Rev George A. O'Donnell, S.J.

A. M. D. G.

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THE EFFICIENCY OF THE WOODSTOCK MOTOR-GENERATOR SETS.

The house current at Woodstock (110 volts D.C.) may be supplied from any one of four generating units - two steam sets 25 and 10.5 kw. in capacity, and two Westinghouse motor-generator sets, the larger of 25 and the smaller of 15 kw. output capacity. Any two or more of the sets may be run in paralell if necessary. The input side of the motor-generator sets operates on 220 volt 3-phase A.C. purchased from the consolidated Gas, Electric Light and Power Co. of Baltimore.

The efficiency tests were conducted by the very simple process of comparing the Company's A.C. meter read over a certain interval with the corresponding readings of the D.C. meters on the house switchboard; hence no great accuracy is claimed for the results, and the whole test is more of a technical than of a scientific nature. The particular A.C. meter at Woodstock was rated at 40 watt-hours per disk revolution, and this figure was assumed to be correct; but the chief source of error in the figures is probably to be ascribed to our own D.C. meters, which were ordinary Weston switchboard ammeters and voltmeters, the calibration curves of which were not at hand; hence we had no alternative but to use their readings just as they stood. The measurements were usually taken for a period of 10 revolutions of the meter disk excepting for loads upwards of 150 amperes, when 20 revolutions were timed. The time was noted to the nearest second. If the load had varied more than 2-4 amperes (depending on the load) during the timed interval, the results were discarded and the readings repeated when the load was steadier.

The results were submitted in the form of two plots. One was an input-output plot, where the efficiencies appear as a family of lines lying between the Y-axis and the line y = x, while the actual readings lie on nearly straight lines which start from the A.C. consumption on zero load and which intersect lines of higher efficiency as full load is approached. The other plot was the ordinary plot of efficiency against load, and shows the expected rapid rise of efficiency followed by a constant full-load efficiency of 83% and 76% for the smaller and larger sets respectively. The figures corresponding to the smoothed curves on these plots are given below:-

Tables.

Large Set

$$y_{(calc.)} = .00652x^{1.967} + x + 3.54$$

D.C. Output x kw.	amps.	A.C. Input y(obs.) kw.	A.C. Input y(calc.) kw.	y - b-x kw.	Effic. (obs.) %	Effic. (calc.) %
zero	zero	3.54	3.54	zero	-----	-----
2	17	5.55	5.57	0.01	38.7	35.9
4	34	7.70	7.64	.16	54.0	52.3
10	86	14.55	14.15	1.01	71.0	70.7
14	120	19.04	18.71	1.50	74.5	74.8
18	154	23.82	23.45	2.28	75.8	76.7
22	188	28.61	28.38	3.07	76.1	77.6
25	214	32.20	32.20	3.66	76.1	77.7

Small Set

$$y_{(calc.)} = .00673x^{2.025} + x + 1.66$$

D.C. Output x kw.	amps.	A.C. Input y(obs kw.	A.C. Input y(calc.) kw.	y - b-x kw.	Effic. (obs.) %	Effic. (calc.) %
zero	zero	1.66	1.65	zero	-----	-----
2	17	3.72	3.69	0.05	53.7	53.8
4	34	5.76	5.77	.13	68.3	69.4
8	68	10.15	10.15	.46	79.9	79.1
12	103	14.70	14.68	1.04	81.6	81.7
15	128	18.28	18.27	1.62	83.0	82.2
18	154	22.20	22.00	2.52	86.6	81.8

Bus-bar voltage, 117 volts.

The quantities marked "obs." in the tables are those read off the smoothed curves input against output and efficiency against output. The ones marked "calc." were determined as explained below.

In order to study the forms of the two curves it was necessary to put them in mathematical form which was done as follows:

The quantity y - b - x in the tables is evidently the power in kw. required merely to drive the machines over and above the no-load power; if this were equal to zero (i.e., if the power required to drive the machine at heavy loads were no greater then that required to drive it unloaded), the first plot would be that of a straight line of the type $y = mx + b$.

However, on plotting this quantity y - b - x against the output x it was found to increase approximately as some power of x; hence the real form of plot #1 would be given by the expression $y = ax^n + x + b$, providing the aforesaid increase be assumed to be a power function. Various combinations of a and n give values of y agreeing well enough with the actual values over the short range of the plots, but the values actually selected were such as would also give a maximum efficiency at the maximum rated load.

