## EQUIPMENT: LAMPS BRIGHTEN

Oil was the chief early source of lamp fuel, and the Petty Lamp, brought to New England on the Mayflower, was the lamp of the 18th century. It was an open lamp filled with whale oil-malodorous and smoky because the thick wick kept oxygen away from the center of the flame. Smoke was reduced by the invention of a narrow, ribbon-like wick. In subsequent types, the idea of using two tubes close together to create an updraft has been attributed to Benjamin

1780 The decisive improvement in the oil lamp was made in 1780 by Ami Argand. The burner he devised consisted of two empty coaxial cylinders with a circular wick between them. The central tube carries a stream of air to the heart of the flame, while the surface of the flame is ventilated everywhere along the protected glass tube surrounding it. An additional improvement was made by Lange, who changed the shape of the glass tube so that the air was forced to oxidize the top of the flame.

used the basic Argand scheme, but oil was pumped to the wick.

1803 The Hydrostatic lamp of Philippe Giroud was quite ingenious, but the predominant lamp of the second half of the 1801. The basic problem was to maintain reservoir, invented by Franchot in

efficient of the mechanical oil lamps.

oil to flow downward to the burner, but deep shadows were cast by the oil tank. In 1860 this disadvantage was overcome by placing the tank between two wicks or directly underneath one burner.

1779 The introduction of illuminating gas by William Murdoch marked a basic gas by William basic revolution in lighting. It was first used for public lighting on the occasion of the Treaty of Amiens, and in 1808 was installed on London's Pall Mall Street.

1826 Thomas Drummond produced an extremely brilliant light by mixing two parts of hydrogen and one of oxygen over a stick of lime, but most of the subsequent developments in gas-fuel lighting were based on coal gas and natural gas in various combinations with air.

The problem of increasing the efficiency of the lamp was solved with various types of wire nettings and chemically treated fabric mantles to enable part of the dispersed heat of the flame to be re-

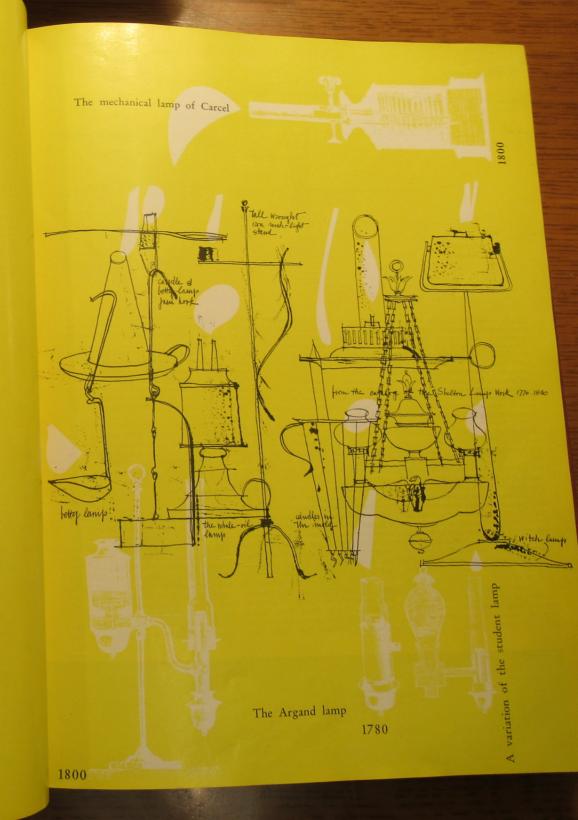
## Electricity

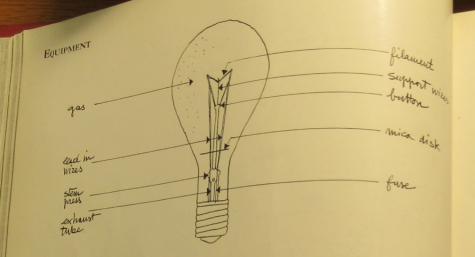
1800 The Mechanical Lamp of Carcel The first electric lamps were not incandescent but arc lamps, light being produced by an electric current flashing between two sticks of charcoal. The first was invented by Sir Humphrey Davy in

19th century was the Moderator Lamp, a fixed distance between the sticks. Fouwith a spring fuel feed and cylindrical cault and Duboscq wrestled with it in

1857, but practical applications needed 1836, and perhaps the simplest and most more powerful generators. A series of devices controlling the carbon sticks was The so-called Student or Reading lamp, developed. London and New York used in use since the beginning of the century, one of the most popular, the Brush lamp, worked on the principle of allowing the for many years. (Continued on Page 171)

LIGHTING part 2





particularly want otherwise, make colors

Practical considerations are not negligible-getting the highest efficiency, i.e., tone tends to dull blues and greens. ered) possible per watt (power conare handled by the bulb or tube itself, treat the fixture and its role.

