Winter 12-1912

Volume 22 - Issue 3 - December, 1912

Rose Technic Staff
Rose-Hulman Institute of Technology

VOL. XXII TERRE HAUTE, IND., DECEMBER, 1912 NO. 3

THE TECHNIC

TERMS

One Year, $1.00 Single Copy, 15 cents

Issued Monthly at the Rose Polytechnic Institute.

Entered at the Post-Office, Terre Haute, Indiana, as second class mail matter.

THE habit of cutting classes has gained quite a hold on some students, or groups of students this year. We do not wish to preach, but if those who do it would only realize it, they themselves are the only losers by such a practice.

It has often been suggested that Rose should follow the example of numerous other schools and allow a certain number of cuts—say one cut per credit per term, with a penalty in case this number is exceeded, or in case a large group of students indulge in what the faculty terms a concerted cut. Of couse, the plan has some disadvantages. Some students cannot really afford to stay away from any classes, and were the scheme adopted, it would really encourage them to do so. In a case of this kind the student himself would have to be the sole judge.

Something should certainly be done to bring to their senses those men who are forever suggesting, at the slightest provocation, or no provocation at all, "Let's cut." If any man thinks that he is good enough that he can stay away from any particular class, let him do so, but it is decidedly unfair for him to ask others to accompany him. Under these conditions, many men do cut classes, simply because they are afraid that the other members of the class will call them quitters. It is a case of taking your choice between getting "in bad" with the faculty or with the rest of the class. It has been our experience that those who instigated these affairs were usually the very ones who needed all the class room work that they could get.

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OUR leading article this month is a lecture on "The Engineering Graduate as a Salesman." This was delivered before the student body a short time ago by Mr. Claiborne Pirtle, '98, who is now Vice-President of the Electric Controller and Manufacturing Co., of Cleveland, Ohio. Mr. Pirtle very kindly put his talk in manuscript form and allowed us to use it for the Technic. "Engineering Salesmanship" is claiming more and more technical garduates from year to year, and to those who are thinking of taking up this line of work, the article should be especially interesting.

THE Alumni article for this issue, "Freight House Design and Operation," by W. G. Arn, '97, is a reprint from the Engineering News of October 31, 1912. We are indebted to Mr. Arn for permission to use the article, and to the Engineering News, not only for the use of the article, but for the cuts employed as well.

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NOW, lest we forget, "Boost for Basketball." All those talks about supporting the football team will apply to other branches of athletics just as well, so bury the little hammers and get together. The football season has taught us one or two things—that any team needs support, and that the season is not over until the last game is played. (Butler found that out, to her sorrow). There is material in school for a good team—one that can duplicate last year's trick of beating Wabash on their home floor. Only one man on last year's squad has graduated, and while his place will be hard to fill, there are several candidates for it. At any rate, boost, don't knock.

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AN Engineering school is in its very nature a special school. The training a student receives is given on the principle that an engineer is an engineer from 7 in the morning until 12 at night, and that the rest of the time is spent in obtaining a little much-needed sleep. The subjects studied are of a technical nature, and little time is devoted to English, Economics, and the like.

To overcome the obvious disadvantages of such a system, the catalogue of the Institute reccommends that the candidate for admission should spend a year or two at some general college before entering Rose. This is excellent in theory, but for financial and other reasons it is practically impossible for most of us to do it. There is but one other way in which we can keep ourselves from becoming very narrow and one-sided individuals. This is by reading good literature outside of school hours.

It is said that the demand for technically trained men in lines of work outside of the strictly engineering field is increasing daily. Such men are needed as executives, superintendents, salesmen and sales managers, purchasing agents, etc. It would be impossible for a man to hold down any of these positions with no further training than that given him in engineering alone. He would have to be able to talk intelligently on almost any subject, and would also be called upon to deal with men. Such work requires quick thinking, sound reasoning, and the ability to put ones thoughts into clear concise English without the slightest hesitation. The power to do this can only be gained by the systematic study of good literature, and since no opportunity for this is offered in school, it must be done outside.

Another phase of the question is brought out in the demand for clean politics. Every man —be he engineer or lawyer—should study the great ecconomic questions of the day in order that he may be able to vote wisely upon them when the opportunity comes. The greatest menace to the country today is not the man who controls the primaries through fraud and stuffs the ballot box to bring about results that will serve his own selfish purposes, but it is the educated man who stays away from the polls, and says "What's the use?" Such a man should be banished to a desert island and made to study such works as Edward Everett Hale's "Man Without a Country" and George William Curtis' essay on "The Public Duty of Educated Men." No man who has not studied the principles of ecconomics, or whose reading has been confined to technical journals and popular fiction, can hope to serve himself, his employer, or his country, wisely and well.