Such values were found as follows: The efficiency of the sets is given by the fraction x/y, and plot made is really a plot of x/y against x (in amperes), whose maximum will be found theoretically by the expression

$$\frac{d\,(x/y)}{dx} = 0$$

Performing this operation, we have,-

$$y = ax^n + x + b$$

$$x/y = \frac{x}{ax^n + x + b}$$

$$\frac{d\,(x/y)}{dx} = \frac{ax^n\,(1-n) + b}{(\,ax^n + x + b)^2}$$ which will have a maximum under the condition

$$ax^n(1-n) = -b \quad \text{or,} \quad ax^n = \frac{b}{n-1}$$

From the equation of the first plot we have

$$y = ax^n + b \quad \text{or,} \quad ax^n = y - b - x$$

and by combining these two equations we have

$$\frac{b}{n-1} = y - b - x, \quad \text{or} \quad n-1 = \frac{b}{y - b - x}$$

Since we have assumed that the maximum efficiency will be attained at normal maximum rated load, we have but to substitute in this equation the values of this quantity in kilowatts, and the A.C. input corresponding to it; the value of b, the no-load input, was determined separately for each machine at a time when it could conveniently cut off from the house mains. Making these substitutions for each set we have finally,

$$n \text{ (large set)} = 1.967$$
$$n \text{ (small set)} = 2.025$$

By going back and substituting in the other equations, the corresponding values of a may be readily found:

$$a = \frac{y - x - b}{x^n} = \frac{b}{(n-1)x^n} \quad \text{whence}$$

$$a \text{ (large set)} = 0.00652$$
$$a \text{ (small set)} = .00673$$

The empirical equation of plot #1 may therefore be written

$$\text{Large set } y_{(calc.)} = .00652x^{1.967} + x + 3.54$$

$$\text{Small set } y_{(calc.)} = .00673x^{2.025} + x + 1.66$$

both of which fit the observed points quite closely and also satisfy the condition

$$\frac{d\ (x/y)}{dx} = 0$$

at 25 kw. and 15 kw. respectively. At loads exceeding these, the efficiency falls off, as can be seen in the case of the small set when it was given a 25 % overload. The mathematical reason for this fall in efficiency at extra loads lies in the fact that the losses in the sets (over and above the loss at no load) increase approximately geometrically while the load is increasing arithmetically.

After the outline of this paper had been presented at the Holy Cross meeting this summer, Rev. E.C.Phillips, S.J., of Georgetown Univ., called the writer's attention to the fact that under the circumstances of the problem the curves constituting plot #1 could not be straight lines; and later, while the present paper was being prepared, he worked out the analytical proof of this and suggested an actual equation for these lines and the same form as that given in this paper. This note of Fr. Phillips was received shortly after the present paper had been completed.

Besides Fr. Phillips, the writer wishes to thank Mr. John Blatchford, S.J. for assistance in taking the meter readings in the power house; also Mr. Harry Sohon for valuable suggestions.

F.W.Power, S.J.
Weston Mass.

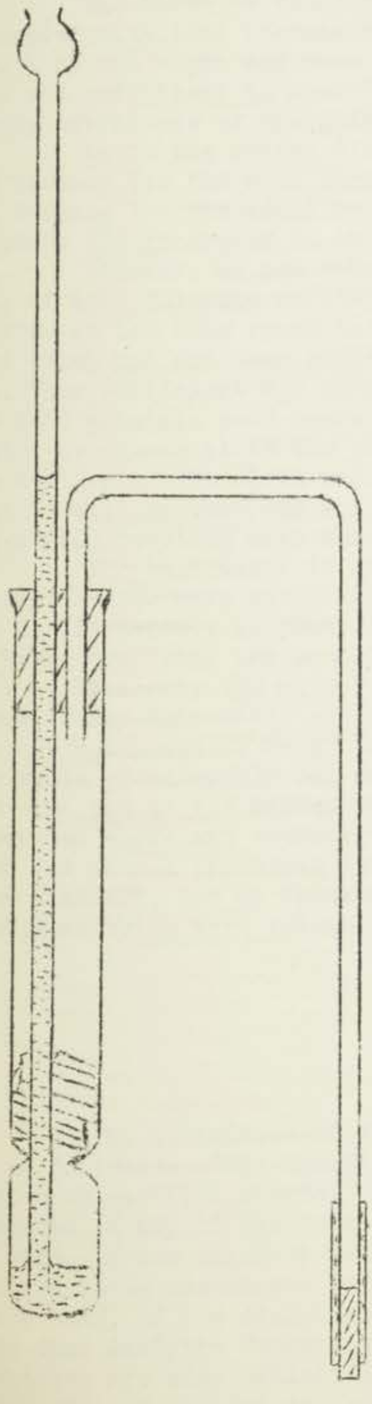
AN EMERGENCY H_2S GENERATOR

Confronted with a sudden increase in the qualitative class for the new school year and with only one laboratory available for all kinds of work, and with limited hood space, a speedy method had to be devised to supply the large number of students all with the necessary H_2S and ready for all times. The following is a brief description of the apparatus used in the emergency.

A large pyrex test-tube, 200 mm x 25 mm is constricted in three or four places as shown in the accompanying sketch.