Certain elementary demands besides the In color rendition, incandescence used to by every, or nearly every, light source. fluorescent tubes were sadly lacking in sidered as a unit) ought to cause no un- is really the most important, since you comfortable glare. It should, unless you expect complexions to be more red than and textures look consistent with their healthiest only if some red is in the "natural" appearance, the way you ex- light; you don't mind quite so much, and can't tell without comparison under two by their appearance under daylight, an or more light sources, whether a blue unstable thing but usually appearing fabric, e.g., is as blue as it can be or is grayed a trifle, as it will be under incandescent light, whose slightly orange

the most lumens (light actually deliv- The big lamp companies have worked feverishly to get some red into their sumed); ease of installation, mainte- fluorescent tubes, and now they offer nance, and replacement; and length of seven variations of color performance, life, to name the big ones. Usually light by using different mixtures of phosphors is preferred in a particular direction or on the tube's inside surface. There directions, rather than spreading indis- is "Daylight," the earliest fluorescent, criminately. Many of these conditions which emphasizes greens and blues, and "White," also lacking in red but stressbut only in part. That part is discussed ing yellows and yellow-greens. "Standlook at, but only to see that the glare is Cool White, stressing the yellow in

"Soft White," a pinkish tube especial good for pinks and tans. A loss good for prince ciency is automatic with red-produce

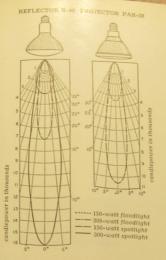
Rough materials, such as fabrics, har stone, and unpolished woods appearance and unpolished woods appearance appear more textural under incandescent he than fluorescent because the nature incandescence is strongly directional p not diffuse, coming from point source and so creates minute shadows with the material.

Fluorescence can stretch its practical and economical virtues rather farther than incandescence, even though the cost installation is higher and the tubes an more expensive than incandescent bold of equal wattage. Fluorescent tubes ge on the average, about 21/2 times as man lumens per watt as incandescent lame and their average life is about seven times as long.

The most common incandescent but looks like the "A," or "general service" type dissected above. Electric current briefly on these two pages; later ones and Cool White" and "Standard Warm coming through the lead-in wires justing White" are red-less, but the Warm White the molecules in the filament at temperature of the molecules in the filament at temperature. Frosting on many bulbs is intended not to has more yellow-producing phosphors tures well above 300° Centigrade be enough to make them comfortable to and so gets a rather warmer look than dividing temperature between invisible not too extreme on those occasions you green, e.g. Then there are three versions

Tungsten has been found most appeared by the party of do have to look at it. So the glare remaining must be attended to in the distribution of the strength of the s maining must be attended to in the fixture by a variety of means most of the ture, by a variety of means, most of them shown on following pages.

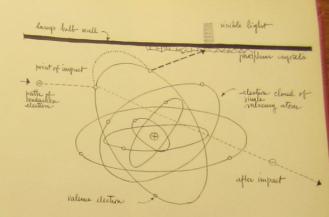
The tubes—Deluxe Warm White," which has more yellow phosphors than its tures, and the higher the filament to ture, and the higher the filament to ture, and the higher the filament to ture. counterpart, "Deluxe Cool White," and perature, the greater the efficiency.



Some of the many variations in incandescent bulbs are shown at left below. Letters indicate shape, usually, and a number always follows the letter in designating a particular lamp, telling the greatest diameter of the bulbs in eighths of an inch; an "A 17" would be a general service type bulb with a broadest diameter of 17/8". The A comes in wattages from 10 to 1500. Besides often being frosted to reduce glare, it, and the next commonest PS type, may be silvered, either along the sides to send all light downward in a broad spread, or on the bowl to reflect light up for use in in-

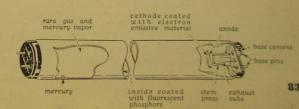
Projector (PAR) and reflector (R) lamps control the direction and spread of light in either a spotlight or floodlight distribution, as shown in the diagrams above. A spotlight distribution concentrates most of the light within an area of 15° radius, floodlight, 30°. The R lamp, available in 75 watts (then it is an R 30 size), 150, and 300 watts (R 40), is blown to shape and has a metallic reflecting coating; the degree of heaviness of the coating determines whether the lamp is a spotlight or floodlight. The PAR-38 lamp, which comes in 75 or 150 watts, is constructed of two molded glass partsa metallic coated reflector and a lens. Larger PAR lamps are made, too. In the PAR spotlight, the Pyrex lens is not so heavily stippled in the center as in the PAR floodlight, achieving a sharper cone of light.