THE ENGINEERING GRADUATE AS A SALESMAN

By Claiborne Pirtle, '98.

IT is often erroneously assumed that only those persons engaged in selling goods and materials of one kind or another are Salesmen. The best definition I have heard of Salesmanship is this:

Salesmanship is the power to persuade others to purchase at a profit that which one has to sell.

We all have something to sell, so we are all Salesmen. Most of the Senior Class will have to sell their service next June and they will want to sell at a profit; not necessarily a monetary profit, but rather where they can get the most profitable experience. No one is a salesman who does not sell at a profit and a true salesman will make few sales that do not profit both the seller and buyer. If the buyer does not profit, he cannot continue to buy, and if the seller does not profit, he will soon have nothing left to sell. If a seller takes all the profit, the buyer will not deal with him again and the seller must ever find new buyers. Such a seller is not a salesman but a mere trickster and usually ends with no profit to himself either monetary or otherwise.

In selling your service you must pay a profit and the bigger profit you pay the bigger profit will be returned to you. The life of most men during their college days is a sheltered one—father pays the bills, and several years as a rule are required for them to realize that they must give a profit on their service and that if they do, it will be returned to them when they have proven their worth.

Many college graduates, and especially engineering graduates, think their diplomas should secure them positions at once at a large salary. None of you Seniors would expect a buyer to look at your thesis drawings of a machine and contract to buy the machines from you at a profit. You would expect difficulty in influencing anyone to invest the actual cost of building the first machine, and you would expect him to try the first machine for a long time in actual service before investing heavily in its manufacture. Your diploma is merely the thesis drawing of the machine that R. P. I. has been making of you during the past four years. You must not expect any one to invest more than the actual cost of a modest living in you at first, and you must wait till you have been tried out in actual service for some time before a heavy investment is made in you in the shape of a large salary.

Fifty years ago there were few engineering graduates and practically no engineering graduate salesmen. Now there are many engineering graduates not only serving as engineers, but also as Presidents, General Managers, Production Superintendents, Purchasing Agents, Sales Managers, Salesmen, etc., and in a broad sense they are all Engineer Graduate Salesmen.

And now I am going to quote liberally from Arthur Frederick Sheldon on "The Science of Successful Salesmanship."

"The business world is divided into two great classes; first, the manufacturing or industrial class—those who make or prepare the world's products; second, the distributing class—those

who sell and market the products which the industrial class has furnished. While these two classes are distinct, they are also by their nature firmly allied and their relation very intimate.

The two great divisions of the business world need men and women, both employers and employes, who can mix brain-stuff and soul-stuff with their work. In this age of keen competition, which amounts to a struggle for the survival of the fittest, business has crying need for speakers of words that mean something, words that weigh, not mere talkers. It needs the spirit of action and enthusiasm in employers and employes alike. Body, soul and intellect must all be in the work.

Only thorough education can supply these needs, and here I must tell you briefly what it is I mean by thorough education. It consists, in effect, of two processes: the filling-in of knowledge and the drawing-out of the latent faculties of mind, soul and body. In other words, it is the enrichment of the whole man, or the whole woman, by acquisition on the one hand and development on the other.

It must be admitted that both divisions of the business world have numbers of men and women who are admirably educated. But we know there is plenty of room for more. There are millions who do not come up to the right standard. Moreover, it is certain that no one is so strong, either mentally, morally or physically, but he may become stronger. This is a truth which no one will more readily admit than they who are already strong.

If there is anybody who needs to dig down to law and principle, needs to comprehend the how and why of things, needs the filling-in of knowledge and the drawing-out of latent powers—which are both essential to thorough education—it is they who bear the mighty burden of producing and distributing the world's wealth.

This brings us straight to the question, who are the world's salesmen? In the general sense, I would promptly answer, that they consist of our business establishments of every grade and kind.

Any intsitution, great or small, whether it be a corporation, a partnership, or an individual firm, which has for its object the sale of goods for profit, is a Salesman.

It is a collective or composite salesman, and every worker in it, from the president down to the office boy, is a member of that composite salesman. The object of the concern, as a whole, is the sale of goods for profit, using the term "goods" to apply to anything which is kept or handled for sale. The item of profit on the balance sheet at the end of the year is the kernel of the enterprise. The quality of salesmanship exercised must be gauged by that profit. If the amount of the profit is substantial, it may be taken for evidence of good salesmanship by the institution as a whole. If the profit be small, or the balance is on the wrong side, the salesmanship has been bad. The establishment may have good salesmen among the workers who actually make the sales, but either by poor management or things going wrong "inside," the profits may be destroyed. It is thus we preceive clearly the unity of the concern from the viewpoint of salesmanship.