This is easily done with the ordinary laboratory blast lamp and a pointed stick of charcoal. A no. 3 stopper is fitted with a 7 mm delivery tube and thistle tube of the usual style. This size of delivery tubing has been selected to enable easy washing with a tubing brush afterwards.

The apparatus is prepared for operation by only partly inserting the length of the thistle tube down thru the smaller diameter left by the constrictions. Pieces of stick FeS are now slipped in from below the unattached stopper. They are caught and held in place by the constrictions as per diagram.



The stopper is now tightened into the pyrex and enough acid is added thru the thistle tube to just more than cover the sulphide. Thus a steady and always regular flow of the gas is delivered into the receiver.

The entire apparatus may be conveniently supported in a test-tube rack in one of the farthest holes in the back with the delivery tube turned away from the rack.

It has been found that the ordinary 6N reagent sulphuric acid as prepared for everyday use if diluted 1:4 (a specific gravity of about 1.05 or a normality of 1) gives consistently the best results. The stream of gas generated under these conditions seems to be very constant and at the same rate throughout the two to three hours run generally given to the analytical period. The bubbles of gas can be always and easily counted. The precipitation of the copper group after the method outlined by Fr. Coyle in his Notes is complete, immediate, and slow enough on the whole to get out all the cadmium, antimony and tin, but not too slow to cause unwarrented delay. Moreover, fresh acid continually comes in contact with the sulphide, as the specific gravity of the green sulphate formed during the generation is about 1.1 according to local determinations.

When no more gas is wanted, the apparatus can be set aside whole and entire, and the evolution of gas stopped quickly. A nipple from a medicine dropper, or else, a piece of rubber tubing plugged up at one end with a glass rod, is inserted at the outer end of the delivery tube after the latter has been washed clean. Sufficient pressure is thereby developed within the instrument to force the acid back into the reservoir of the thistle tube and thus break contact with the sulphide.

With the dilution prescribed and the small diameter of the commonly used thistle tube, the pressure of the enclosed gas is neither too great for the stopper nor too low for the receiving vessel even when the latter happens to be a long test-tube or large beaker.

The apparatus has the further advantages of being always ready for use on short notice, of causing interruption of no one's work but that of the individual delinquent who may be responsible for any accident to a large plant, of avoiding just

complaints from the poor victims living "just upstairs" on account of the presence of a real poison in the air, of less waste of materials on a grand scale, (as happens with Kipp generators and plants), and finally, of insuring everybody always of a sufficient and necessary supply without having to wait for "the-first-come-first-served" to get his fill.

Two disadvantages may appear on first sight. One is the possible leakage from the reservoir during the generation, the other is the leakage occuring when the gas should not be generated at all.

The first of these is not a real difficulty. A bit of cotton wadding was saturated with lead acetate solution and loosely hung over the reservoir for a period of one night and more and no tinge was evident on examination of the wadding. This was sufficient to show that very little if any gas escapes thru the reservoir during operations of the generator.

As to the second difficulty. The leakage may seem quite noticeable if we are looking for the most perfect results from a very simple instrument. If we are not looking for the ideal we can easily ignore the second difficulty especially if we place the generator in the hood.

However, we can remedy even this defect. The cause of the leakage is from bits of iron sulphide falling off the large pieces which rest on the constrictions. As soon as the bits reach the bottom of the pyrex they are attacked by the sulphuric acid which has not been pushed up the thistle tube by the pressure of the confined gas. Thus sufficient H_2S escapes thru the reservoir to blacken at least for a time any lead actetate held there for a test. A good remedy is to wrap up loosely in some cotton or cheese cloth the pieces of sulphide before dropping them into the test-tube The texture of the cloth will allow easy access to the acid but can so be chosen that it will prevent any small particles of unattacked FeS falling into the acid afterwards reacting with the latter to produce gas when the gas should be stopped.

The instrument is as much as we can expect from its very simplicity, and on account of its many advantages may recommend itself for a trial especially to those who do not believe in plant systems as being always reliable nor in Kipp generators as being too leaky and wasteful.

Recently the author was approached by a laboratory instructor of a well-known nearby University and asked whether he couldn't offer a workable suggestion for his H_2S problem. He stated that they have been using Kipp generators there and the waste of materials has caused some complaints to issue from the authorities who had sent him to the Ateneo to seek a solution. He borrowed a generator of the type described above and intends to install individual ones after the authorities have seen fit from a practical demonstration. We give the authorities credit for being from Missouri, but we think that they will agree with us in choosing an individual system as being more reliable and efficient, than a general Kipp plant or plants.

Mr. F.D.Doino, S.J.
Manila, P.I.

THE DIAMETER OF A CONIC.

