

Learning by Seeing

By George H. Dacy

MAKING practical application of the "Seeing is believing," slogan, the Bureau of Commercial Economics, Washington, D. C.—the greatest distributor of educational motion picture film in the world—is, at present, rotating its film resources of 35,000,000 feet of negative contributed by thirty different countries so that the pictures are exhibited to 2,000,000 people every twenty-six days. The ramifications of this unique organ of education are now so numerous and world-wide that it is possible to provide all portions of the globe from the frigid Arctic Circle to the plains of Senegambia and the steppes of Russia through 3,600 distributing cities with a change of "movie" film every week, supplied from over 100 film exchange centers operated by the organization.

The Bureau of Commercial Economics is an altruistic association which utilizes the facilities and instrumentalities of governments, manufacturers and educational institutions in the universal dissemination of useful information by the graphic method of motion pictures which are always displayed to the audiences free of charge. The free "movie" shows are held at universities, colleges, technical and agricultural schools, public libraries, state armories, community centers, state granges, settlement houses, missions, chambers of commerce, boards of trade, rotary clubs, fraternal institutions, welfare clubs, factories and wherever the people are interested and crowds can be assembled. Thirty-six specially equipped motor trucks provided in each instance with a powerful projector, an electric generator, a field phonograph and a collapsible screen are operated in carrying the motion pictures to the rural communities both in America and foreign countries.

Educational films—supplied by industrial, scientific and commercial enterprises as well as by the railroads—which portray every conceivable operation from controlling a forest fire to making an automobile, from manufacturing pins to building locomotives, are distributed. Films are sent at regular intervals on dog sleds from Newfoundland to the Arctic Circle over a route which covers 2,100 miles. By means of portable projectors and small lighting generators, the Esquimos, lumber jacks, fishermen and prospectors of this north-land country are regularly entertained—often in the ice-built huts of the natives or the crude shelters of the whites—with motion pictures which bring the doings of the outside world to these pioneering peoples.

Primitive carts drawn by oxen are used as the means of transportation in conveying the films and motion picture machines to the inland villages of the Dutch East Indies, while throughout the Orient the camel is occasionally harnessed as the beast of burden to carry the current events as depicted in pictures to the various tribes and creeds of the desert. The Hindoos of India enjoy the same "movies" which delight the natives of Peru, Chili and Bolivia; these get the applause of audiences of Inca and Hopi Indians as well as those of local assemblages in every state in the United States and every province in Canada. To Australia, South Africa, China, Japan, Russia, England, France, Italy, Denmark, Sweden, Norway and to every quarter of the earth where the motion pictures have



An ingenious arrangement of gimbal rings and heavily-weighted pendulum serves to keep the motion-picture camera on an even keel

penetrated, the "teaching-by-eye" films of the Bureau of Commercial Economics are now disseminated.

For a period of eighteen years, Dr. Francis Holley, formerly a builder of trans-continental railroads, was blind, due to paralysis of the optic nerve. During this time he traveled all over the world, visiting various eye specialists in hopes of regaining his vision. Ultimately he decided if ever his eyesight were restored that he would devote the balance of his life to making the world at large see things. Finally, by the use of high frequency electric current treatment, Dr. Holley's vision was restored, although as a consequence of the electrical treatments his lower limbs were paralyzed. He has made good his vow to carry visual education to the masses, he being responsible for the organization and success of the Bureau of Commercial Economics.

Nearly a score of years ago, Dr. Holley conceived the plan of teaching industrial workers concerning complicated operations in their respective factories by the use of films. Under his direction the first educational motion picture ever made was filmed in one

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Keeping the Camera on an Even Keel

By J. E. D. Meador

DESIGNED to overcome the effect of the camera's tilting while taking motion pictures on a ship's deck at sea, which makes the skyline appear to rise and fall, a device patterned after the marine gimbal has been constructed and employed by a motion picture company with excellent results.

The accompanying illustration clearly depicts the new idea. The camera resting on aluminum gimbals and, equipped with ball bearings, may be turned completely around without moving the tripod. The legs are made of 1½-inch steel tubing, the lower ends being fitted with adjustable pointed tips. The pendulum, an iron ball, with auxiliary weights, suspended by 1½-inch pipe, measures 34 inches in length. The ball and weights aggregate 150 pounds. To facilitate carrying, the ball has a cross pipe through it to serve as handles. With camera loaded the complete outfit weighs about 250 pounds. The tripod legs can be adjusted to give the camera an elevation of ten feet.

The gimbals were manufactured in New York from plans and embody several new ideas. A severe test that included exposing several hundred feet of film, while the camera was vigorously rocked, proved the device a success. The designer has taken steps to secure patents covering the most important improvements embodied.

Telephoning in Cipher

EVERYONE probably has felt an uncomfortable fear, at times, that a private conversation over the wire was being listened to by an unbidden and unwelcome third party. Such listening in, in fact, is quite possible even on a private wire and many are the instances where information thus gained has figured in divorce courts, criminal cases, or the game of politics. In time of war, of course, such betrayal of guarded secrets may become a matter of life or death. Various methods have been employed for preventing such leakage. One that has been recently made known is the invention of a young French physicist, M. Poirson, attached to the laboratory of General Ferrié.