The firm or corporation that furnishes anything for profit, is by that fact a collective or composite salesman. All who share in its work or help to manage its affairs are concerned, either directly or indirectly, in the problem of good salesmanship. They should all alike be moved by the principle of unity just explained.

It is not alone mercantile firms we must take in this light. The railroad company, for example, sells transportation and sometimes its own securities. A Gould or a Vanderbilt is not less a salesman than one of his freight or land agents. The banker sells money and the use of money, and is also an interested party in the sales of his mercantile clients.

Real estate firms traffic in houses and lands. Gas companies, water companies, electrical companies, even municipalities and states, are

more or less engaged in the supply of goods or services for profit.

Hence, all the chiefs and officers of these various enterprises need to be experts in the business of selling, since it contributes not alone to their own advancement, but to the profit of the investors or capital they serve. In all such institutions, including those of a strictly mercantile nature, from the president down to the humblest clerk or office boy, each is a part of the composite salesman. They are like so many organs or limbs in a gigantic creature whose mission is the sale of goods for profit. If they all work well and work together, that is, if they work on the basis of science and harmony, the result cannot fail to be the profit desired. If they do not work scientifically, if any organ or limb is either faulty or incompetent, the giant is to that extent disabled and misses the expected measure of profit.

And on this condition of all getting together and pulling together, the interest of employers and employes is identical. The greater the item of profit, the better can the employer afford to do by the employe; and in the long run and on the average, must and will do.

Looking at this question in a still broader light, we might say that every active member of society is in one sense a salesman. Nearly all are at times engaged in selling transactions. The farmer sells the product of his toil. His profits in many cases depend upon his salesmanship, his ability as a business man.

The laborer in the industrial world sells his labor. He is a "speaker of words" when getting his position and he sells his goods, his services, on the "installment plan," one delivery each day. How long his contract for delivery shall continue, depends almost entirely upon the quality of his goods, the excellence of his service.

Thus, we see that Salesmanship, the business of profitably marketing one's services or goods, is an attainment which concerns almost everybody.

But now let us focus our view on those who are commonly regarded as the world's salesmen, professional salesmen, persons whose specific business it is to sell goods and who make their living by it. If we look out over the whole realm of trade, and commerce, we shall find that all its selling or merchandising is done by one or another of four classes of salespeople. These we may name as Retail Salesmen, Wholesale Salesmen, Specialty Salesmen and Business Promoters.

The Retail Salesmen comprise what are known as clerks or counter workers in the retail trade.

By wholesale Salesmen we mean commercial travelers; the men who sell goods "on the road," to the houses that retail them. As we use this term, wholesale salesmen, it of course includes the merchants and jobbers and manufacturers who employ these travelers, as well as the clerical and industrial staffs of the wholesale concerns.

Specialty Salesmen comprise those who sell a particular article, commodity or proposition to individuals or firms on whom they call. They sell to persons or concerns who buy for their own use, consumption or enjoyment.

The fourth class, termed Promoters, are salesmen who undertake to initiate and organize new enterprises, the launching of new corporations and the marketing of their stocks and securities, and, generally speaking, the financing of such large enterprises as railroads, steamships, mines and manufactures.

Those of you who become professional salesmen will very likely work in the two highest grades, that is, Specialty Salesman or Promoters. You will sell machines or material involving engineering in their makeup and use, or you will promote companies for the manufacture and sale of such machines or materials, or you will do both of these things.

I find that very many people have confused notions as to the difference between science and

art. They frequently use the terms as if they were synonymous. This is not the case, by any means, and you, as a student of science, must know and realize the difference with all precision.

Let us go down to the primitive roots of the two words. Here we find that art is simply *doing*, while science is *knowing*. Art is a work, a task, a business. Science is the knowledge that qualifies or guides to the performance of the work. Science shows us how things should be done, and why they should be done in speific ways.

Science thus deals with cause and effect; and hence it must include the statement of principle. Art can only reach excellence as the product of this knowledge. There is no worthy art without the exercise of science. Therefore, all art is a fruit or product of some fundamental science. We cannot do things right unless we know *how*. We do them better if we also know *why*.

It is thus Herbert Spencer tells us, "What we call learning a business really implies learning the science involved in it."

