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NOTICE TO SUBSCRIBERS.

Hereafter we shall follow the general rule regarding subscriptions, and shall continue sending THE TECHNIC to subscribers until notified to discontinue.

AT an early hour Friday morning, February the ninth, Hon. Richard W. Thompson, for many years President of the Board of Managers, quietly passed away at the ripe old age of almost ninety-one years. For several years he had been growing feebler and feebler, but by efforts almost superhuman he had managed to attend to the duties pertaining to that office with a grace and dignity which, together with his clear-sighted judgment, made him pre-eminently the man for the place. The Board of Managers will feel most keenly the sad circumstance which has deprived them of their leader and counsellor, one whose advice was always welcome and timely and whose zeal for the welfare of the Institute which he fostered and watched over with paternal affection, was never lagging. It was one of the great pleasures of Col. Thompson's long and useful life to be present at the graduating exercises and to encourage the young men about to enter the battle of life with a few well chosen and beautifully worded phrases, such as few possess the happy faculty of being able to frame. His words fell upon attentive ears, and his advice, coming as it did from one whose varied experiences in commercial pursuits and affairs of national importance, enabled him to speak with assurance, has influenced many a young man in his struggle for supremacy.

Always attentive to the needs of those about him, and ever willing to lend a helping hand to the unfortunate and needy, he made friends with all, and especially was it his delight to assist the young men of his country, in whom he took exceptional interest. We mourn his loss as one which cannot easily be repaired, and shall ever remember him as a kind and generous gentleman, whose principles could not be assailed, and whose integrity and honesty were above reproach. The good which he has done lives after him.

IN a recent number of the *Railway Gazette* there appeared a most interesting description, by Prof. M. A. Howe, of one of the oldest bridge structures in this country, involving the principles of suspension. The bridge is located in that hilly and picturesque district of New England which abounds with works of primitive engineering. Many of these works are intact today and performing duties much more exacting than their designers originally intended them for; and they stand as a credit to their designers and as monuments to their builders.

The bridge in question has been in constant service since the date of its completion (1810), and has not yet outlived its usefulness. In its construction are involved many features which, at the time of its erection, were novel and unique. Instead of the steel cable as used in suspension bridge construction at the present time, the weight of the roadway and traffic is supported by six chains made of one-inch square bar iron. The links are 24 inches long, and the weight of the roadway is suspended from them in the usual

manner. The distance between the towers is 244 feet, center to center, and altho the bridge is perfectly safe, a vertical deflection of two feet is noticed when the bridge is crossed by an electric car. The cars have been running for the past eight years, and the structure is apparently as serviceable as it was before it was subjected to such excessive usage.

IT IS gratifying, indeed, to those having the management of the Institute in charge to know that their work is appreciated and that the young men whom they send forth are so well grounded in the fundamental essentials to the successful practicing of engineering in its broader sense, that their services are sought for continually by some of the largest and most successful manufacturing concerns in the country. Many requests are received from such organizations for young men who, altho their practical experience is decidedly limited, are judged to be capable of filling responsible positions because they are graduates of an institution whose Alumni are today occupying, and with marked success, similar positions. Many positions are at present open to men who graduate this year. Every student owes it to the Alumni who have made such a reputation for the Institute to do himself justice in his school work by preparing himself thoroughly for any emergency which may arise, in order that he may be able to acquit himself creditably, and thereby add his small share to the good name which the school now enjoys, and which the Alumni are faithfully upholding.

AT a recent meeting of the the Technic staff, Mr. W. A. Peddle was chosen to fill the position of local editor from the Freshman class. Mr. Peddle, although he has never had any such duties to perform previously, is the happy possessor of those faculties which are requisite to success in this line and we most sincerely hope that the Freshman class will aid him in every way possible and remember that they, as a class, are entitled to as much consideration in the Technic as any other class in the Institute. Contributions are always solicited and but too seldom received. The Technic is a school paper and as such it is the aim of the editors to make it as representative as possible of the student body.

FOR several years a gradual decline has been noticeable in Indiana State Athletics and the trouble culminated last year with the field day fizzle. Meetings of the I. I. A. A. were poorly attended and interest seemed to be lagging in every instance. The records and accounts of the various departments had been allowed to assume a very deplorable condition and the outlook was anything but promising. At the first meeting of the association this year, which was better attended than previous meetings, it was decided that agreements more binding would have to be perfected in order to make the association a success and in accordance with this policy a committee was appointed to revise the constitution, making such changes and amendments as would give more power to the officers of the association and thereby prevent such objectionable troubles as have arisen in the past. The committee has already had one meeting and the constitution, as altered, now awaits the ratification of each member of the association. It is to be hoped that the good work will not be delayed, and now, while enthusiasm is as its highest, is the time to adopt such measures as shall prevent future difficulties. The interest displayed so far in the coming field day is encouraging, indeed, and from all reports the meet will be one of the most successful for some time. Efforts are being made to have every institution in the association fully represented and large delegations from the various colleges are expected to attend.

Hon. Richard W. Thompson

AT the last commencement exercises of the Rose Polytechnic Institute, June 15, 1899, when, with rather feeble step but dignified bearing, there entered the assembly room a tall, spare form, but little bowed by age, the congregated alumni, students and friends of the Institute greeted with a spontaneous burst of applause the man who for many years did not allow such an occasion to pass without gracing it with his presence. When Richard W. Thompson bowed with courtly grace in recognition of this welcome, and with kindling eye looked upon the assembly, none could doubt that he was there not only because of his official position as President of the Board of Managers, but as one whose interest was deep in higher education, and whose love was strong for all who went forth from the halls of the Rose Polytechnic Institute.

When he arose to address the graduating class and assembled friends, the thought may have come to more than one: will this be the last time that words of good cheer from him will fall upon our ears at commencement time. When his voice, at first feeble, grew stronger and clearer, until in almost youthful vigor it rang out, linking happily chosen words into beautiful sentences and gracefully rounded periods, gravid with wise council and deep thought, it seemed promising that such strength of mind and body would yet be able to long withstand the prostrating force of advancing age and that his voice would be heard at future commencement periods. His death, on February 9th, came therefore none the less as a keen shock to all of us who then hoped that he might yet be spared for a long time.

Richard W. Thompson was born 1809, in Culpeper County, Virginia, and it may be truly said of him that he was a noble type of those men of whom it is said "that they were Virginia gentlemen of the old school," who distinguished the Mother of States. In early life he received a good education, such as was possible to obtain in those days. His home influences were pure and good, and he himself said that at his mother's knee he learned those lessons which contributed most largely to that success in life which finds its root in sterling honesty and tenacity of purpose.

When he was twenty years of age he left his old home with the firm determination to carve out for himself a path in life. For a short time he clerked in a store in Kentucky, then came to Indiana and founded the Lawrence County Seminary at Bedford. After teaching for some time he determined to enter the mercantile trade again, beginning as a clerk. By accident he came into possession of a small law library, in which he invested to accommodate a friend, and which he expected to dispose of in a short time. His love for books led him to spend his evenings reading these law books, and before he was aware of it himself, his progress had been such that his future pursuit and profession in life had become permanently fixed. By the advice of a friend he applied for a license, and was admitted to practice in 1834. This same year he was elected as a Whig to the Indiana Legislature, and re-elected in 1835 and '36. His election to the State Senate followed, where he acted as President *pro tem.* in 1837, the Lieutenant Governor having resigned. At the expiration of that term he devoted himself to the practice of law, appearing again as a prominent political factor in 1840, in the Presidential campaign—Tippecanoe and Tyler, too. In 1841 he served in Congress, declining a renomination at the end of his term. He then removed to Terre Haute to practice law. In 1847 he was returned to Congress from the Terre Haute district. At the close of his term he voluntarily retired from public life. In 1849 he was appointed Minister to Austria by General Tay-

lor, but declined to accept the position. Several other appointments by the general government he refused.

Mr. Thompson held the office of Judge of the Eighteenth District of Indiana one term, 1867, but declined to be a candidate at the election in 1869. During the civil war he was active for the Federal cause. He was commandant at Camp Dick Thompson, near Terre Haute, and served as Provost Marshal of the district. He declined political offices during this period, though many appointments were offered him. He devoted himself to the duties of counsel for the Vandalia and several other railroads. He was President of the Board of Trustees of the State Normal School and a member of the Board of Trustees of Asbury University. In March, 1877, he was appointed by President Hayes as Secretary of the Navy and at the close of his term he became Vice President of the Panama Canal Co. This office did not occupy his entire time and he was enabled to give some of his attention to literary work for which he had great taste.

Col. Thompson was the author of The Papacy and the Civil Power; Footprints of the Jesuits; History of Protective Tariff Laws and Personal Recollections from Washington to Lincoln.

In 1883 Col. Thompson was elected to the Board of Managers of the Rose Polytechnic Institute. He thus became connected with the Institute for which he always had a deep interest from its beginning. At the inaugural exercises when President Thompson was officially placed in charge of the Institute, he was one of the speakers, and in a brief address he showed a thorough grasp of the educational problems of the day. He showed rare insight into the future demands upon educational institutions in preparing young men to develop and make stronger our national prosperity. In his eulogy upon the character of Chauncy Rose, delivered about the same time, he shows such generous appreciation of character, strength and unselfish nature in the founder of the institution, that one cannot help but be impressed by the fact that the eulogist himself made these qualities his guiding principles in life.

