cumulation of electrical energy takes place. This energy after a suitable time interval, during which the rays are allowed to act, may manifest itself in a powerful discharge, which can be utilized for the operation or control of mechanical or electrical devices or rendered useful in many other ways. The radiant energy is directed upon an elevated conductor, connected with one of the armatures of the condenser, positively electrified by the invisible radiations. The electricity is carried off from the other armature by connecting it with the ground. The accumulated energy is discharged through a suitable receiver.

Recent Improvements in the Nernst Lamp.

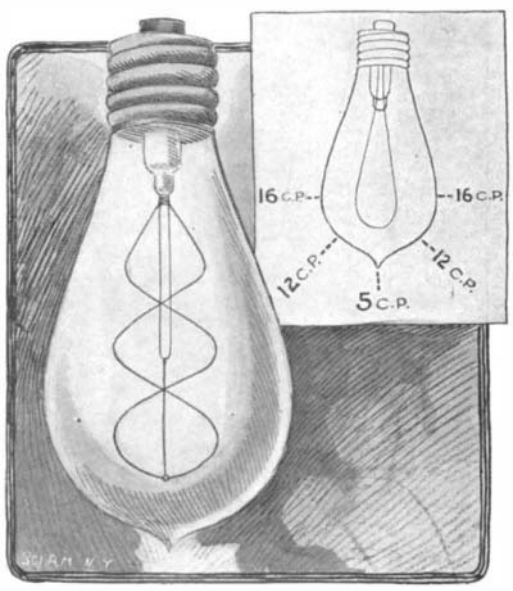
Several patents have recently been issued in the United States to Walther Nernst, Henry N. Potter, and Marshall W. Hanks, for processes and devices designed to overcome various defects which have been noticeable in the Nernst lamp.

Mr. Potter intends to use several spirals of wire to effect the heating of a single glower, or a number of glowers. A single spiral suffices to heat small glowers with sufficient uniformity, but when glowers of large-current capacity are to be started up, the heat must be very evenly distributed to prevent cracking of the glower. Instead of increasing the diameter and length of wire of a small heater, which is rather costly, Mr. Potter finds it cheaper to multiply heaters in parallel. Several heaters equal in surface to a single large heater, he finds, will heat up more quickly, as they have but a fraction of the mass of the large one. Several heaters can be so distributed about a glower that their combined effects heat much more evenly than a single spiral practically can.

The quality possessed by the glowers of acquiring an increased conductivity under the influence of heat has been counterbalanced by the employment of ballast-conductors placed in series with the glowers. But in the practical manufacture of standardized ballast and of glowers having uniform qualities under the conditions of practical use, it is sometimes found that an additional adjustment of the ballast is needed in order to secure perfect working. It is sometimes desirable to employ a ballast inclosed in an air-tight chamber, or so to construct the principal portion of the ballast that it is not readily adjustable. Mr. Nernst has devised a divided ballast, a portion of which is standardized as perfectly as possible, while the remainder is adjusted according to the peculiar conditions of each glower. By the employment of the divided ballast it is possible to compensate for any imperfection in the standardized ballast or in the glower, or both.

Mr. Nernst has likewise invented four compositions for glowers. These compositions consist essentially of the oxide of zirconium mixed with earths of the yttrium or cerium groups.

An effective and easily practised method for treating Nernst lamp glowers whereby they may be adapted to circuits of a given voltage, is the subject of the patent granted to Mr. Hanks. The adaptability



THE IMPROVED FORM OF INCANDESCENT LAMP FILAMENT COMPARED WITH ONE OF THE "HAIRPIN" TYPE.

of glowers to any given voltage is determined by length, cross section and composition; and it is generally the practice to make the glowers for use with circuits of any given voltage as nearly as possible of the same composition, the same diameter, and the same length. Despite the utmost care exercised in manufacture, more or less variation from the condition desired is likely to ensue. After the glowers have been completed it is obviously not feasible to change the composition or to decrease either the diameter or the length. Mr. Hanks therefore proposes to provide glowers which actually require higher voltages than those for which they were originally intended, with coatings of material, the composition of which is the same as that of the glower body itself. Assuming that the glowers to be treated are actually adapted for higher voltages than those for which they are desired, Mr. Hanks subjects them in a heated condition to a cloud of powdered material which is the same as that of the glower body itself. If the glower is treated while hot and is rotated during treatment, the powder will be deposited in a uniform layer. The treatment is continued until a voltmeter, connected across the circuit from which the energy for heating the glower is derived, indicates that the desired increase in cross-section has been obtained.

THREE NEW ELECTRICAL DEVICES.

The matter of rating the efficiency of an electric lamp of the incandescent type is always difficult. for the reason that the glow is found to vary greatly when

SPRING-ROLLER LAMP HANGER.

the readings are taken at different points. Because of the variable distribution of the light rays, this form of illumination could never be regarded as entirely faultless. What is known as the "hairpin" filament, the first form ever used, varied but slightly in its illumination on the horizontal plane; but it was sadly deficient in its vertical distribution, a very small percentage of its maximum candle power being thrown directly down through the tip. The next step forward was the single loop, which had the effect of increasing the amount of light directed through the tip end of the bulb; but the vertical distribution was much more irregular than with the "hairpin" filament. Following these were the double filament, the anchored coil, and the double loop, but none of these reached the standard set. The latest addition to the assortment of bulbs on the market is one with a spiral filament, which is shown in the accompanying cut beside a "hairpin" filament. The spiral design is said to give the maximum candle power at every point on the vertical as well as the horizontal plane.