John Ruskin put the same truth in his own picturesque style when he said: "The doing that makes commerce is born of the thinking that makes scholars." And again, in his famous Dictum, that "Life without industry is guilt, but industry without art and education (that is, without art founded on science), is no better than sheer brutality."

It is by methods founded on science that the element of profit is chiefly attained. Witness in many industries the use that is now made of wastes and by-products. In the gas-works, for example, the coal-tar that was formerly thrown on a rubbish-heap is converted by science into a number of valuble products. It is here we get the whole series of beautiful aniline dyes.

So it is with the wastes of abattoirs or slaughter-houses. In a circular from the Chicago Stock Yards I have seen a list of no less than seventeen valuable drugs that are produced from the refuse cast aside by the meat butchers.

In the industrial field of the business world it may be said that the success of nearly all our manufactures depends on the science of rational mechanics. Every known machine is an embodied theorem, and in these days we owe to machinery nearly all the arts of production. "Trace the history of your breakfast roll," observes Mr. Spencer. "The soil out of which it came was drained with machine-made tiles; the surface was turned over by a machine; the seed was put in by a machine; the wheat was reaped, threshed and winnowed by machines; by machinery it was ground and bolted, and the flour made into biscuits. Look around your house, probably the bricks in its walls were machine-made; by machinery the flooring was sawn and planed; the mantel sawn and polished; the paper hangings made and planed. The legs of the chairs, the carpets, the curtains, are all the products of machinery. And the book you read,— are not its leaves fabricated by a machines, and covered by those words by another? Add to which, that for the means of distribution over land and sea, we are similarly indebted. And then let it be remembered that according as the principles of mechanics are well or ill-used to those ends, comes success or failure, individual and national."

Thus it is clear that nearly all the pursuits and activities of men, industrial or commercial, are vitalized and aided to success by means of science. Some of them depend on one science and some on two or more. And here we observe a process of great interest.

Many industries and callings have become so wide in their scope that the facts and principles belonging to them have called for separate arrangement, and thus have branched out as new sciences. The old-time mariner, for instance, drew his help from Astronomy, Meteorology, and other sciences in the making of a sea voyage. When these various fragments of science were finally grouped and harmonized together

they became the science of Navigation. So it was with the special knowledge of the farmer. It came to him in so many chips from different sciences, each bearing in some way on the raising of good crops, until at length this knowledge was unified and termed the science of Agriculture.

Commercial sciences have grown up in the same way. The business of the money-changer has become the science of banking. The methods of the ancient book-keepers have shaped the science of Accounting. We have sciences of Transportation, of Advertising, of Insurance, and many others that have sprung out of the details and methods of business life. Up to date, however, there has been no Science of Salesmanship, although selling or merchandising is essential to trade of all kinds and bristles at every point with principles and details. Hence, we are prompted to ask how these various sciences grew and took form, and if the same development can be accomplished in salesmanship.

There are able and successful business men who claim offhand that there is no science in Salesmanship but that is simply because they have not reflected on the subject. They have been successful themselves because they have worked in harmony with natural laws of success, consciously or unconsciously; and my experience thus far shows me that it has been oftener unconsciously than consciously. The same laws of success, the same basic facts, truths, and principles which they utilized in their business, are those that when organized become the Science of Successful Salesmanship.

The man who wants to grow and seeks for light; who works by principle; who studies the why and wherefore of all his acts and methods —in a word, the Scientific Salesman, is he who will be fit and ready in every business emergency always ripe for larger responsibilities and always on the direct road to success.

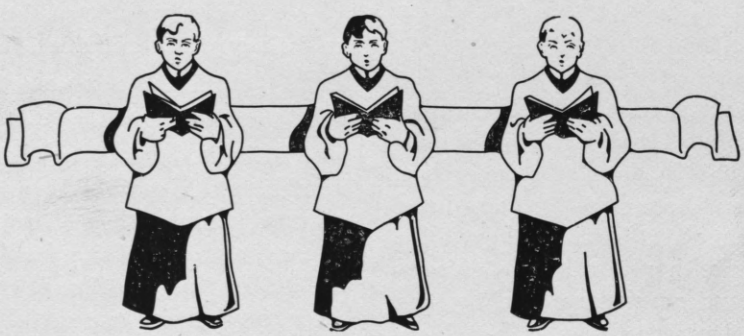
A merchant was once asked: "How many salesmen have you?" His answer was, after a little reflection, "I have three." "Why," his friend remarked, "I thought you had many salesmen." "I have many people engaged in the work of selling," said the merchant, "but I have only three salesmen. The rest are simply order-takers."