In March, 1893, Col. Thompson was selected President of the Board of Managers, succeeding Mr. Josephus Collet. During the period of his connection with the Institute he was ever attentive to all its wants, never failing where it was in his power to lend aid. Whenever well enough to leave his home, he attended the meetings of the Board. At commencement time he was always a central figure and we know of but one commencement during fifteen years which he failed to attend. The two hundred and sixty Alumni, who have, upon their graduating day, listened to him as, out of the wealth of his personal experience, gave them good advice and encouragement for the future, will cherish his memory, not only as a commencement orator, but as an example of pure, honest, unselfish man of that beauty of character which seems to permeate and elevate all that comes under its direct influence.

For the students, to his last day, he had the kindliest interest. He seemed to grow young in their company and be able to enter into the very spirit of their enterprises and thoughts. They will miss his friendship, but his influence will continue to be felt.

As we knew him he was a man possessed of that integrity which no temptation could shake, an honesty which no one could assail, a strength of character which would not be overthrown, a gentleness without a flaw. As such will his memory be to us a precious heritage to be cherished and kept fresh, that we all may be better for having known him.

Experimental Determination of Draw-Bridge Reactions.*

PROF. MALVERD A. HOWE.

GIVEN the loading and the corresponding reactions, it is a very simple matter to determine the true stresses in the members of any framed structure, either by algebraic methods or by graphics. The dead load is easily determined with sufficient accuracy from structures previously built, and the live load is usually specified, but the corresponding reactions must be determined by the computer in some manner which leads to approximately correct results.

The proper process to follow in computing the reactions for draw-bridges of the type shown in the accompanying illustration has not been definitely decided upon by bridge engineers, and at the present time two or three methods are in common use. The final stresses do not differ seriously when found by these different methods, but it is quite unsatisfactory not to know which method leads to results most nearly correct. The well-known bridge engineer, Mr. J. A. L. Waddell, says in "De Pontibus":

"Candidly, the author has very little faith in even the approximate correctness of the ordinary methods of computing live-load stresses in draw-spans; nor has he much more in the super-refined methods involving the principles of least work or stretching of the different truss members, or the principle of the Three Moments with varying moments of inertia."

In order to shed a little light upon this important question and to determine, if possible, a reliable method for computing draw-bridge reactions, a steel model constructed upon a scale of 1 in. to the foot was built in the Rose Polytechnic Institute shops for experimentally determining the reactions of different loads by weighing them. The bridge selected as a copy was erected in 1898 by one of the best bridge companies in the country, and, as stated above, the linear dimensions of the model are nearly one-twelfth those of the large bridge. The sectional areas of the members are approximately one fifty-third those of the bridge used as a copy. The dimensions, areas, etc., for each member of the model are given in Table I., which also contains the general dimensions of the large bridge.

TABLE I. Showing Comparative Dimensions of Actual Structure and Its Model Tested at the Rose Polytechnic Institute. (Fig. 3.)

Piece.	Make-up.	Model — Area, sq. in.	Model — Length in ins.	Bridge — Area, sq. ins.	Bridge — Approx. length, in ft
A a	Two 1½-in. channels	0.702	36.234	40.0	36.3
b c	" 1-in "	0.432	36.234	23.5	36.3
d e	" 1-in. "	0.432	37.802	26.5	36.3
f g	" ¾-in. eye-bars	0.203	38.600	19.8	38.8
h i	" ¾-in. "	0 204	39.408	18,0	39.6
j k	" ½-in. "	0.194	42.720	24.0	42.8
l m	" 1½-in. channels	0.702	42 720	43.8	42.8
e f	" 1-in. "	0.432	30.000	19.8	30.1
g h	" 1-in. "	0.432	31.000	23.5	31.1
i j	" 1-in. "	0.432	32 000	29.0	32.1
m T	" 1½-in. "	0.702	45.000	39.2	45.0
K a L b	" 1½-in. "	0.702	46.000	20 6	46.1
M e	" 1½-in. "	0.702	23.000	38.2	23.1
N g	" 1½-in. "	0.702	23.000	38 2	23.1
O i	" 1½-in. "	0.702	23.000	23.2	23.1
P k Q l	" 1½-in. "	0.702	46.000	29.0	46.3
B c C d	" 1½-in. "	0 702	46.040	34.3	46.2
D f	" 1½-in. "	0.702	23.020	37.9	23.1
E h	" 1½-in. "	0.702	23.020	37.9	23.1
F i	" 1½-in. "	0.702	23.344	29.3	23.4
g m	" ½-in. eye-bars	0.191	24.798	31.5	24.8
H T	" ½-in. "	0.191	16.000	30.0	16.0

Remarks: Span of model, 161+16+161 ins.; span of large bridge, 162+16+162 ft. Trusses of model, 16 ins. center to center; trusses of large bridge, 16 ft. center to center.

As the object of the investigation was to obtain results which could be applied to structures as actually built, the model was not made an "ideal structure," but follows very closely in detail the large bridge. The top chord is continuous from hip to hip, and the bottom chord is broken at the center support only. Where eye-bars are found in the large bridge, similar construction is found in the model, the heads of the eye-bars being

* Thro the courtesy of the *Eng. News* we are enabled to reproduce this article, which appeared in that journal Nov. 30, '99. We are also indebted to the *Eng. News* for the illustrations.—EDITOR.

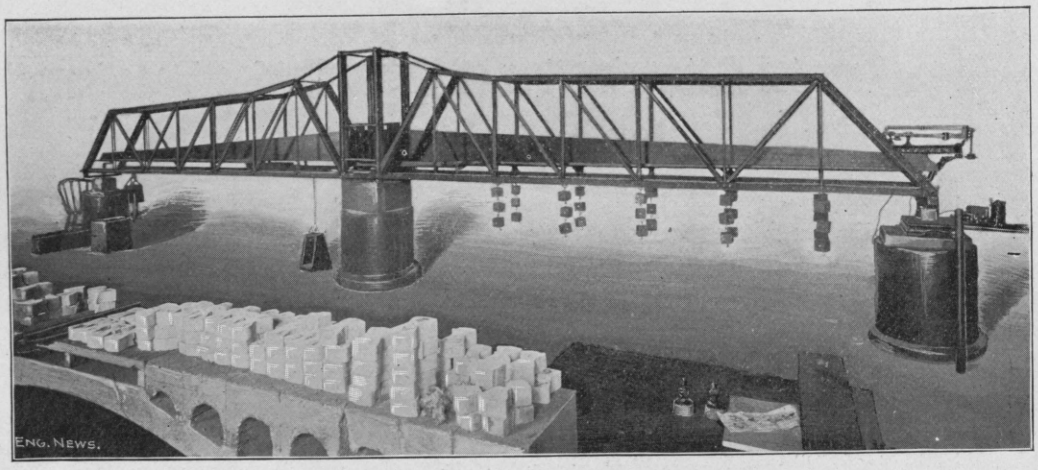


FIG. 1. View of Model Draw-Bridge tested at the Rose Polytechnic Institute, to determine End Reactions for Different Conditions of Loading.

forged from the bar and not welded on. The floor and lateral diagonals are omitted in the model.

The supports of the model are clearly shown in Fig. 1. The reactions were weighed upon specially constructed scales with agate bearings reading to 1-100th of a pound. The loading was applied at the bottom chord pins by means of individual five-pound weights (Fig. 1). The center pins rest in semicircular holes in cast-iron uprights, which are a part of a cast-iron bed-plate anchored to the center pier. These supports are in the longitudinal axes of the trusses. The ends of the model were supported by means of adjusting screws placed in the longitudinal axis of the structure, which were directly supported by the scales or the masonry piers.

The methods employed in weighing the reactions are best described by dividing them into series in the order in which they were tried. The method of procedure was essentially the same throughout in the following respects: The scales were balanced under a load of about 50 lbs., induced by raising the ends of the model with the adjusting screws. Then a load of 50 lbs. was placed upon the panel-point considered in one arm of the model and the scales balanced. The difference between the readings before and after the application of the load was taken to be the actual reaction for 50 lbs. An additional 50 lbs. was then added, and the scales balanced, and so on until a load of 200 lbs. had been applied, when the loading was removed by 50-lb. increments. This gave seven determinations of the reactions for a load of 50 lbs.

Series No. 1.—The center pins of the model merely rested in the semicircular holes mentioned above, being kept in place by the weight of the model, which is approximately 500 lbs., and the ends were supported by the adjusting screws upon the platforms of the scales. It was assumed that, if the scales were at all times balanced, or the pointer on the weighing beam was kept at the same point, the end pins and the center pins would remain in the same relative positions to each other and the model would fulfil the condition of resting upon "level supports." Each panel in turn in the first arm was loaded in the manner outlined above and the reactions weighed, and results obtained as tabulated in Table II. The results being reduced to loading of 100 lbs.

Series No. 2.—Following the above experiments 50 lbs. were placed upon panel No. 1, then upon panels Nos. 1 and 2, etc., until one arm was loaded for five panels. The results obtained are given in Table III. This loading was now removed in the inverse order in which it was applied. Table IV. contains the results obtained.