The definition of the diameter of a conic, as usually given in textbooks, is as follows:- "The diameter of a curve is the locus of the middle points of a system of parallel chords." However a difficulty may arise, which Ihave not found answered in any of the books at my disposal. The difficulty takes the form of a dilemma. If the diameter extends beyond the conic, as it should since a line is considered to be indefinite in extent, where are the chords which it bisects? On the other hand, if the diameter terminates on the conic, what is its equation? It is true that Analytic Geometry gives equations for the diameters of conics, but these equations are also satisfied by an infinite number of points lying on the extensions of the diameters. But the equation of the diameter should be satisfied by all points lying on it, and by no other points.

That the definition as given is true, that the diameter does really extend beyond the points of intersection with the conic and bisects a series of parallel lines which may be considered as chords of the conic, is a point which should be stressed. If we solve simultaneously the equation of a conic, which is of the second degree in x and y, and the equation of the straight line, y mx b, we get coordinates for the points of intersection of the form x p q and y r q. If we consider the slope of the line, m, as constant, and the intercept, b, on the axis of Y as variable, giving a series of parallel lines, q will depend only on the value of b. According as the discriminant q is positive, zero, or negative, the two points of intersection will be real and distinct (showing that the line is a secant and, between the points of intersection, a chord in the ordinary sence), real and coincident (in which case the line is tangent to the conic), or imaginary. In any case, whether q be positive or negative, the coordinates of the points midway between the points of intersection as given above will be real points of the form (p,r), since in the application of the formula for the bisection of a line, the radical terms automatically disappear. The locus of this midpoint will constitute the diameter. We must then consider the diameter as extending beyond the limits of the conic, bisecting real chords within the curve, and, outside the curve, meeting the parallel lines at points midway between their imaginary intersections with the conic, as determined by the algebraic solution.

Thomas D. Barry, S.J.
Georgetown University

A BALANCED AQUARIUM

A very successful aquarium was put in here at Evergreen recently at a minimum expence. It measures five feet in length, two feet in width and is eighteen inches high. The framework of 1 inch angle iron was made by a decorative iron works for thirty dollars and the plate glass for the sides and base together with the work of cementing it in and delivery cost seven dollars making the entire cost thirty seven dollars. The day it was delivered Ireceived a circular from a supply house advertising a three foot aquarium for seventy dollars, twice the price and high the size.

The aquarium has been filled for two months now and is almost perfectly balanced. It is true to nature in that it resembles a natural pond. No gold fish were put in to spoil the natural effect with artificiality. Minnows and gudgeons from nearby ponds together with a few snails make up the larger animal life. Tadpoles were introduced and later taken out when it was found that they devoured some rare algae present. The plant life consists of Elodea, Lemna, Nitella, Myriophyllum, Potamogeton and other as yet unidentified species. Large colonies of Vorticella came in on the Duckweed (Lemna) and quickly spread to all the other plants and the sides of the glass. The Nitella is growing vigorously and fruiting. Spirogyra and other unidentified forms of green algae are doing well and several colonies of Gleotricha (one of the colonial Blue-Green Algae) were introduced. No crayfish were put in as previous experience has shown that they prey on minnows and other small fish. All the material was collected on a few trips into the surrounding country on which much material for use in the laboratory was also collected.

A good balanced natural aquarium is more than a mere laboratory decoration. Much valuable laboratory material can be kept alive in it from year to year always ready for use and live material is much better than preserved. The study of new forms of Protozoa and Algae found in the aquarium is most interesting and stimulating to the students.

Charles A. Berger, S.J.
Loyola College
Baltimore

THE NEW PHILOSOPHERS' RECITATION BUILDING

The eager Scholastics who examined every operation in the making of Woodstock's new home for "Science", realized that a number of advances had been made in the science of architecture since the days when Pharaoh's slaves pulled huge boulders and pillers into place, and now that the building is complete, perhaps a description of it may interest older scientific readers and thos who are concerned with the future of the Province's scientific reputation.

The whole building is square, three stories high and at the west of the main building. The framework was built up of reinforced concrete, around which the shell of granite and cinder blocks was moulded. The fact that the building wears the same granite garb as the older house and is joined to it by a two-story, stuccoed ramp, would interest only the idle spectator, so let us start our inspection with the basement, which contains the biology department. As the ground slopes rapidly, this section is clear of the hillside, and enjoys the afternoon sun-light, which unfortunately is a bit embarrassing when working with the microscopes, of which we already have a battery of eight. A northern exposure would have been preferable. The biology equipment is rapidly being collected by Fr. Didusch, who got a late start, having been Socius at Shadowbrook for the first two months of the school year. The array of skeletons, bottles and jars of preserved specimens and boxes of microscope slides is already imposing. This floor, as well as the others, is supplied with gas, hot and cold water and electricity, 110 and 220 volts. In the basement are also the gas plant which generates the gas which is stored up in the tank outside, the acid vault, and a large, empty room, which, it is rumored, will be a reference library and reading room for the Philosophers.