All lamp manufacturers produce the same equipment, except for a few specialized items each may have. Bulb sizes, wattages, and base sizes have been standardized among the several companies, making replacement and interchangeability of General Electric's, Westinghouse's, Sylvania's, Champion's, or anybody else's no trouble at all.

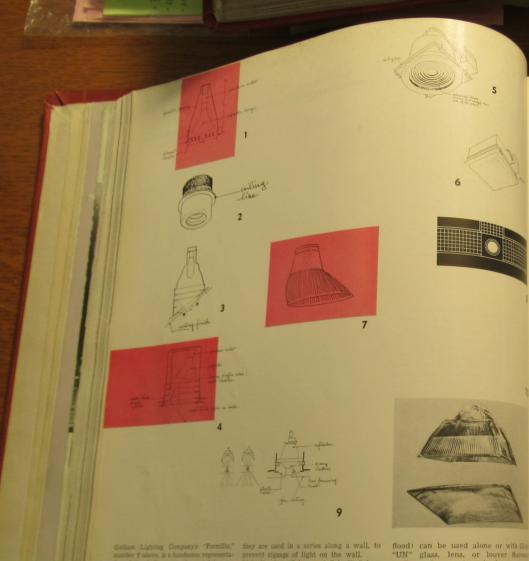


Production of light in a fluorescent tube is achieved by atomic pnenomena in the rare mercury vapor that fills the tube and in the phosphor crystals coating it. The process is dissected in the diagram above, which represents a mercury atom composed of electrons rotating at different orbits (determined by the particular energy level of each electron) around a nucleus. When an electron is boiled off one of the electrodes at either end of the tube, it may collide with an electron of the mercury atom, transferring some of its energy. The charged electron moves out from its usual orbit but returns eventually to it, or to an intermediate one, releasing the surplus energy in invisible ultraviolet radiation. This radiation strikes a phosphor crystal on the tube, where a similar atomic process results in radiation of light.

"Hot-cathode" and "cold-cathode" refer to the type of electrode used to discharge electrons into the tube. Hot-cathode is the usual kind, employing tungsten filaments, while cold-cathode uses a cylindrical form coated on the inside with electron emitting materials. Cold-cathode can operate at much lower temperatures than hot-cathode, lasts at least twice as long, and is instant-starting, while hot-cathode ordinarily needs a short time to preheat the electrodes to a point where they will release a large number of electrons. Instant-starting hot-cathode lamps are available, but they need a high starting voltage, causing strain on the ballast-a device that, besides heating the electrodes, limits the current so that it won't keep growing till it destroys the lamp. "Slimline" hot-cathode lamps are instantstarting. The Cold Cathode Lighting Corporation in New York will shape an installation to specifications, curving tubes to fit a cove, e.g. and has several choices of color rendition much like hot-cathode.







coduce brightness, or General Lighting's design of the reflector.

Light distribution in 3 is controlled, not in that spreads light widely. se hang but in the Alexa inside surface. A sample of Pittsburgh Reflector Com-

tive of the shells commonly containing re- Lightolier has "Colouvered Calculite" lens fector or projector lamps. Built in, or used spotlights like 5, ceramic tinted along one as a surface fixture, it has a satin aluminum side of the risers to eliminate glare and finish a black inside surface and vertical send light straight down. Reflectors inside the fixture are brought flush to the lens so of you don't want to hide the light source that very little light escapes. A similar lens material, Corning Glass Works' Pyrex Century's ellipsoidal reflector spot is above the ceiling there are semi-recessed actions such as Century Lighting's white tions by changing the position of the bulb 2 with horizontal basiles to in relation to the lens and by varying the from 20° to 80°, depending on whether

Albalite (a Corning product) glass diffuser ters can be inserted to shape the bear

troffers. Louver type is shown. Pin-hole spots emit light from a scane noticeable hole in the ceiling. A projector or reflector lamp can be un carefully placed in height so that the flected rays will converge at the open more involved device (9), has an open design of the reflector.

design of the reflector.

or two lenses are used and on the lens or lenses. Metal framing is the lens or lenses. Metal framing is the lens or lenses. Metal framing is the lens or lenses. cisely, to project light in an exact lin A sample of Pittsburgh Reflector Company's built in silvered "Permaflectors" 7, is you are lucky to get 20% efficient you are lucky to get 20% efficient Holophane Company, Inc., concentration to be reflected to send light in a particular direction of the reflected to the property of the reflected to the property of the reflected to the reflecte for a wall picture, e.g. With any pic-Contact by the state of the sta