Series No. 3.—Balanced loading on panels No.

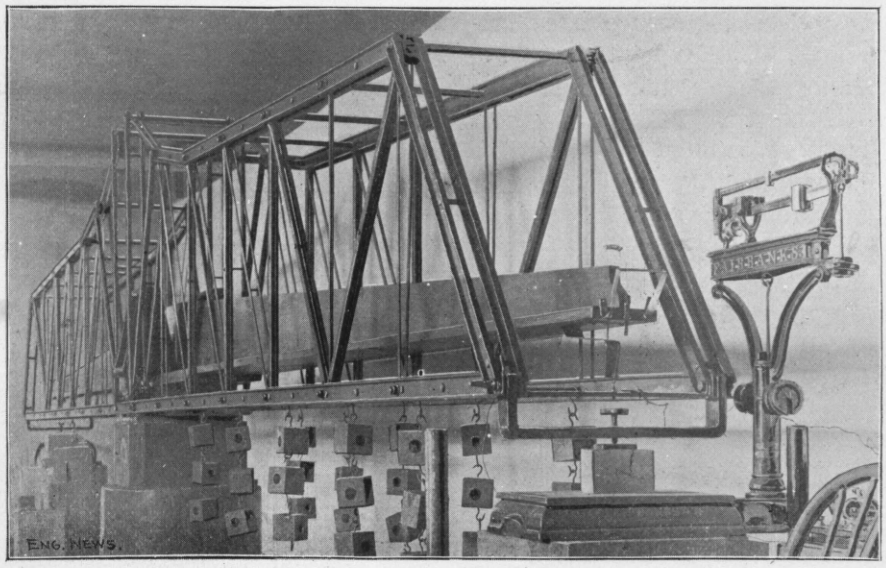


FIG. 2. View showing Arrangement of Scales, Electric Contacts, etc. of Model Draw-Bridge.

1 and 2 respectively were next tried, with the results given in Table V. Checking the reactions, as weighed, under the assumption of equal moments over the center supports they were found to be very consistent, indicating that the two arms of the model behaved in practically the same manner. Nevertheless the results differed so radically from those by computation that their accuracy was questioned, and it was decided to determine if the model fulfilled the condition of "level supports."

TABLES II. to VIII.—Showing Results of Experiments Made to Determine Drawbridge Reactions Under Different Conditions of Loading.

Table II

Load of 100 lbs. on panel, No.	No. of experiments combined.	Reaction Loaded arm.	Reaction Unl'ded arm.
1	7	+66.3	—19.64
2	7	+53.1	—18.42
3	7	+41.2	—16.08
4	7	+29.1	—13.80
5	7	+18.8	— 9.85
6	7	+ 9.0	— 5.48

Table III.

Load of 100 lbs. on panel, No.	Reaction. Loaded arm	Reaction. Unl'ded arm.
1	+66.3	—23 0
1—2, inclu.	+54.0	—17.7
1—3, "	+43.2	—14.2
1—4, "	+30.5	—12.6
1—5, "	+19.6	— 8.9

Table IV.

Load of 100 lbs. each panel.	Reaction. Loaded arm.	Reaction. Unloaded arm.
1	+66.9	—19.7
1—2, inc.	+55.4	—16.2
1—3, "	+43.2	—14.0
1—4, "	+30.4	—12 9
1—5, "	+21.9	— 6.8

Table V

Load, 100 lbs. on panel.	No. of experiments. cmbd.	Reaction. North. arm.	Reaction. South. arm.
1	4	+70.91	+70.61
2	5	+59.17	+58.97

Table VI.

Load, 100 lbs. on panel.	No. of experiments combined.	Reaction for loaded arm.	Load 100 lbs. on panel.	No. of experiments combined.	Reaction for loaded arm.
1	6	+85.2	4	5	+39.3
2	6	+72.1	5	5	+24.8
3	5	+55.8	6	5	+12.5

Table VII.

Load, 100 lbs. on panel.	North arm: No. of results combined.	North arm: Reaction for loaded arm.*	North arm: No. of results combined.	North arm: Reaction for loaded arm.†	South arm: No. of results combined.	South arm: Reaction for loaded arm †
1	39	+83.8	4	+84.0	10	+85.9
2	10	+69.8	13	+67.8	16	+71.6
3	10	+51.8	4	+50.2	10	+52.4
4	10	+36.5	4	+35.5	10	+35.9
5	10	+22.4	6	+22.6	10	+23 6
6	35	+10.0	8	+10.4	10	+ 9.9

*Howe. †Kidder.

Table VIII.

Load 100 lbs. on panel.	No. of results combnd.	Reaction. for loaded arm.	Reactions as found by computation. Continuous girder method.	Partially continuous method.	Pul method.
1	53	+84.3	+82.2	+82.7	+83.6
2	39	+69.8	+64.9	+66.7	+67.9
3	24	+51.8	+48.4	+49.6	+52.4
4	24	+36.1	+33.2	+34.5	+36.4
5	26	+22.9	+19.8	+21 0	+21 9
6	53	+10.0	+ 8.6	+ 9.3	+ 9.7

Series No. 4.—The scales were removed from the south arm of the model and the end anchored down to the masonry. At the north end two metal rods were driven into the ground and their tops connected by a piece of wood, tightly

clamped to each. Upon this was placed a machinist's surface gage, with the pointer touching the U-piece containing the adjusting screw. The breaking of this contact was indicated by an electric bell.

The first rough trial of this arrangement at once indicated that the end pins did not retain their original positions in the previous experiments, but that they were lower after the loading had been applied.

Carefully conducted experiments under the above conditions gave the results shown in Table VI. These are seen to be considerably larger

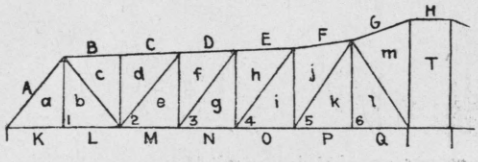


Fig. 3.—Diagram of Half-Span of Model Drawbridge.

than those found in previous experiments. This difference was so marked that the possibility presented itself that with unbalanced loads the center pier might tip slightly and thereby increase the reactions for the loaded arm.

Series No. 5.—To eliminate the effect of any tipping, a wooden beam was placed in the longitudinal axis of the model, and supported upon the center pins in the axes of the trusses (see Fig. 1), and securely clamped down to the cast-iron bed-plate. This practically fastened the center pins in place.

Electric contacts were provided at each end of the beam and the model, at the intersection of the longitudinal axis and the center lines of the end pins of the model. An ordinary telegrapher's relay was employed to determine contact. One end of the model was anchored down to the masonry and the other supported upon the platform of the scales. The scales were balanced as in previous experiments and the end pins kept in their original positions relative to the wooden beam by the adjusting screws and the electric contacts. By this method it was possible to be reasonably certain that the model behaved as if upon "level supports." Great care had to be exercised in making the experiments, as very slight disturbances would open and close the electric contacts. (Fig. 2.)

The passage of an electric car, some two hundred feet away, was sufficient to rapidly open and close the contacts, and it was possible even to tell in which direction the car was going by noticing which relay "talked" first. A few hundred pounds placed upon the pavement near the center pier was noted by the relays.

In order to see if the beam might be tipped from some movement of the center pins (since the pins were clamped the possibility of their movement seemed very slight), the mirror, scale and telescope method was resorted to, and it was found that the pressure of the finger upon the metal bar clamping the pins was sufficient to tip the wooden beam—so, finally, the wooden beam was supported upon the cast-iron bed-plate quite independent of the model, and the center pins clamped in place. With this arrangement the final experiments were made, the number being sufficient to make the final means reliable.

In order to eliminate any personal equation, a number of experiments were made by Mr. Kidder, a member of the senior class. The writer's experiments were confined to loads upon the north arm of the model, but Mr. Kidder's included both arms. Table VII. shows these results for each arm, while Table VIII. gives the general means of all of these results, as well as the reactions, computed by the three different methods in common use.

The computed reactions were obtained by means of the following formulas.