The first floor is graced by the Physics' Department, composed of a lecture room, a laboratory, a light room and a private laboratory. The lecture room has a large, up-to-date demonstration desk and the seats, of the one-arm type, are arranged in tiers. Electricity is supplied from outlets in the floor, and water from two disappearing sinks in the desk. Builtin ringstands and gas outlets add to the convenience of the desk. In the back of the room is a large, heavy shelf, firmly attached to the wall, for the balances, and a case containing X-ray tubes, Crooke's tubes, and other interesting breakables. The laboratory is fitted out with large experiment tables and big glass cases for apparatus. Both lecture room an laboratory have a large sink, hot and cold water and electricity. The light room is divided up by partitions so that four pairs of experimenters can work simultaneously without disturbance. In the center of each cubby-hole is a table built high enough to render working with the spectroscope, optical bench, etc., convenient. The other large room on this floor is now occupied by the Philosophers' Mission Academy, which is at present assisting in preparing the Woodstock Mission Exhibit.

The second floor is taken up by the Philosophers' recreation room, their library and the second year Philosophy class room.

The third floor houses the Muse of Chemistry, whose suite consists of e lecture room, a laboratory, a private laboratory and dark room. The lecture room is the twin brother of the Physics' lecture room, but of course the laboratory differs somewhat. The large fume chamber, sink and distilled water apparatus take up one wall The rest of the available wall space is given over to glass cases of apparatus and reagents. There are two long desks fitted out with gas, water, Farmer's Supports, etc., in the laboratory, and on these the sets of bottles needful for analysis have been arranged. There is room for another desk when the registration demands it. At present only a few second year Philosophers are using the laboratory, engaged in Qualitative Analysis under the direction of Fr. John Brosnan. The private laboratory is a combination laboratory and storeroom, and also contains the balance, in its glass case. The rest of the third floor is taken up with the first year Philosophy class room. At the head of the stairs is the electric motor and fan for operating the ventilation system throughout the building and removing fumes from the various hoods.

F.J.Ewing, S.J.
Woodstock, Md.

MOTION PICTURES IN SCIENTIFIC RESEARCH AND IN TEACHING.

While the motion picture will always be primarily a vehicle of amusement, it is being increasingly used as an aid to research and in teaching science. This development was much slower as long as the standard size, or 35 millimeter, film was the only one available, but since the advent of the smaller size film, particularly of the 16 millimeter, on non-inflammable or cellulose acetate, stock, the scientific use of the motion picture has increased and is increasing enormously. This increase was due in the first instance to the comparative cheapness of the smaller films; for while a thousand feet of 35 millimeter positive cost on the average fifty dollars, which cost was more than doubled if the price of the negative was included, the equivalent footage of a 16 millimeter positive cost twenty-four dollars, if only a single positive was desired, this price including the negative which was turned into a positive by a sprcial reversing process. If more than one positive was desired, the cost of the negative approximated twenty-four dollars, and each positive cost twenty dollars.

One of the most elaborate researches in which the motion picture played an important roll, was the determination of the elasticity of the earth and the direct measurement of the tide-raising force by Michelson and Gale in 1913 and subsequent years. Those interested will find a description of these experiments in chapter two of Moulton's "Introduction to Astronomy"; a briefer notice in Russell, Dugan and Stewarts revision of Young's "Manual of Astronomy"; and a more detailed account in the Astrophysical Journal for 1914 and subsequent years. Motion-pictures have been frequently employed in studying the growth of flowers, of the animal cell, of the embryos of animals; in observing the habits of animals in the wild and domesticated state; in recording unusual surgical operations, and for many other researches where the advantages of being able to repeat observations at will from the motion-picture record are obvious. Recently Mr. Will Hays, the President of The Association of Motion Picture Producers and Distributors of America announced a plan of intensive use of the motion picture in surgical research and teaching and pledged the co-operation of his organization. And the development of the various types of "talking" motion-picture, such as the Vitaphone, the Movietone, the Audiophone, the Pallotophone, etc. has brough in a rich harvest of observations on light, sound and electricity, the study of which observations will doubtless lead to valuable discoveries.

In the teaching field the standard size film has had an interesting development. Ours are doubtless familier with the fine films in Geology, Biology, Sanitation and History made and distributed by The Society for Visual Education, 327 South La Salle Street, Chicago; with the technical and industrial films of the Department of Commerce, Bureau of Mines, Pittsburg; with the entomological and agricultural films of the U.S. Department of Agriculture, Washington; and with the films illustrating electrical phenomena and their application of the General Electric Company of Schenectady, N.Y. All these organizations publish comprehensive lists available on application. But the more extensive use of these films for teaching has been restricted by the regulations which govern the showing of the standard size film, especially the inflammable variety, and by the want of familiarity of the large number of teachers with the projection machine even of the so-called "portable " types. Then there was the expense factor. Not only was the initial expense of even a portable projector heavy - a "portable" of any efficiency or reliability costs a minimum of $250.00; but the rental of films was a constant expense. Seldom was this rental as low as $2.00 per day per reel; usually it was $3.00 or even $5.00. When transportationcosts were added the expense became prohibitive for most schools.