It is often necessary to shift the position of a hanging electric lamp. One man likes his light high, while another wants it as near the work as it can be placed. In offices and industrial establishments where one desk or workbench is used by different persons, many curious ways of making the change are brought into requisition.

A device by which this change is at all times readily accomplished is shown in the accompanying cut. The lamp is provided with about ten feet of flexible cord, and mounted on a spring roller which locks automatically at any desired point. By the aid of this arrangement, the lamp can be drawn up or down to any point, in much the same manner as a spring-curtain.

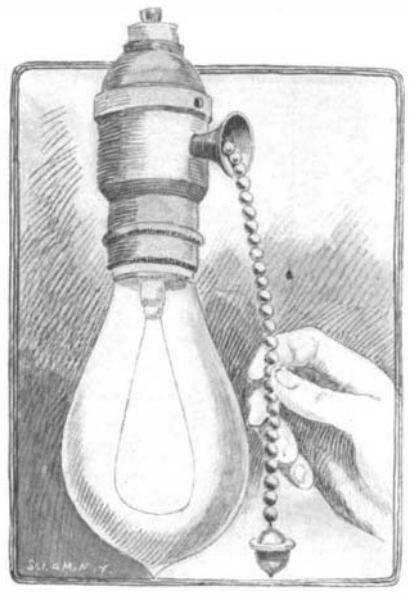
An electric light when hung quite high is necessarily wasteful, for the reason that it is a matter of considerable inconvenience to turn off the current. Of course in such instances a wall switch button may be used, but this entails more or less elaborate wiring and more expensive attachments in the lamp-socket. The thumbscrew with which most of the lamp-sockets are fitted at present is the most simple and economical arrangement which can be devised, and answers all purposes where the lamp is within easy reach. It is, however, inadequate where it is found necessary or desirable to hang the lamp beyond the ordinary reach, because in order to turn it off after use, it is necessary to secure a chair or ladder. Rather than do this the light would be allowed to remain in operation, running up needless charges for current. With the chain pull just brought out, this matter is solved in a very simple manner. The socket is supplied with a make-and-break attachment of the sliding kind, operated by means of a chain of any desirable length. One pull of this chain extinguishes the light and the next turns it on. This apparatus is said to be quite as convenient as the wall switch and, as stated above, much more economical.

A Substitute for Rubber.

The young shoot of the Rocky Mountain greasewood plant has a milky sap, and the old wood a resinous gum, which is soluble in carbon disulphid and in other known hydrocarbon solvents of rubber. From the young greasewood sap two inventors have discovered a method of making artificial India rubber. The plant is bruised between rollers, whereby the bark is loosened and the woody fiber of the larger stems crushed. The entire mass is then inclosed in a vessel, mechanically agitated, and exposed to the action of carbon bisulphid, carbon disulphid, naphtha, or other solvent of India rubber. After exposure for some hours to the action of the solvent, heat being applied if necessary, the liquid is strained off. The liquid solvent and contained gum are then placed in a closed vessel and the volatile solvent driven off by heat. The gummy mass that will not volatilize in the still or receiver is then washed in water, either warm or hot, and is then subjected to repeated rollings. The gum resulting is of a brown color, highly flexible and elastic, combustible, and seems to possess the characteristics of India rubber, except that it has rather a balsamic odor, differing from the odor of commercial rubber. The gum can be vulcanized by the addition of a quantity of sulphur in the same manner as the India rubber of commerce.

A Novel Horn for Phonographs.

A single horn is ordinarily used in phonographs to discharge the sounds, the small end of the horn being connected with the short tube of the reproducer either directly or by the interposition of a rubber tube connection. It has been proposed to use two horns communicating with opposite sides of the reproducer diaphragm, with the discharge ends arranged side by side. The purpose of this construction is to improve the tone, quality and power. Furthermore, it has been proposed for a similar purpose to employ a number of independent horns mounted upon a part to which a rotary movement is given. The horn in this case consists of a large bell or hood embracing a number of small horns communicating at their smaller ends with a transmitter having a mouth. A throat leads from the mouth to the diaphragm frame of the reproducer. It is claimed that music,



CHAIN-PULL ELECTRIC LIGHT.

vocal or instrumental, is reproduced by this new horn with great clearness, and that the power of every sound is materially improved.

A Sorely Needed Invention.

In the manufacture of oilcloth no means have yet been devised for utilizing the waste trimmings. Since the printing machine for the oilcloth must be absolutely to gage, at least one inch to one and a half inches are lost on each side of a strip of material. These trimmings are particularly valuable because they contain a considerable amount of linseed oil; and a method reasonably cheap and economical is wanted to extract this oil from the trimmings.