Model considered as a continuous girder of two equal spans—(moment of inertia constant):

$$\text{Reaction for loaded arm} = \frac{4 - 5k + k^3}{4} P.$$

Model considered as a partially continuous girder of two equal arms—(moment of inertia constant):

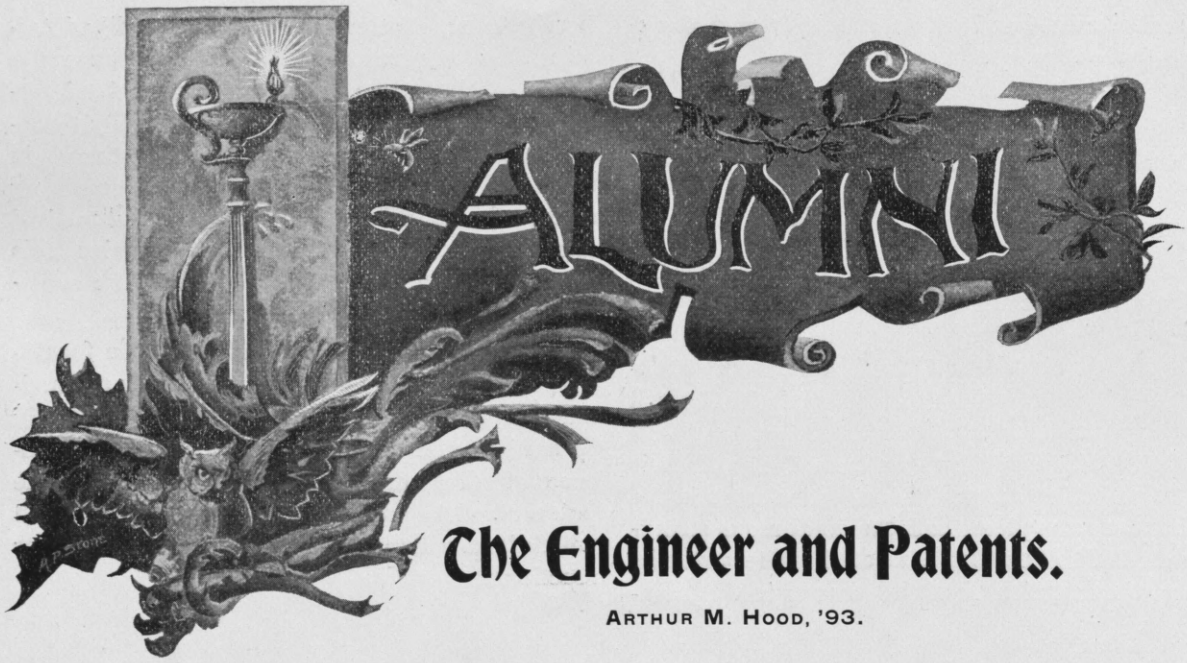
$$\text{Reaction for loaded arm} = \frac{1}{4 + 6n}[4 - 5k + k^3 + 6n(1 - k)]\ P.$$

Model considered as an elastic framed structure (pul method):

$$\text{Reaction for loaded arm} = \frac{\Sigma\, pul + P\,(1-k)\,\Sigma\frac{u^2 l}{a}}{\Sigma\frac{u^1}{a}}$$

From Table VIII. it is quite evident that the pul method gives results in closer agreement with those obtained by experiment than either of the others, although the model is but partially articulated, which condition is assumed for framed structures, when the members are not assumed to be rigid. In bridges as now designed it is quite probable that the lack of articulation in the joints for some pieces and the continuous stringers carried by floor beams riveted to the verticals, affect the magnitudes of the stresses in the members to an amount which cannot be readily determined by any known method. Now since the effects of these two conditions cannot be determined, and since their effect is probably to decrease rather than increase the direst stresses in the members, they can be neglected in computing stresses in framed structures and the pul method used for the determination of reactions, since this method leads to correct results when the structure is articulated and elastic.

For large draw-spans any of the three formulas given above will lead to final results not seriously different, so that the pul method need only be used in the final design. For framed structures of widely different sections and depths the pul method is probably the only correct method which is now known for determining the proper reactions.



The Engineer and Patents.

ARTHUR M. HOOD, '93.

ALMOST every manufacturing concern of any importance in the United States is either founded upon or is directly affected by patent rights. In fact, it might almost be said that there is not a single industry in the country which is not affected to a greater or less extent by the patent monopoly. This being the case, almost every engineer who enters into the active practice of his profession is required to consider, in order to properly conserve the interests intrusted to him, the relation which some particular patent or invention bears to the article which he, or his competitor, is manufacturing.

It has been my idea for a long time, therefore, that every engineer ought to have presented to him, at some time during his course of study, a general outline of the requirements and privileges of the patent law. Not that every engineer should be skilled in the interpretation of patents, for that would be impossible, but that he may have a general idea which will enable him to settle, for himself, many preliminary questions, and which will enable him to more quickly recognize the necessity of competent advice, if such should in reality be required, and which will also better enable him to present his ideas and needs to his company.

To begin with, an inventor has no common law right to any invention which he may produce, so that, without statutory provisions, an inventor is utterly powerless to reap any decided advantage from the product of his genius unless he can keep his invention entirely secret, for otherwise there is nothing to hinder his competitor from copying exactly his ideas and utilizing them for his own benefit. Under the common law, therefore, there was no real incentive for any person to spend any time in the development of old devices, or in the production of new.

The necessity of some provision for an incentive to inventors was early recognized by the founders of our republic, and the eighth Section of Article 1 of the Constitution provided the whole foundation for the patent system of the United States, when it gave to Congress the exclusive right,

> "To promote the progress of Science and the useful Arts by securing for Limited Times to Authors and Inventors the exclusive Right to their respective Writings or Discoveries."

There is not sufficient space for me to enter

into even a cursory discussion of the development of the law in this country. Suffice it to say, that the law as it now stands is a gradual development, the result of many changes as the needs were presented.

The word "patent" has, by general usage and custom in this country, been commonly limited in its meaning to letters patent for invention In this limited sense a "patent" is an intrument in writing issued by, and under the seal of, the Government in accordance with the law, granting to an inventor and his legal representatives a monopoly consisting of the exclusive right to make, to use, and to sell the particular invention described therein, throughout the United States and Territories thereof, for the term of seventeen years.

A patent is not the arbitrary exercise of authority on the part of the Government, but is, in reality, a contract between the inventor on one side, and the Government, in behalf of the general public, on the other side, and that contract stated in "words of one syllable," is substantially this: The Government says to the inventor, "If you can give to the public valuable information which it might not otherwise obtain, we will give to you, in consideration for this information, and in consideration of the benefit which you by your disclosure have given to the public, any benefit which you may be able to reap from the enforcement of an exclusive right to make, to use, and to sell your invention, for the term of seventeen years, at the end of which time the public is to be given, without further consideration, all the rights which have been yours exclusively for the period named."

There is in this contract, therefore, no guarantee on the part of the Government that the right thus granted shall not be subordinate to grants which have been previously issued, nor is there any guarantee on the part of the Government that the *prima facie* right thus granted shall be valid, the inventor being required to exercise his own judgment as to the proper presentation of his side of the contract. The patent is not an absolute right which the inventor can rightly expect the Government to enforce for him, but is merely a weapon placed in his hands which, if properly and efficiently handled, he may use against his competitors to establish and bring to him that reward to which he is justly entitled for the exercise of his genius. A patent is, in fact, merely a foundation upon which the inventor may stand the better to enable him to meet his competitors.

In order to entitle any person to the grant of a patent he must, therefore, establish the following facts:

1st. That he is the first, original and sole inventor (or that jointly with an other or others they are the first, original and joint inventors), of the alleged invention which he describes.

2nd. That the alleged invention is both novel and useful, and is not injurious to the public health and morals.

3rd. That the public has not, prior to his invention, been possessed of the knowledge, or substantially the knowledge, which he proposes to give them.

Under our system for the grant of patents it is merely necessary, in order to establish a *prima facie* case, for the inventor to allege these facts in proper form under oath, and it then devolves upon the Patent Office, on behalf of the Government and the general public, to prove or disprove the correctness of the inventor's assertions.

In order to properly present his case to the patent office, therefore, the first step, after the production of the invention itself, is for the inventor to present to the patent office, together with a petition for the grant of a patent and the necessary oath, a description of his invention, which shall be so full, clear and accurate that "any person ordinarily skilled in the art to which the alleged invention appertains may be thereby enabled to make and use the same." This description, in order to be perfectly clear, and in order to prevent possible loss in case of subsequent litigation, should be prepared with the greatest care by one who is familiar, with the requirements of patent law, and also familiar with mechanical construction and mechanical

equivalents. The invention should be illustrated, if possible, by a black line drawing which should show clearly, and fairly accurately, the essential features. The written description should end with a series of one or more short paragraphs, called claims, each of which should set out in clear and concise language the particular and necessary elements of the invention.

In the original presentation of the claims, care should be taken to have at least one claim which shall be broad enough to cover, not only the specific form shown and described, but should also be sufficiently broad to cover possible and probable variations which in their production would require the exercise of invention. It is true that so long as an application is pending in the patent office the applicant may amend or broaden his claims, but if the introduction of a broad claim in the patent office is delayed until the advent of a second applicant for a patent for an invention which would be dominated by the proposed broad claim, then the first applicant is estopped from asserting his broad claim. This is a new principle recently laid down by the Court of Appeals, and is at variance with a long-continued and supposedly settled practice.

When the invention has been properly presented to the patent office it is the duty of the examiner to examine the same to determine, first, whether the formal parts of the application are in proper legal form, and to determine whether the specification and drawings correspond with each other, and second, whether the two together describe an operative device. The question of utility is not seriously considered, for the reason that a modicum of utility suffices to fulfill the requirement of the law. As soon as these points are determined in favor of the applicant, the patent office makes a careful examination of all the patents for similar inventions which have been issued in this or any foreign country prior to the date of application, and also an examination of all printed publications at hand which are likely to contain descriptions or disclosures of similar inventions. If in his search the examiner finds anything which in his judgment might by any possible means be held to be included and covered by any one of the claims which have been made by the applicant, these claims are rejected and attention is called to the particular publication which the examiner has found. The applicant then has the right to amend his claim in conformance with the requirements of the examiner, or, if he believes the examiner to be in error, he may present his arguments in favor of his contention. It is in the preparation and subsequent prosecution of the claims of an application that the greatest care should be exercised, for it is upon the claims that the whole right of the patentee must rest.