But a definite and far reaching improvement of these conditions has begun with the advent of the 16 millimeter film. Its cost of manufacture is one-fourth that of the standard variety; there are no restrictions and its use in a class-room, no booth or licensed operator being required.

The projecting machine is extremely simple in operation, and the cost is much lower than the standard-type projector. Eastman Kodak Company sells an efficient 16 millimeter projector for $60.00, which is very suitable for class-rooms up to 200 pupil capacity; a larger modal which can be used in a hall for a audience of 500 to 600 people costs $180.00, Ball and Howell of Chicago sell a projector like the last-named for $180.00 also. Extensive libraries of 16 millimeter films are forming the rental price being about $1.00 per reel per day on the average of course just at present there are not many films of a strictly scientific nature in these libraries, the most extensive of which are the Kodascope Libraries with offices in various large cities of the country. But some excellent films in Geology, Chemistry, Physics and Biology are available.

Recognising the need of an extensive library of 16 millimeter films for the class-room, the Eastman Kodak Company about a year ago established a Teaching Film Department under the direction of several well-known educators. In order to ascertain as perfectly as possible the needs of the various schools, an elaborate experiment was planned and is being carried out during the present school year. This experiment was described by Dr. Thomas E. Finegan, Education Director of the Teaching Film Department in a paper read before the Society of Motion Picture Engineers at its Lake Placid meeting last September. Briefly the experiment consists first in the production, with the aid of experienced teachers of the subjects, of the following films:

GENERAL SCIENCE

1. The Water Cycle
2. Water Power
3. A Municipal Water Supply
4. Purifying City Water
5. The Formation of Soil
6. Limestone and Marble
7. Sand and Clay
8. Compressed Air
9. Atmospheric Pressure
10. The Planting and Care of Trees - Part 1
11. Reforestation
12. Fire
13. Heating and Ventilating
14. Fire Prevention
15. The Green Plant

GEOGRAPHY

1. The Hawaiian Islands
2. The Philippine Islands
3. The Panama Canal
4. Alaska
5. Bituminous Coal
6. Anthracite Coal
7. Iron Ore to Pig Iron
8. Pig Iron to Finished Product
9. The Automobile
10 The Mohawk Valley
11. New England's Deep Sea Fishing
12. Wood Pulp
13. Wheat
14. Corn Growing
15. Cattle

GEOGRAPHY

16. Wisconsin Dairies
17. Cotton Growing
18. The Old South
19. New Orleans
20. Hydro-Electric Power in the Southern Appalachians
21. Irrigation
22. The Pueblo Dwellers
23. The Painted Desert
24. The New South
25. Flour and Bread
26. The Union Pacific Pass
27. The Oregon Trail
28. Safety on the Sea
29-30. The Gateway of the Nation - 3 reels (New York City)

HEALTH

1. Posture
2. Safety
3. Respiration
4. Circulation
5. Milk

Secondly, four schools were selected in each of twelve cities so chosen that they might give a cross-section of national conditions. The cities are; Newton, Mass. Rochester, N.Y.; Detroit; Chicago; Lincoln, Nebraska; Denver; Oakland, California; San Diego; Kansas City. Mo; Atlanta, Ga.; Winston-Salem, N.C.; New York City. Three of the schools in each city are elementary schools, one is a junior high school. In each city one half the children will be given instruction in the subjects chosen for the experiment without the use of films, while the other half will be taught with the aid of the films. The results, which will be comparative, will it is hoped reveal the method of solution of the many problems involved in the whole question of the use of films in teaching. In all some 14,000 children will take part in this experiment. If the results justify the procedure, the Eastman Kodak Company will undertake the preparation of similar films for high schools and colleges. Ours should be alert to the progress of this movement, in order that it may be kept in channels at least not inimical to the ideals of Catholic education. We can, perhaps, co-operate in the making of films for our own special uses.

From the standpoint of college and university teaching, a more significant announcement was made recently by the Pathe Exchanges Incorporated that an arrangement had been made with the Departments of Anthropology and Geology of Harvard University, by which Harvard professors were to make a selection from the millions of feet of negative which Pathe has gathered, particularly through the Pathe News during the last twenty years. The professors would edit and title the films which would be offered to colleges and universities teaching anthropology and geology. Some of the films thus selected have been shown recently in some cities, and are said to be highly instructive. This last development merits the attention of Ours even more than the Eastman experiment.