13 pushes the lens (called a "Controlens") can hide in the fixture or poke out at any up, in a concave fashion, reducing its degree up to 90, accommodates PAR or R brightness from any normal seeing angle. lamps, and is completely rotatable. Silvray Lighting, Inc.'s "Silver-spot" (11) Number 15, an indirect recessed fixture uses a silvered bowl lamp to reflect light by General Lighting, has a brushed alu-

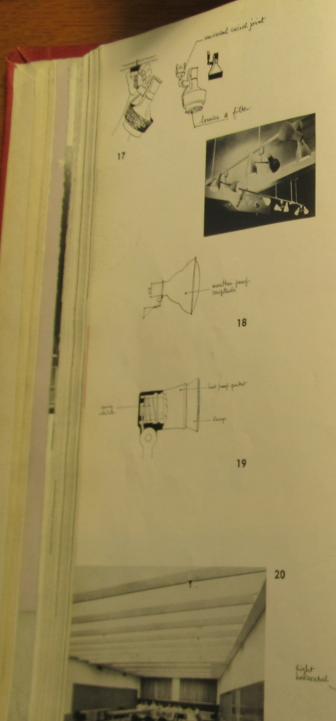
up into a metal dome that beams the light down in a broad distribution. Louvers here, as usual provide 45° shielding.

Rotatable spotlights are available in many styles, one of them being Gotham's Monopoint Control Accentlite (12). The opening is elongated so that a good proportion of light will be emitted even when the lamp is tilted, as it can be from 0° to 45°. Semi-recessed eyeball units, rotatable and tiltable, are produced by several companies, including Litecraft Manufacturing Corporation and General Lighting, which also has "Rotobeam" (13), a fixture that can be white baked enamel, unless you want a pushed flush with the ceiling as well as color finish, Domo-Lite uses a circular dropped up to 45°

Swivelier Company's "Gyro-Lite" (14), right in a Gruen and Krummeck store.

minum reflector below the bulb and 3 metal reflector above. It comes in several sizes, for lamps from 100 to 300 watts. Gotham's indirect domelite (16) uses a silvered bowl lamp to reflect light up to a baked white eggshell finished aluminum lamp brightness. The fixture may be suspended, too, comes in diameters of 28" or 36", and provides a broad distribution. American Lighting Equipment Company has "Domo-Lites" similar to Gotham's, in diameters from 18" to 42". Finished in



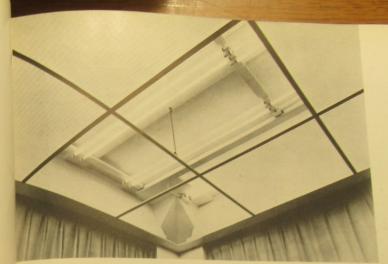


For displays, Bulldog Electric Products Company offers the Trol-E-Duct track, Dietured at left in the Herman Miller Chelego showroom designed by George Nelson, The track comes in demountable parts of five and ten feet, and the wiring system makes every inch a potential electrical outlet. So fixtures can be attached wherever evanted, with two kinds of plugs—a Gamp-on (shown in 17), and a roller type that can slide along the trolley. Swivel joints and sold electrical tracks here, let the lamps be turned in any direction.

Century Lighting has, among other things Century Lighting, the long range, narrow for outdool land and spread, Alzak reflector fixture at left (18) spread, Alzar for sizes with diameters from 1t comes from 100 to 1500 The spring-clutch (19) is Lighting Prod-The spring Products, Inc.'s weather-proof "Storm King." Luminous ceilings have been widely applied in the past few years, offering what illuminating engineers call "high quality lighting," i.e., even brightness surroundings. Rohm & Haas Company's Plexiglas, an Rohm & Hadden and Transmits acrylic plastic, diffuses light and transmits all light wave lengths so that the color of light is not distorted. The transmission factor depends on the thickness used, but it's usually between 53% and 66%, reenforced to about 85% when the ceiling above is very light. Plexiglas is available flat, shaped in three dimensions to specifications, or corrugated, as it is in 20, a General Motors conference room. The ceiling system here is the F. W. Wakefield Brass Company's "Wakefield Ceiling," which has perforated fins filled with Fiberglas acoustical wool to deaden sound, and vents for air circulation. The structure of another Plexiglas ceiling is dissected in 22, at the Champion Lamp Works in Lynn, Massachusetts.

Works in Dylin, Massachaetts, Holophane Company employs prismatic glass in 21 (9300 in their Holoflux series), to send plenty of light down, and upwards to light the ceiling, but very little diagonally where the eye will see it.