It sometimes occurs that two parties come to the patent office, each asking for a patent for substantially the same invention, and, if the claims which are made prove to be allowable, the patent office declares an "interference." Each party to the interference is required to prove by testimony: when he first conceived the invention at issue; when he made his first sketches or model; when he first described his invention to others; and when, if ever, he first made a full size operative device. In such a contest, the unsupported testimony of the inventor, although under oath, counts for little, and it is upon this point that many inventors fail. The law requires that the patent shall be given to the first inventor, but the courts have held that the first inventor is he who, without unnecessary delay, gives the benefit of his labors to the public. All of the points above mentioned are therefore vital to a proper determination of the question of priority, and, while a comparatively small per cent. of applications are placed in interference, the inventor should accustom himself to keep an accurate record of the development of any invention which he may make. It should become second nature for the engineer and inventor to make sketches of all ideas which may occur to him, and, more important still, to date and save such sketches. As soon as any line of investigation has reached a point where the final result seems well in view, the inventor should take care to show his sketches to several friends, explain-

ing his ideas to them carefully and fully, and, if possible, obtaining their signatures. I say "several friends," for there is safety in reasonable numbers.

As soon as the invention has been well matured in the mind of the inventor there are two courses opened to him. He may immediately file an application for a patent, or he may proceed to embody his ideas in a full size operative device. There is but little choice between these steps, but one or the other should be taken with "reasonable diligence," for otherwise a later inventor may be declared entitled to the patent, because, immediately upon the entrance of the second inventor in the field, the first inventor is required to exercise "reasonable diligence" in placing his invention in the knowledge of the public and in asserting his right to a patent. There can be no positive affirmative definition of "reasonable diligence," but, as competition in invention has increased, the courts have become less and less lenient. For instance, in one of my recent cases, the Commissioner has held, in support of my contention, that a delay of three months was fatal. In this case also the defeated party, although alleging an earlier conception, was unable to produce witnesses who were able to show that they had, anywhere near the time of alleged conception, obtained from the inventor an adequate knowledge of the invention.

After a patent has been issued the patent office loses control over it, and the inventor is then put upon his own resources to enforce, as best he can, the rights which have been given him. There are, unfortunately, a good many people who have the idea that, having once obtained a patent, and having received from the Government its beautifully lithographed certificate, sealed with the red seal of the patent office, and tied with pretty blue ribbons, there remains nothing for them to do but to sit at ease at home and hire an amanuensis to whom they may dictate their refusals of offers of large sums which they are sure will appear. Fortunately for the development of our industries no such condition exists, for if it did the result would be a paralysis of manufacturing enterprise. As a matter of fact, as already said, a patent, even though it be for a pioneer invention (something, by the way, which is now extremely rare), merely furnishes the inventor a foundation upon which he may base his future operations, and until "perpetual motion" is discovered, inventors and patentees will find themselves compelled to hustle in order to realize any benefit from their inventions and patents.

The questions which most frequently come to the engineer in considering a patent, are:

"Does the device manufactured by my competitor infringe my patent?" or "Does the patent which I manufacture infringe the patent held by my competitor?"

Accurate answers to these questions can only be obtained from an expert, and after a careful and thorough investigation, but often times, for a working basis, the engineer may himself, by the observance of a few general rules, be able to reach a fairly accurate conclusion, so far as the patent shows on its face. In the first place, each claim of a patent is to be considered by itself, because each claim stands or falls by itself, and for the purpose of its interpretation must be considered as though it were the only claim in the patent. Broadly speaking, a device does not infringe a given claim if that claim includes as a positive element any element the equivalent of which may not be found in the device under consideration. The main difficulty is to determine what an "equivalent" is, and it is upon this point that the greatest diversity of legal opinion exists. If a patentee has purposely included in his claim an element which, though inessential, affects in one way or another the operation of one or more of the other elements recited in the claim, he cannot properly insist that any person manufacturing a device which does not include this element infringes his claim.

As a general rule, it is always best for a manufacturer to avoid infringement if possible, and unless the claims of a patent have been well drawn, an easy avoidance is generally possible. If infringement seems desirable, and suit is brought by the owner of the infringed patent, competent

counsel should be employed, and, as a general rule, he should be allowed to make a personal examination of the patent and other records in order to find, if possible, anticipating matter which the patent office, for one reason or another, overlooked.

A good general rule is: Keep out of litigation if possible; compromise if litigation seems probable; but if fight be necessary, put yourself in good hands, and fight with vigor.

ALUMLI NOTES.

Jan. 25, 1900.

Editor, The Rose Technic:

I have just perused the annual '98 class letter, and thought perhaps you could use some of the news to advantage, hence I will try to give you a short epitome of what it contains:

Austin is with the American Steel Wire Co., of Pittsburg, Pa. He says he is getting his lazy streak modified to some extent.

Brachman is in the testing department of the General Electric Co., of Schenectady.

Eastwood is located at Ensley, Ala., where he has been testing the first Open Hearth Steel Plant in the South.

Fletcher is Vice-President of a cotton plant, the Moose Gin Co., of Morrilton, Ark.

Ford is on the Maintenance of Way of the Choctaw & Memphis Construction Co., between Little Rock and Memphis.

Hubbell and Freudenreich are in the Patent Office, at Washington, D. C. Both are studying law. Hubbell is the father of the first son of '98.

Montgomery is with the Roebling Construction Co., of New York, with headquarters in Chicago, being resident manager of the northwest territory.

Lansden is in Birmingham, Ala., where he has hung up a shingle in his own name as Electrical Engineer.

Pirtle says he has accepted a permanent position in the lighting department of the General Electric Co., of Schenectady. He reports a fair living and bright prospects.

Roberts is instrument man with the Louisville & Nashville R. R., at Nashville, where they are putting up a new, handsome depot, engine house, coal bins, etc.

Ryder is chief electrician for the Union Copper Mining Co., of Gold Hill, N.C. While trying to stop an Automobile by using his finger as a brake between two cog wheels he came out minus the end of one finger.

Schneider is in the testing department of the General Electric Co., of Schenectady.

Stewart has left the Southern Indiana Ry., and is now located in Chicago as engineer for the Lake View Town Co., of California.

Stiltz is in a Government position as draftsman in Bureau of Construction and Repairs U. S. N., at Cramp's Yards, Philadelphia.

Theobald says he is not climbing poles, nor twisting wires, putting up nor testing telephones, neither indoors nor out, yet he is with the New York Telephone Co.

Vorhees is drafting for the New York Shipbuilding Co., of Philadelphia. He says he is getting the same old dollars per week.

Wamsley is with the Maintenance of Way of the Big Four at Mattoon. He was recently married and intimates that he will pass into oblivion in consequence.

Wiley says he is overseer (of two) in the elec- department of the Homestead Steel Works, at Alliance, Pa.

Whitten is engineer in testing department of the Worthington Pump Works, Brooklyn, N.Y. His work takes him to all the Jersey towns, all over Long Island and part of New York State.

I have mentioned all but the Kloers and myself. The Kloers are in the Van. Shops here, and I am at the Wabash Mills, City.

Yours truly,

Terre Haute. N. S. KIDDER.

Edward Walser, '96, has taken charge of one of the cyanide mills of the Cochiti Gold Mining Company, at Bland, New Mexico.

J. B. Haney, '97, is with the Riter & Conley Company, Pittsburgh, Pa.

N. P. Burt, '99, who has been taking graduate

work at Worcester Polytechnic since last September, is now employed by the Great Western Stove Company, at Leavenworth, Kansas.

A. P. Stone, '99, is with the Brown Hoisting and Conveying Machine Co., of Cleveland, Ohio.

Clarence Tucker, '97, has resigned his position with the Driggs-Seabury Gun Co., of Derby, Conn., and has accepted a situation in the Designing and Experimental Department of the Otis Elevator Co., of Yonkers, N. Y.

ROSE TECH. CLUB OF CHICAGO.

The Club held its tenth meeting at Mangler's, Saturday evening, January 27th, 1900. Those present were :

Dr. C. L. Mees, Terre Haute, Ind.
T. L. Condron, '90,
W. W. Crowe, '95,
S. S. Frank, '92,
H. J. Kilbourne, '94,
J. H. Lendi, '97,
W. S. Menden, '91,
J. T. Montgomery, '98,
A. V. H. Mory, '94,
G. W. Phillips, '95,
J. M. Platts, '99,
W. R. Sanborn, '96,
L. Sanford, Jr., '96,
H. C. Schwable, '99,
A. G. Shaver, '97,
F. F. Sinks, '96,
M. B. Stewart, '98,
F. W. Wicks, '92,
O. E. Becker, ex. '95

Regrets were received from a number of the Alumni who were unable to be present.

At the conclusion of a very delightful dinner the meeting was called to order by the President, Mr. Condron, and reports were received from the several officers, the most interesting being the report from the Treasurer, which showed a balance of cash on hand. No one was able to explain this—not even the Treasurer himself; so it was passed over with the mental resolve that it should not occur again.