Rev. M.J. Ahern, S.J.
Weston, Mass.,

IMPORTANT CORRECTION IN MOULTON'S "INTRODUCTION TO ASTRONOMY"

Those of Ours who use this text-book should note that on page 58 of the revised Edition there is an important correction to be made in the conclusion drawn from the tide-experiment. We read there: "It was found that the east- and - west pipe the observed tides were about 70 per cent of the computed, while in the north- and - south pipe the observed tides were only about 50 per cent". This experiment experiment was first performed by Michelson and Gale in 1913 and continued until the outbreak of the World War. When Michelson resumed the work after the war he found, on going over the computations, that owing to an error of the computer the north-south value came out 20 percent less than the east - west value. On correcting the computer's error he found both values to be the same - 69 per cent. The rest of the paragraph in Moulton's text following the sentence quoted above should be delete.

THE MANILA OBSERVATORY

We have recently received a copy of a publication of the Manila Observatory entitled "The Latitude of the Manila Observatory" by Rev. Charles E. Deppermann S.J. The observations were made during January 1927 with the Repsold Broken Transit. The Horrebow-Talcott Method was employed. A list of the stars observed is given. They were taken from the Boss Preliminary General Catalogue. The value of the Latitude obtained is 14° 34' 42.05" $\pm$ 0.04". It is certainly more accurate than that given in the American Ephemeris which is 1.05" smaller.

Fr. Deppermann after taking his degree at John Hopkins and spending a year in special study at various observatories joined the Manila Observatory staff at the end of the summer of 1926. He was assigned to the astronomical division. With the approval of the Director, Fr. Selga, he began preparations to take part in the international Longitude determinations which began in October. He had brought with him from Georgetown a short and long wave radio receiving set to receive and record the time signals. After a good deal of time spent in setting up antennae, making a loop and getting his apparatus in shape after the long voyage, he was able to get a number of the stations sending out signals. Only Cavite and Saignon proved loud enough for automatic registration. However the ear method for coincidences did not seem much inferior to the latter. The long wave signals of Bordeaux and Nauen proved very reliable. The short wave set gave excellent service. It could be used for D'Issy Lembang (Java) and Honolulu. It was not possible to get Annapolis or Bellevue or any stations on the western coast. The results of the observations have been worked up and they are now in press Fr. Deppermann writes that the shutters of the dome housing the big equatorial which were very difficult to handle have been changed. Other improvements have been made. After completing the Hartmann test for the objective of the telescope he hopes to make a test of the Potsdam photographic spectroscope.

He got some fair pictures of the transit of Mercury in spite of clouds. The observatory is already looking to the total eclipse of the sun on May 9th, 1929. It hopes to take an active part in observing it.

MATHEMATICAL MEETING AT GEORGETOWN

On December 3rd, Georgetown University was host to the Maryland-Virginia-District of Columbia Section of the Mathematical Association of America at their semi-annual meeting. Although the weather was forbidding, cold and rainy, sixty-eight were present at the meeting, forty-six of them being members of the Association. Ours who were present were Father Phillips, Father Tondorf, Mr. Nuttall, and Mr. Barry of Georgetown, and Father Logue of Woodstock.

The meeting was held in two sessions, at 11 A.M. and 2 P.M., in the recentl enlarged Physics Lecture room.

The meeting was opened by a brief address of welcome by Father Charles W. Lyons, the President of the University. Four papers were read at each session. Fr. Phillips, who is the secretary of the section, delivered one of the papers at the afternoon session. The subject was "Rational Paths with Supersingular Equations."

During the interval between the morning and afternoon sessions, those present were the guests of the college at luncheon in the Hirst Library, after which they inspected the college buildings. Great interest was shown in the Seismological Observatory, over forty persons going to the cave to examine the instruments.

Thomas D. Barry, S.J.
Georgetown University

Note: We may add that according to the "Hoya" the College paper, other distinguished men of science besides mathematicians have recently visited Georgetown. Among these were General Ferrie who was accompanied by Fr. Baisnee a veteran of the world war who lost an arm in action and Dr. Friedlander. General Ferrie is a world authority on radio and is we believe head of the signal corps of the French Army. He played an important part in the recent international longitude determinations and gave material assistance to Fr. Lejay in carrying out this work at Zi-Ka-Wei.

He visited the seismological and astronomical observatories and was much impressed by Fr. Phillip's radio equipment for the reception of American and foreign time signals. Dr. Friedlander was a guest of Fr. Tondorf. He is an authority on vulcanology being the director of the Vulcanological Observatory at Naples and editor of the Journal of Vulcanology. Dr. Harrison E. Howe a member of the National Research Council and the editor of "Industrial Engineering Chemistry" also visited the University to lecture before the Chemical Society.