When vibratory currents are interrupted audition is greatly interfered with. In making experiments suggested by this fact, M. Poirson obtained surprising results. He found that if the current be interrupted with a frequency varying from 100 to 125 the voice is altered, becoming harsh and strident. When 125 to 170 interruptions are produced one hears a little better. With 210 to 270 interruptions the voice is once more greatly altered, but beginning with 290 interruptions communications are much better heard. These experiments suggested to the investigator the idea of replacing the interrupter by an inverter of the current. Rapid inversions modify the harmonic composition of telephonic currents and currents thus deformed become absolutely unintelligible over the telephone along the entire length of the line, producing upon the ear the impression of some weird unknown language. At the receiving end the telephonic currents thus interfered with are reestablished in their normal order by inversions which are identical and synchronous with the former ones. The apparatus has been named the cryptophone.—By M. Teris.



1. A movie outfit in the Arctic Circle that travels a circuit of 2100 miles. 2. A motor-truck picture show that was exhibited to 65,000 people in one evening at Washington.

3. Interior of one of the motion-picture trucks, showing phonograph, generator and projecting machine

The perambulating film that educates while it interests

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Our Mechanical Eyes

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against a spherical surface which forms the inner surface of a bowl. The abrasive material is emery powder or an equivalent. The larger grain sizes are first employed and then the smaller ones.

The next machine operation is that of polishing. Before or during this procedure, scratches may be discovered on the ground surfaces of the lenses. If so, the block must be ground again, as the removal of actual scratches is not a job for the polishing machine. A block with its complement of lenses perfectly ground is now set in or on a fixed holder in the polishing apparatus. The polisher rotates over the block polishing the various lenses by means of fine polishing material. The polisher is a shell having the same curve as the block and containing a lining of heavy felt which is cemented to the shell. The curvature of the block is vital and must be maintained. In hot weather this may be difficult or impossible to do, if the lenses are not kept moist and the temperature thus held down.

The lenses are now to be ground on the reverse side. The first step after removal from the old block is gaging for thickness, this dimension being now of very great importance, largely because one side is already finished. The grinding and the polishing are processes similar to what they were before. Inspection is, naturally, an important matter. If a lens is of first grade then it must show no defect within an ellipse 1.56 x 1.20 inches set within the lens size 1.76 x 1.36 inches.

It has already been noted that a residue of 20 per cent acceptable glass from a melt of lead optical glass is satisfactory to the manufacturer. But the percentage is often much less. Sometimes it is as low as 10 per cent or less. Here we have a reason for a higher price for lead optical glass than for commoner varieties of glass. All this is accentuated, when it is necessary to find glass for the objectives for great refractive telescopes. It is only rarely that a single block can be found which weighs as much as 100 pounds, if perfection in quality is desired. "A single fine vein, perhaps too small to be visible to the unaided eye, may be found to run through a whole block in such a way that it cannot be removed without breaking or cutting up the whole piece, and it will be seen that the frequency with which this is liable to occur increases with the volume of the piece required."

Lighthouse lenses are made from glass which is manufactured by a somewhat different process. Instead of letting the mass of molten glass cool down in bulk and break up into fragments, it is poured into iron molds which give it approximately the final form desired. It is then ground and polished to exact size and figure. Rings for annular lenses are produced up to 48 inches in diameter. Segmental rings are made of still larger diameter—up to 7 feet. Most lighthouse lenses are of lime glass, but for special purposes a dense flint glass is made with a higher refractive index.

Learning by Seeing

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of the cutlery works at Sheffield, England. Subsequently he has extended this original and initial idea until at present the index of motion picture subjects offered by the Holley organization includes practically every mechanical, medical, industrial, commercial and scientific activity adapted to portrayal by pictures. Recently Dr. Holley has made arrangements with the National Department of Agriculture so that, henceforward, he will distribute the interesting films of this government agency not only throughout America but to every nation under the sun which wishes to learn about more progressive systems of farming.

Matters of personal hygiene, first-aid

systems of treating wounds, the care and nutrition of infants, methods of sanitation as well as the rudiments of the three R's are now taught by pictures, the six million odd mountaineers of the Appalachian Mountain belt being the beneficiaries. The films and motion picture equipment are carried into the mountains on mules, the creek bottoms and trails being impassable for other methods of transportation and railroads in those regions being few and far between.

Despite the fact that the Bureau of Commercial Economics has over 35,000,000 feet of negative in daily use, last year it was able to supply only 45 per cent of the requests for film which it received. The Americanization of our foreign born laboring classes is a matter of critical concern at the present time and for educational work of this description the motion pictures speak the universal language. They appeal forcibly to both literate and illiterate and for the visualization of current ideas and patriotic events in American history, the motion picture is the perfection of pictorial appeal. The educational "movies" provide wonderful short cuts and top speed processes for the tutelage of the immigrant classes.