At this point Mr. Condron stated that it was in order to re-elect the President. After he had finished explaining what he meant, the following officers were elected :

W. W. Crowe, President.
A. V. H. Mory, Vice President.
J. T. Montgomery, Secretary and Treasurer.

Short talks were made by several of the members. Mr. Sanborn told of the trials of traveling in the Klondike, and how he appreciated railroads while he was where there were none. It was quite noticeable that in his talk gold was mentioned only once, and that as a postscript, when he was asked where he had obtained a small bottle containing the fragments of a badly pulverized car brass.

Dr. Mees entertained the Club with the news from the Institute, and his talk was enjoyed and greatly appreciated by all the members; and he received the hearty assurance that the Chicago Alumni would never lose interest in their Alma Mater.

A desire was expressed by the Club to entertain the senior class while they were on their class trip this year.

After individually expressing to Mr. Crowe their appreciation of his efforts in arranging the meeting, the Club adjourned at a late hour.

J. T. MONTGOMERY, Secretary.

The Welsbach Sytem of Illumination.

EDWARD F. PHILLIPS, '00.

ABOUT 1880 Carl Auer, a pupil of Bunsen at the University of Heidelberg, became interested in the subject of illumination. Bunsen impressed on him the fact that the ordinary method of burning gas in which particles of carbon were heated to incandescence by the heat produced by the combustion of the hydrogen was far from being an economical method of obtaining illumination, inasmuch as the amount of light yielded was but a small per cent. of the energy contained in the gas, and gave it as his opinion that the light of the future would be obtained by first converting the illuminating gas into a heating flame through the medium of the well-known Bunsen burner, and then applying the heat so produced to bring to incandescence some refractory material. Auer thought a great deal about this suggestion, but about this time the electric light attracted his attention before he had obtained any practical results. He began a series of experiments with a view of producing a filament of refractory material which might be used in the incandescent electric lamp in the open without being consumed. While engaged in this work he produced the incandescent gas light.

The Drummond oxy-hydrogen lime light was already known, but none of its modifications had come into commercial use, because the material to be acted upon by the heat was necessarily present in considerable mass, and has required gas under pressure and a very high temperature in order to bring it to incandescence. The Welsbach light is successful because the oxides are produced in a very thin or attenuated form, so that the minimum of heat will produce the maximum of light.

Within the last few years numerous patents have been granted Auer for the use of oxides of osmium and thorium in the manufacture of filaments for incandescent electric lamps.

In the perfected Welsbach gas lamp a modified but very perfect form of the Bunsen burner is used, the heat from which brings to incandescence the hood or mantle. In the manufacture of the mantle the process begins with the weaving of an endless hollow cylinder of fine cotton thread. This is carried out with a knitting machine, the stitch being like that produced by a crochet needle. The cylinder, which is about two inches in diameter, is then carefully washed and dried, cut into five-inch lengths, and saturated in the solution which consists principally of a mixture of the nitrates of lanthanum, yttrium zircanium, thorium and cerium. It is then spread upon a spool which is rotated by machinery, in a drying closet, so as to secure uniform distribution of the material. The cylinders have been previously reinforced or folded over at one end so as to have a larger amount of material through which to thread the platinum wire by which the mantle is to be suspended.

They are now gathered together by means of the platinum thread, the ends of which, projecting on opposite sides of the gather, are looped over an iron ring. The web cylinder is then spread over a former so as to separate the threads and open the loops, and is then fired by bringing the flame of a Bunsen burner in contact with the top. The cotton ignites and burns off rapidly, leaving the oxides as a skeleton of the same form, but, of course, very much lighter (the ordinary size weighs seven grains) and not so strong. This skeleton or mantle is then condensed by ignition at a high temperature in the flame of a Bunsen burner and the ignition completed with a blast lamp. The mantle has now shrunk to about half its former size. It is too frail for shipment, and to make it stronger it is dipped into a solution of kristaline (a celluloid preparation) and dried in an air bath. The mantles are then packed separately in cylindrical pasteboard boxes for shipment, and when placed in position on the burner and ignited the kristaline burns off rapidly and the lamp is ready for use.

Mantels have been made by mixing salts of these same metals with a solution similar to that used in the manufacture of artificial silk. This is formed into threads, and these woven into the shape of the mantle and ignited, leaving a skeleton of the oxides similar to those produced by the other process.

Among the elements used in the manufacture of the solution in which the cotton cylinder is dipped are lanthanum, zirconium and yttrium, produced respectively from the minerals cerite, zircon and samarskite morazite sand, the product of the disintegration of some granites is a phosphate of cerium metals usually containing some thorium silicate. The oxide of the latter is also used. These minerals are found in Norway, Sweden, Ceylon, South America, the Ural mountains, and in our own country in Connecticut and North Carolina.

The solution is of a milky appearance, rather like lime water, and by varying the proportions of the oxides it is possible to produce a light from an intense white to a brilliant yellow.

The chimney usually used is of the common Argand shape, about two inches in diameter, made of glass or mica. Owing to the close proximity to the mantle, as soon as that delicate fabric has become torn the chimney is almost invariably broken by the flame impinging upon the inner walls, and in breaking it usually carries the mantle with it. It may be improved by placing near the bottom a number of small holes. Air entering these openings mixes with the ascending column of air, bringing oxygen constantly in contact with the mantle, rendering combustion more nearly perfect, and the mantle incandescent to the very top, producing a more perfect light.

In attempting to overcome breakage of chimneys and use torn mantels by increasing the diameter of the chimney or making it globe-shaped, the draft is decreased, making the combustion imperfect and reducing the light obtained about twenty-five per cent. The light will also be more sensitive to air currents.

A device which dispenses entirely with the troublesome narrow chimney consists essentially of a globe about three and one-half inches in diameter which forms a combustion chamber, an air tube surrounding the lower part of the mantle to separate and to direct the drafts, and an ejector or jet blower which is made of metal and placed immediately above the mantle. In this chimney the rapidly ascending column of products of combustion called the central draft enters the blower or ejector-nozzle, where it acts the same as steam in an ejector, inducing an outer draft which, moving upward close to the inner walls of the globe, forces away from the glass and into the metal chimney the flames issuing from holes in the mantle, thus reducing the breakage of glass to the lowest limit, and uniting with the central draft above the blower emerges through a chimney common to both.

The average life of a mantle is five hundred hours.

FRESHMAN BANQUET.

IN accord with ancient usage, the Class of 1903 held its first annual banquet at the Terre Haute House, on January 24, 1900.

For several days prior to the event the commercial world of Terre Haute had been catering to the representatives of the Freshman Class, until all the details were arranged.

Finally the date was set, and all proper persons notified, and while the happy Freshmen conversed on the subject with mysterious nods and passes, no gleams of recognition could be discerned on the faces of the Sophs. This state of affairs continued until Wednesday evening, January 24th. At the appointed time divers bands of cleaned Freshmen could be seen wending their way towards the Banquet Hall. When the clock struck for seven-thirty, three Sophs and all of the Freshmen, except Bowie, were assembled. The Sophs had just happened in. At eight o'clock, Bowie having arrived, the Freshmen, under the leadership of President W. A. Peddle and Toastmaster R. A. Oglesby, took seats. The three Sophs had meanwhile been released.

Everything passed off smoothly, including most of the hats and overcoats of the banqueters, which articles of clothing had been kindly removed from their place by interested Sophomores. Two departures from the general custom were made. First, no wine was served; and second, the toasts were given between the courses, both of which innovations proved successful. Several upper classmen were entertained during the evening. After the coffee, stories of ghosts, fish and other things were told. Several colored dancers, assisted by Ringgold's orchestra, lent their aid and danced in the approved plantation manner.

At, or somewhere near midnight, the class dispersed for home, first, however, visiting several Sophs and telling them what a fine time they missed. The class yell was also given with considerable noise and enthusiasm.

A number of embryo collegians seemed greatly worried at the prospect of the morrow's recitations, but the Professors were kind, knowing as they did how it was themselves.

TOASTS.

President, William Adrian Peddle.
Toastmaster, Richard A. Oglesby.

The Class . . . . . Marion W. Blair
The Faculty . . . . . Robert B. Arnold
The East . . . . . Clarence A. Cohn
The West . . . . . Seth Fenelow Arnold
Athletics . . . . . Irving J. Cox
The Sophomores . . . . . Harry S. Braman
The Ladies . . . . . Brent C. Jacob
Our Prospects . . . . . William D. Ingle

THE SOPHOMORE BANQUET.

Once more the Banquet time is here, and the Sophomores, by the liberal use of strategy, and bearing in mind that "discretion is the better part of valor," succeeded in making their feast a grand success in every detail.

It happened this way:

Some weeks ago the Freshmen managed to reach the hotel in safety, holding their banquet, and according to all reports had an enjoyable evening, but all the time they were engaged in the revelries of the banquet hall, the Sophomores were stealthily making their way into the room where the Freshmen had left their hats and coats.