A JESUIT PRESIDENT OF THE SEISMOLOGICAL SOCIETY OF AMERICA

A high honor was conferred upon Fr. J.B.Macelwane of St. Louis University by his election on October 22nd to the presidency of the Seismological Society of America. The election took place at a meeting of the national directors of the Society held in San Francisco. This Society which is national in its scope and membership was organized in San Francisco after the great earthquake of 1906. The call for the meeting was issued by Professor A.G.McAdie who is at present the director of the Blue Hill Observatory near Boston. The Society now has 879 members residing in the United States and Canada with a number of associate members in its Eastern Section. Professor G.Davidson of the U.S.Coast and Geodetic Survey was the first president. Fr. Macelwane is the eleventh to hold the office. ..

Among his predecessors were Prof. McAdie, Professor Harry Reid of Johns Hopkins, Professor Woodworth of Harvard, Professor C.F.Marvin Chief of the U.S. Weather Bureau, Dr. O.Klotz of the Dominion Observatory and Professor Bailey Willis of Leland Stanford. The Varsity Breeze of St. Louis University for Nov. 9th states that Fr. Macelwane began his work in Seismology at St. Louis University under the direction of Fr. J.B.Goesse. After two years of post graduate work at the University of California he took his Ph. B. degree there in 1923. He then spent two years at this University as Assistant Professor of Geology giving his time chiefly to Seismology. He had charge of the Seismograph stations and developed the courses in Seismology. During this time he had as graduate student the present director of the seismographic stations of the University of California, Professor Perry Byerly. Fr. Macelwane was ordained in 1918. The Bulletin extends to Fr. Macelwane its heartiest congratulations and wishes him a successful administration.

PUBLICATIONS

By an oversight we neglected to call attention in our last issue to an able paper in the Physical Review for October 1927 on the "Infra-red Radiation of Hydrogen" by Fr. A.H.Poetker of Marquette University. It is an account of a research he he carried on at Johns Hopkins University. He studied first the atomic and then the molecular spectrum of Hydrogen in the infra-red region. The lines were produced by means of a grating and photographed on neocyanin plates recently developed by the Eastmen Company. These plates when specially treated showed lines down as far as 10,700 A. Six higher members of the Paschen series were found whose measured wavelengths agreed with those computed from the Bohr theory within the limits of experimental error. The wave lengths of about 425 lines in the molecular spectrum between 7500 A and 10,700A were photographed and measured. Most of these are new. We congratulate Fr. Poetker on the results of this research.

Popular Astronomy for November 1927 contains an abstract of a paper read by Fr. E.C.Phillips of Georgetown at the Madison Meeting of the American Astronomical Society in September on "Personal Equation in Observing Occultations". It is an account of a research carried on at the Georgetown Observatory to determine the lag of an observer in recording occultations under different conditions. A special apparatus was constructed to produce and record occultations. Using the chronograph and the usual observing key, the lag was smallest for the disappearance of a star at the dark limb of the moon when the latter was rendered visible by reflected earth-shine. It was 0.25 and 0.29 seconds for two observers. When a stop watch was used the lag was negative. the observed time of disappearance being about 0.25 seconds earlier than the actual time. Fr. Phillips appears in the group picture of the meeting which forms frontis-piece of the number.

"Tycos"- Rochester for October 1927, gives some views of the Observatory of our French fathers at Zi-Ka-Wei. One of these shows a group of French Marines who were detailed to guard the observatory during the recent troubles.

Popular Astronomy for December 1927 contains a number of variable star observations made at the Georgetown Observatory. We note also in the monthly report of the American Association of Variable Star Observers that at the October Meeting Mr. J.A.Blatchford of Weston College was elected a member. In the report of the Students' Observatory of the University of California Fr. P.A.McNally is mentioned as one of the collaborators in the publication of the elements and ephemeris of the Minor Planet Comas Sola.

The Science News Letter of October 29th has an interesting article on Earthquakes. It refers to the organization and work of the Jesuit Seismological Association and the scheme of cooperation carried out by our Association, the U.S. Coast and Geodetic Survey and Science Service. A map is given of the earthquake epicenters located through this cooperation from June 1925 to June 1927. A picture of the Galitzin seismograph at Georgetown and its record of the Santa Barbara earthquake are given. We have already referred to the sketch of Fr. Macelwane in the same publication for Dec. 3rd.

The Astronomical Journal for December 8th, 1927 has an article by Fr. E. Phillips and Mr. T.Barry on "Occultations of the Stars by the Moon". Fifteen stars are given ranging from the 3.2 to the 9.4 magnitudes. The observations form part of the program of occultation work inaugurated at the Observatory. This includes the observation and reduction as far as possible of all the dark limb immersions of the American Ephemeris stars and of such fainter stars to about the ninth magnitude for which reliable catalogue places are available; and also an investigation of the personal equation both absolute and relative affecting these observations. Eaah occultation is observed , as far as possible, by at least two observers recording the time of disappearance both with the chronograph and stop watch. Mr. Blatchford also made some of the observations.