Incandescent and fluorescent are combined in Mitchell Manufacturing Company's "Mitchell Module," a system of four modular units that can be coordinated into any 90° pattern: a 16½" square holding four fluorescent tubes in a row; a square, same size, with a PAR spot or flood encircled by a fluorescent Circline; a 16½" x 48¾" unit with four fluorescent tubes; and a 16½" x





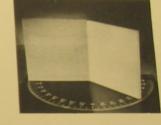
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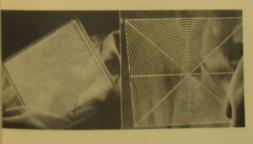
97½" unit with four 96" Slimline lamps. Charles Eames used the Mitchell Module in the 1950 Good Design show at the Merchandise Mart, shown in 23. It can also be recessed. White Polystyrene louvers hide the tubes from any angle over 40°.

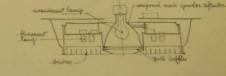
An eggcrate is built right in Corning Glass Works' "Fota-Lite" (24), photographically, The pattern may be produced either on a surface of the glass or throughout its depth, as it is here. On the left side of the picture, where the louvers are vertical, the square affords a 45° cutoff from the line of vision, while the other one has the louvers bent in a 30° angle so that you can hardly see through the glass from any position. Corning also has "Alba-Lite," a smooth, translucent, light opal; prismatic panels; and, of course, Pyrex, used in Frank Lloyd Wright's Johnson Wax buildings for the famous hallways and some ceilings. Corning's latest accomplishment is a photochemical process of producing three-dimensional patterns of any depth or delicacy in glass, or of cutting holes through it in perfect detail. Two samples are shown in 25.

detail. Two samples are shown in 25.
Gotham combines a PS incandescent bulb
with eight fluorescent tubes in 26, a fixture
that can be either surface mounted or recessed. Having a 30¼" diameter, it is also

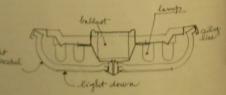


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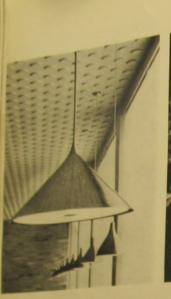
Gino Sarjatti of Milan clamps pieces of metal together for straight, noble floor lamp at left, fixture at right



When a light source must be seen anyhow, it might just as well be good-looking, like those on this, half of the opposite, and the next two pages. Some subjugate their sculpturesque selves to duty (Silvray's hanging fixture on the next page, e.g.), some strike a compromise between looks and office (any of the Sarfatti numbers, say), while others let lighting, or at least baldly useful lighting, go hang. Chores are the least of considerations in the bubble lamps below, e.g., made by the Howard Miller Clock Co. (distributed by Richards Morgenthau) of white vinyl plastic that softly filters light into a room. George Nelson is in the picture not to define the scale of the sculptures, but because he designed them.



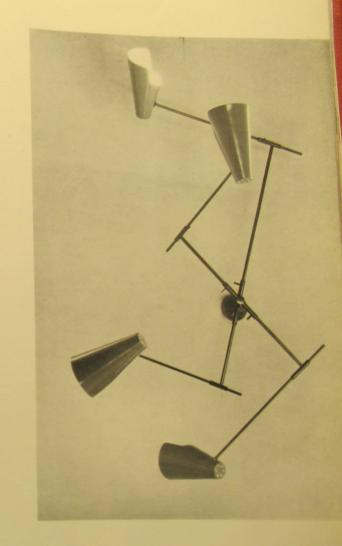




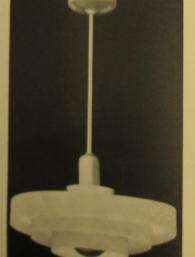








Proces Typoli of Hebroki creates lighting fatures with the enterties of facing light and the materials he works with left a single impression, as in those above, excel-cing all finished linear. There usuall be little point in providing the breas writes a light bulb source teside, and the plessession and charming clease of top right pre-unts a specialic of resignmenting light and accepture.



in other flooring female for indicate lighting, using a filtered heart passe, where steamer rapid present plant.

Sarfatti's metal arms stretch and bend above, hold four colored scoops that send beams of light in edjustable directions. Middletoum Manufacturing Company's Light Tree, designed by S. J. Miller, at top left extends from floor to ceiling, holds four R.-Do lamps for whatever purpose you want to give them — up-lighting, down-lighting, accent lighting. Lightoller has many adjustable fixtures, designed and engineered by Gerald Thurston. Height is not the only tentative matter in the one at left above, since the fixture can also run along a traverse rod set up in a chosen direction.