In the course of time the Freshmen hats of gray and scarlet found a resting place far from their owners' heads. Knowing that the class pride of the Freshmen had sustained a great injury by this action, and wisely supposing that they were seeking revenge, the Sophs took every precaution to prevent a like trick, or any other, being played on them, and, suffice it to say, all Freshmen plans were frustrated.

According to the ethics of the Institute, the Sophomores posted a notice of their banquet in the hall, and in a very short time the news had reached every Freshman's ears, and all set out to capture any or all Sophomores who might be so unfortunate as to be caught napping.

But the Sophs were safely entrenched in the hotel by this time, and the freshmen were met by a loud "horse laugh" from the fourth story of the Terre Haute House.

Frequent sallies were made by the Freshmen but all were defeated by the vigilance and precautions taken by the Sophs.

Three Sophs, who had strayed from the fold, were captured by the alert Freshmen early in the evening, but no violence was perpetrated upon them, and two of them were subsequently dismissed, after it was too late to attend the banquet. One escaped, but was beseiged and not allowed to show his colors at the banquet. All three disavowed any intentions of ever attending the banquet.

A beautiful supper was served by Mine Host Neipp, and after the coffee was poured toasts were responded to by several members of the class.

In the wee small hours, when all good people were in bed and the class of 1902 had spent a most enjoyable evening, a motion for adjournment was made and all departed for their respective homes, voting this the most successful of their banquets.

The notice posted was most unique, and contained many new and original ideas concerning members of the class and also of the faculty.

The list of toasts was as follows:

Edgar L. Flory, President.
Chas. H Jumper, Toastmaster.

The Class . . . . . S. D. Burge
Gymnastics . . . . . H. E. Wiedeman
Poly Life . . . . . C. Housum
The Faculty . . . . . Trafford Tallmadge
Sophs . . . . . By a Freshman
Our Reply . . . . . E. Lindley Jones
The Ladies . . . . . V A. Hommel
Our Future . . . . . Fred Fishback

Music by Sophomore Glee Club.
E. L. Jones, Director.

The following is a copy of the notice:

Grand Comedy Company L't'd.

Composed of the Members of the Class of 1902 of the

Rose Polytechnic Institute.

Given at The Terre Haute 8:00 P.M. Thursday, Feb. 1, '00.

A Refined Comedy Company

Orchestra under management of . . . . . Herr Jones

Pres. E. L. Flory . . . . . Vice-Pres. R. B. Crebs . . . . Sec'y E. B Powell . . . . . Treas. Harry Willis.

Ballet Master . . . . Monsieur McKibben — Stage Mop . . . . . Bobbie Warren

Property Man . . . . . Sam'y Burge. — Stage Manager . . . . . Bill Housum

Can Rusher . . . Vic Hommel.

Brent, the Strong Man, in his SHOW of Strenth — Jumper in his High Dive after Laundry Bills.

Bert De Wees Dewey in the Battle of Manilla. Kittie Uhl in his realistic impersonation of Oom Paul.

C-Herbert Hills the Yankee, as Darius Green. — Nick in his slide for Home Plate.

THE Great and only original "*Wiedemann*" Ex-Court Fool to his Royal highness Hokey Pokey of Hon Honlululuooloo.

COX and PAIGE IN THEIR FAMOUS RACE AFTER THE "PLUM."

Parks and Peker in the Highly Moral Drama "David and Goliath." Rust in his PUNCH and JUDY SHOW

The Laughable Farce. "Kattman the HOT Instrument MAN, or How to level a Freshman"

To-night will be our 999th consecutive performance and in honor of the event each lady will be given as souvenir, an excellent reproduction of the famous pen and ink portrait of his Niblets, G. W. Maggie Mitchell by the rising young artist Michael Angelo Charles Dana Gibson FISHBACK.

Grand Street Parade to the Banquet Hall as follows:

Commander in Chief, Old Soldier Tallmadge.

Dutch Students' Club; Bucks, Drum-Major.

Hath and his HOODLUMS.

Shamrock Division under direction of MAC.

The Band will play the following Selections:

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"The Telephone Girl," "O Listen to the Band,"
"The Boy Guessed Right,"
"A Little Bit Off the Top,"
"I'd Leave My Happy Home for You,"

Or any pieces desired by the Faculty.

THE following resolutions of respect and sympathy were adopted by the students, in general assembly, Saturday, Feb. 10th :

We, the students of Rose Polytechnic Institute, recognizing in the death of the Hon. Richard W. Thompson the loss not only of the President of the Board of Managers of the Institute, but also of the staunch friend of every young man, do, in general assembly, hereby express our great respect for him and our sincere sympathy for his bereaved friends.

STUDENTS OF ROSE POLYTECHNIC INSTITUTE.

MEMORIAL ADOPTED BY THE BOARD OF MANAGERS.

In the death of Richard W. Thompson the Rose Polytechnic Institute suffers an irreparable loss. A member of the Board of Managers for many years, and of late years its President, he brought to the discharge of his duties large experience, mature judgment and an enthusiastic devotion to the interests of the Institute. He never missed a meeting when his health permitted, and was often present when attendance meant great discomfort and some risk. Whatever special duties wers assigned to him in connection with his position he performed with thoroughness and ability, as he did everything he undertook. At successive commencements for a number of years he presented the diplomas to the members of the graduating classes, and memorable features of those exercises were the addresses he delivered. He saw with the eyes of faith and love, in the graduates whom he addressed, the prophecy and promise of progress even more remarkable than that which was embraced within the large circle of his own life's experience. And so he talked to the young men about to enter on their life work as one who relied on them to harvest in the years to come, albeit he did not expect to enjoy the results of their successful labors, the unfulfilled hopes of his own life, for he was a lover of his kind and his country and was quite unselfish in his devotion to the general welfare. How much of a loss his death is to the Institute those realize most fully who were most familiar with his interest in and concern for its welfare. As a mark of respect to his memory his associates on the Board of Managers will attend his funeral in a body. By their direction, in connection with the Faculty, the exercises for the day at the Institute will be suspended, that all by attendance at the funeral may testify to their appreciation of the loss they have sustained in the death of a great and good man—patriot, orator, scholar, statesman—who was their friend.

BOARD OF MANAGERS ROSE POLYTECHNIC INSTITUTE.

MEMORIAL BY THE FACULTY.

Colonel Thompson has been President of the Board of Managers for many years and has always shown the kindliest interest in everything connected with the school.

He has been present at the meetings of the Board until recently when failing health and strength have prevented ; he has been present at almost all the graduations for many years, and has in almost every case made the graduation address to the class and in every way has shown a strong personal interest in the Institution and in everything connected with it. For these reasons, and for many others which it would be impossible to even mention here, we, the Faculty of the Rose Polytechnic Institute, wish to express our grateful appreciation of everything which Colonel Thompson has done to further the interests of the school ; we wish to emphasize his friendliness, to recall his speeches to the graduate classes as they succeeded one another in long succession, and to remember again the kindly smile and kindly greeting of the genial old gentleman as he recognized any one who belonged in any way to the Institute.

For these and similar reasons we wish to express publicly our grief, sympathy with the family, and as a Faculty to spread these sentiments as a resolution on our records.

It is also ordered that in respect to his memory the exercises of the Institute be suspended on Monday, Feb. 12.

FACULTY ROSE POLYTECHNIC INSTITUTE.

FEBRUARY 17, 1900.

MY DEAR FRIENDS :

The family of Col. R. W. Thompson desire to express to the students of the Rose Polytechnic Institute their profound gratitude for the expressions of kindness and respect shown to his memory by your note of the 10th instant, and in behalf of the family I tender you their sincere thanks.

Very respectfully,

D. W. HENRY.

Students Rose Polytechnic Institute.

Meeting of the I. I. A. A.

THE meeting of the delegates to the I. I. A. A. was called to order by the President at the Denison House, Indianapolis, Friday, February 2rd, 1900.

Delegates from Earlham, Hanover, Franklin, Wabash, Indiana University, University of Indianapolis, Purdue and Rose responded to roll call. DePauw did not send a delegate, but Mr. Weik, who was attending the oratorical contest, was at the meeting in the interest of that school.

The first business brought before the meeting was the membership of Purdue and DePauw. These colleges, having not paid their dues for last year, were according to the constitution no longer members of the association. It was, however, unanimously decided to reinstate them upon the payment of their dues.

The officers of the association for the ensuing year will be: DePauw, President; Wabash, Vice President; I. U., Secretary, and I. S. N., Treasurer.

There was then considerable discussion concerning the loose way in which the affairs of the association have been conducted heretofore. There seemed to be a general opinion that the present constitution was too weak, and that there was nothing binding in it.

Esterline, of Purdue, then moved that a committee of three be appointed, which should meet within two weeks, to draft a new constitution and by-laws, and a code of rules governing athletic contests and the eligibility of contestants of the association. A copy of this draft is then to be submitted to each of the members of the association, such copy to be returned, together with any suggestions to the committee, on or before a certain date. The committee will then meet within one week after said date for the purpose of revising the original draft. A revised copy of the constitution to be then sent to the several members of the association for adoption. The revised copy of the constitution as submitted by the committee shall be final and binding until amended in a manner as designated by the constitution. Motion was carried.

The chair then appointed Esterline of Purdue, Huthsteiner of Rose, and Horne of I. U. to act on this committee. The expenses of this committee are to be borne by the state association.