Motion picture trucks—unique among the "movie" theaters in the universe which travel from point to point in the rural districts of various foreign countries—carry the teachings of filmdom to millions of peoples each year. One of the trucks is on the Island of Sumatra off the Malay Peninsula where tens of thousands of natives work on the rubber plantations. Another outfit at Singapore furnishes highly prized amusement to the local laborers. The natives of the Island of Java sit about on mats, chewing betel nuts as they watch the marvelous picture shows which the "movie" truck provides for their entertainment. Other similar outfits are operated on the Island of Ceylon and in the Levant. The Bureau also maintains a film service which displays pictures on many of the river steamers in Russia in coöperation with the Siberian Steamship Company. In addition the Bureau has over 600 established centers in Latin-America, the chief difficulty being to supply sufficient negative to satisfy the continuous demands from Argentina, Bolivia, Chili, Mexico, Brazil and Nicaragua.

The Heavens in August, 1920

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use of mariners. The predictions made in this way are very good, except when exceptional weather conditions—such as a gale blowing the waters of a long bay or estuary toward one end—introduce unpredictable complications. It is probable, however, that only a small proportion of the mariners who make use of these predictions have any idea how they are made.

The Heavens

The principal constellations are so clearly shown on our map that no long discussion is necessary. Cygnus and Lyra are right overhead, at the hours tabulated below the map for the different dates. Aquila, Sagittarius and Scorpio lie to the south and southwest, along the brightest part of the Milky Way. Ophiuchus, Hercules and Bootes are in the west and southwest, Draco and Ursa Major in the northwest. Cassiopeia and Cepheus are in the northeast, with Perseus rising below. Pegasus and Andromeda are high in the east, Aquarius and Capricornus in the southeast, and Fomalhaut below them.

The Planets

Mercury is a morning star and is best to be seen about the middle of the month, when he rises at 3:45 A. M. (standard time).

Venus is an evening star, setting from half to three-quarters of an hour after sunset, and hard to see.

Mars is in Libra, and comes into quadrature with the sun on the 3rd, after which he may be considered an evening star, though he remains in sight until between 10 and 11 P. M.

Jupiter is an evening star at the beginning of the month, though too near the sun to be easily seen, but passes through conjunction on the 22nd, to reappear as a morning star next month. Thus we have the final breaking up of that brilliant combination of the three planets Mars, Jupiter and Saturn which has given the evening skies in this part of the world such unaccustomed brilliancy during the spring and early summer.

Saturn too is an evening star, setting an hour later than the sun in the middle of the month.

Uranus is in opposition on the 27th. He is then in Aquarius, in 22h. 23m. 34s. R. A., and 10° 54' south declination, and is moving 9s. west and 52" south per day. There are no convenient stars nearby to serve as guides, and he can best be identified with the aid of a good star map.

Neptune is in conjunction with the sun on the 3rd, and is invisible this month.

The moon is in the last quarter at 8 A. M. on the 7th, new at 11 P. M. on the 13th, in her first quarter at 6 A. M. on the 21st, and full at 8 A. M. on the 29th. She is in apogee on the 24th, and in perigee on the 12th—near new moon, so that high and low tides may be anticipated.

During the month she passes near Uranus on the 2nd, Mercury on the 12th, Neptune on the 13th, Jupiter and Venus on the 14th, Saturn on the 15th, Mars on the 20th, and Uranus again on the 29th.

On the afternoon of the 8th, Venus and Jupiter are in conjunction and only 40' apart. This would be a handsome conjunction if the planets were not so near the sun that they will be very hard to see.

Clark's Island, Plymouth, Mass.

July 17th, 1920.

The America's Cup Races

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footed faster. Every yachtsman knows what that means. The "Resolute," beautifully sailed by Charles Francis Adams, turned the outer mark with a lead of 2 minutes 4 seconds, and down the wind "Shamrock" beat her by exactly that amount.

That two yachts of such radically different design should sail for a distance (actual) of 37 miles at an average speed of 9 knots and finish in a dead heat, is unique, surely, in the annals of yachting.

The "Resolute" won, therefore, by exactly her time allowance of 7 minutes 1 second.

If the cup is to remain in the custody of the New York Yacht Club, "Resolute" must now win two races, straight.

Australian "Blackboy" Tree

A PECULIAR product of the vegetable world is what is known as the "blackboy" tree which flourishes in the state of western Australia. It is, in fact, a species of the grass tree, and grows to a normal height of 7 to 10 feet, and is found to be useful for a variety of purposes.

Until recently no attempt has been made to utilize the tree commercially, but a company has now been formed to work and market its by-products. The plant consists of 19 sets of retorts and furnaces, condensers, receiving tanks, etc., and can deal with 100 tons of gum and other material derived from the tree. The company at present employs about 20 men, besides cutters, and among other things being produced are tars free from harmful acids, tarpaulin dressings, rope tar, and sanitary tar, lacquers (such as Japan black), steam and refrigerating pipe lagging, paint for ironwork that requires stoving at high temperature, stains and paints, pitches for marine insulating, phenol, benzol, and alcohols, coke, potash, and pyrogenous acid. The production of dyes, perfumes, and formalin, and various kinds of varnishes is also planned.