at a short distance from a weak magnet will not be strong enough to orient the filings. The orientation may be produced by the use of a strong magnet. But in that case the field immediately about the magnet is so strong that the filings fly toward and cling to the magnet, leaving a space more or less free from any filings at all. The difficulty can be



partially overcome by using filings of permalloy instead of iron. The magnetic susceptibility of permalloy is far greater than that of iron in weak fields, and is considerably less in strong fields. As a consequence permalloy filings will orient themselves farther from a magnet than will iron filings, and they will not be drawn toward the magnet quite so strongly in the region immediately about it.

The accompanying figure is a field mapped with permalloy filings. Note that hard rubber and copper do not affect the field appreciably, the filings being lined up on the inside of disks (shaped like washers) of these materials just as they would be if the disks were absent. The iron disk bunches the lines of force and there is no field inside. The shielding action of iron is clearly shown.

"Proc. Ind. Acad. Sci., vol. 42, 1932 (1933)."

Permalloy being rather soft is not readily filed. A rather coarse bastard cut file gives best results.

To overcome the bright metallic luster of permalloy filings so as to make the lines of force stand out more conspicuously, the writer places them in a small beaker and wets them with India ink, stirring them occasionally while they are drying over a radiator.