The President then asked for invitations for Field Day. Purdue and Rose both responded. Wabash moved to accept Purdue's invitation. Motion was carried.

The delegate from Purdue could not, at that time, tell on what day the Field Meet would take place, but was instructed to inform all the colleges within a week after the meeting.

MEETING OF ATHLETIC DIRECTORS, JANUARY 31, 1900.

The first business before the meeting was the election of a new secretary of the Athletic Association, to fill the unexpired term of R. P. Dryer. Fishback, '02, was unanimously elected.

Dickerson, '01, was then elected manager of the foot ball team for 1900, this position being vacant owing to the recent resignation of Dryer, '02.

It was decided to instruct the delegate to the meeting of the I. I. A. A., at Indianapolis, February 2d, 1900, to invite the colleges to hold Field Day at Terre Haute this spring, under the auspices of Rose.

There was then considerable discussion concerning certain apparatus needed and improvements to be made in the gymnasium. It was finally decided to appoint one of the directors to look after matters of this kind. Tallmadge, '02, was appointed.

The meeting then adjourned.

The classes in the gymnasium were begun on the 30th ult. There were over thirty who reported the first evening, and that number has been attending regularly. There is a great deal of spirit shown, and all seem to be anxious to get as much exercise as possible. To accomplish this the class has been divided into three squads, so that the members of the class are kept busy most of the time. If the class continues it ought to put the men in good condition to begin training for Field Day next spring.

Huthsteiner, '01, was elected captain of the track team for 1900.

Field Day will be held at Lafayette, May 26th, 1900.

Levi is trying to obtain some idiotic acid from Schwartz.

Dr. Mees will go to Louisville, Ky., to deliver a lecture March 7th.

Flory says, "that antimony is a poison and is used for dyeing purposes.

Dr. Gray delivered a lecture in Indianapolis on the 13th of this month.

Prof. Wagner has recently been in Chicago rendering expert testimony.

Juniors make time fly with Hath's electric clock and an alternating current.

Brentano, '02, was out of school for a week on account of the death of his grandmother.

There is a rumor afloat that Prof. Wickersham is having a novel published by Scribners.

Gymnasium work seems to be the proper thing again, and the classes are now well attended.

With the resumption of gymnasium work, interest seems to have revived in athletic affairs.

Tin-ous acid is now being used in the Laboratory instead of Stannous acid, according to Jones.

It might be well for some of the Poly sign stealers to be cautioned against stealing any small-pox flags.

Would you think that Flory was of German descent when he says, "Prof. Hathaway, I don't see that, *yet*."

According to present plans, the *Modulus*, 1901, will be considerably larger than the last publication of this kind.

Dryer, '02, has left school to accept a position in the drafting room of the National Steel Co., of Youngstown, Ohio.

G. B. Lindenberger, '03, was called home to Louisville, and detained for some days, by the death of his grandfather.

The voluntary enrollment of members for a gymnasium class was amply sufficient to justify the arrangement for regular work.

Prof. Peddle will deliver a lecture to the students on "Valve Motions," and Prof. Faurot will speak on "The Use of a Library."

A. C. Lyon, '01, at a recent meeting of the Camera Club, was elected Secretary and Treasurer, to succeed Pfleging, who has left school.

Recent items of news from Kentucky sources have furnished material for a good deal of raillery at the Kentuckians at the boarding houses.

Order is commencing to reign supreme in the Drawing Room since the leader of the orchestra has become interested in Pen and Ink sketching.

Mr. T. L. Condron, '90, in charge of the Pittsburgh Testing Laboratory, Chicago, will deliver one of the lectures in the general lecture course.

Prof. Newall, of the U. S. Hydrographic Survey, who was to lecture to the students this month, will lecture later, probably about the 9th of April.

The Freshmen's April Fool's Day came on the first of February this year, and the Sophomore proved to be too many for them and fooled them "proper." (?)

As is frequently observed, the upper classmen, especially the Juniors, seem to take a more intense interest in lower class feuds than do the participants themselves.

Dr. Mees recently told the Sophomore Class that when they were in the building everybody knew it. The Sophomores have been wondering why he made such a remark.

A picture portraying Professor Hathaway's room as it should be in the estimation of some of the Sophomores, has been the object of great interest, even to the Professor himself.

The poster prepared by Austin, '03, for the January TECHNIC, shows very marked artistic ability, which it is to be hoped will be put to good advantage during his course at Rose.

During the banquet season, Sherlock Holmes himself could be no more subtle in the detection of "clews" than some of the Juniors. Suffice it to say, there are more clews than events.

Mr. Clement, the new superintendent of shops, expects his mother to join him toward the end of the month, and if they can find convenient quarters, Terre Haute will become their future home.

Next week the Sophomore Class will commence the study of Quarternions. It is to be hoped that they will endeavor to obtain the full content of this interesting and practical subject.

The size of the Freshman Class necessitated the use of the café at the Terre Haute for the banquet, instead of the historic room which most of us have inspected so thoroughly, outside as well as in.

Prof. Aldridge will lecture to the students in the near future. His subject will be relative to the work of the repair ship "Vulcan," which rendered such valuable services during our recent war.

A noticeable lull in the activity of the A. A. G. G. (otherwise the "Amalgamated Association of Gallery Gods") has been noted of late. The prospects are bright, however, for a revival before long.

Mr. Clement has started to work on the Universal Grinding machine. The balance of the detail-drawings are being made, and it is hoped that the machine will be completed sometime in the near future.

We used to have the class banquets to look forward to as the time when we could see some sport. Now that they are over, and we turn around for something else to look forward to we find every one protecting their left arms.

Give the man next to you a hit on the arm and see if you can't have some fun.

In a recent quiz which the Sophs received from Prof. McCormick, he started to give only four problems, but finally decided to give six. Tallmadge reminded the class that the more probelms the bigger the zero.

The fact that the plans of the Student Council and other organizations are encouraged as they are by the Faculty is very pleasing, and shows a co-operation on both sides which is likely to be productive of good results.

The testing trips made on an east-bound locomotive by several of the Seniors proved very instructive. The weather, however, rendered the job of sitting on the cow-catcher to make readings a somewhat undesirable one.

The literary program of the Centenary Epworth League, on Thursday evening, Feb. 1, was under the direction of Polytechnic students. Those participating in the program were Loofborrow, Brewer, Burge and Larson.

The students who have learned to appreciate and make good use of the library, have for some time been enjoying the new acquisitions. The books purchased were especially selected and almost all of great interest to the students of engineering.

It seems that the Juniors are the only ones who are not touched by the vanity of special class distinction. The Seniors and Sophomores wear golf caps with the year of their graduation lettered on them, while the Freshmen wear a very noisy hat of light-colored felt adorned with a bright red ribbon.

Complete samples of steel and iron cable for all purposes, as manufactured by the Roebling Company, have recently been received, and are now being mounted in such a manner as to permit of the closest examination by the students. This company manufactures and handles cables and wire rope of every known description. Thanks are due to Mr. Montgomery, thro whose courtesy the specimens were secured.

Prof. W.—"The Spaniards used to spend a great deal of time and money in the study of logic."

Kidder—"And just see what they have come to."

From the Engineering Press.

A hundred years hence it will perhaps be interesting for somebody to look back and go over the data with which it is sought to show that an American Pacific cable is needed. If cabling is then still depended upon, rather than wireless methods, there will probably be as many cables in the Pacific as there are now across the Atlantic, each one of them earning at least its salt. All those who heard or have read the admirable paper presented by Capt. G. O. Squier, U. V. S., before the American Institute of Electrical Engineers, realizes the imminence of the problems connected with the laying of the first of these cables. The Institute has done a public duty in bringing the matter before its members, many more of whom are likely to become personally interested in the subject than now happens to be the case. No matter what our English friends may do—and it is to be hoped that this great work may be carried on with them in close harmony—the coming magnitude of direct American interests in the Pacific demands that this country shall have a leading voice in the control and management of the new cables. Whether the cables shall be actually owned and operated by the United States Government, as urged with so much force and insistance by Capt. Squier, is a question for Congress to settle. We should prefer to see the cable left in private hands, but we would much rather see the Government put it down than go longer without such an invaluable aid to trade and commerce and the direction of our colonies. Capt. Squier's paper is a most timely contribution to a vital question.—*Electrical World and Engineer.*

The deterioration of a cement plaster on the filter basins of the Leipzig water-works is referred to in an interesting note in Number 23 of the *Thon-Industrie-Zeitung* for the current year. This plaster was as smooth as glass when the basins were put in service about two years ago, but it is now so soft that it can be scraped from the walls like clay with the fingers. The deteriora tion is uniform throughout the basins and is not restricted to work executed with any one brand of cement. It is believed to be due to the carbonate acid in the water, which combines with the carbonate in the cement to form a bicarbonate easily dissolved in water. Since the flow through the basins is practically continuous, the bicarbonate is dissolved graduaily. An examination of the reddish brown mud in the bottom of the basins shows that silicic acid, iron oxide and sulphuric acid have also been separated from the cement plaster. The addition of trass to the cement apparently had no effect on the rate of deterioration. —*Engineering Record.*