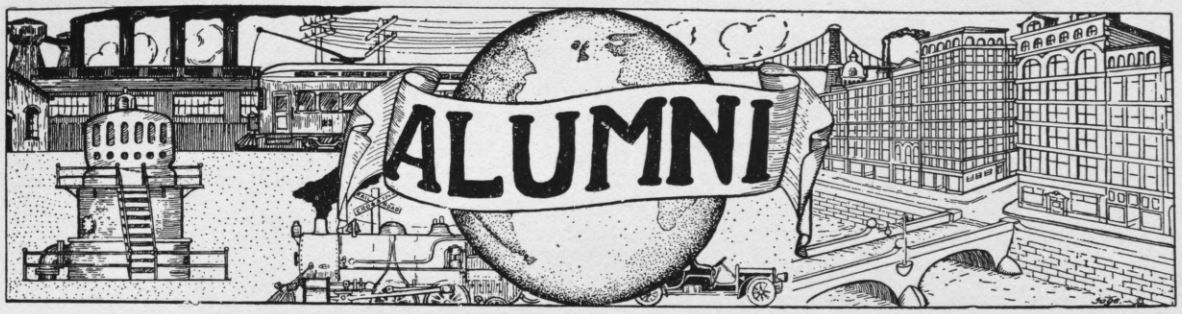
There is a great difference between a salesman and an order-taker. The order-taker simply takes orders from the people who already wish to buy. The salesman stimulates desire and really sells something.

"Show me the individual who is a master of the science of character-building, and who is utilizing his knowledge to the end of becoming stronger in body, mind, and soul; who is an expert in reading his fellowmen; who, with a clear understanding of the basic principles of analysis and synthesis, is a good business logician; and who understands the psychology of selling so thoroughly as to apply its principles, and I will show you, not simply an order-taker; I will show you a genuine salesman."

The time given, is too short to do more than point out the importance of Salesmanship to every individual, no matter what his occupation or ambition. Many able men fail to realize their ambition because they are inherently poor salesmen, and in addition have given no thought or effort in this direction. On the other hand, able men who are successful are invariably good salesmen, either inherently or through self-education. R. P. I. is giving you a good understanding of the sciences underlying the art you will practice after graduation for a living, and the scientific education you here receive, other abilities being equal, will make you a better salesman than those without such an education. Self-education is the best education in salesmanship. You may learn a great deal by reading the books that have recently been published on this subject, and by observing the selling methods of successful men in your line of endeavor; but as in all education this will merely give you a foundation and ideas on which to build your own structure.

That there is a Science of Salesmanship may be questioned, but no one will question the fact that the business of selling is an art, and if a science underlies this art, knowledge of the science will help greatly in the practice of the art.





FREIGHT HOUSE DESIGN AND OPERATION

By W. G. Arn, '97.

IN freight stations in the larger cities the cost per ton for handling outbound freight is entirely out of proportion to the other transportation cost, and runs in some cases to a maximum of $1.50 per ton, almost as much as the average receipts for a 200-mile haul. This expense covers the following items: 1, switching cars into and out of house; 2, handling goods through house from wagon to car; 3, cost of agent and office clerks; 4, a fair return on the land value; and, 5, a fair allowance for interest, maintenance and depreciation on building and tracks. Any material reduction in this expense must of necessity be made in the items of handling and switching, which together cost (in some stations) as much as 50c. per ton. Both of these items depend upon the design of the station.

The cost of handling, however, depends also very largely on the method of moving freight through the house; that is, whether it is moved by the old method of hand trucking, or by such modern methods as motor trucks, telferage systems, or conveyors. The meaning of the term "conveyors" in this article is limited to that ordinarily understood; that is, platform, belt, chain or bucket conveyors.

The hand truck is undoubtedly the most economical method for small stations. Many existing stations can be equipped with motor trucks to effect a material saving in handling. No conveyor has yet been devised which is adaptable to the great variety of goods which must be handled in the ordinary freight station. The telfer, or monorail crane, which has been in use for a number of years in various manufacturing establishments where only one commodity or one class of packages was to be handled, has now been adapted to the diversified needs of a freight station. In the freight station of the Missouri, Kansas & Texas Ry. in St. Louis, all freight is handled by telfers, thus demonstrating the feasibility of so handling all the varied articles handled by railways in their less-than-car loads freight business.

THE DESIGN OF A FREIGHT STATION.

In this article it is proposed to discuss the

principles which should govern the design of a modern freight station, and to submit several designs for such a station. The item of land cost, or value, is of great importance. In some cases it is an impossibility to secure the land necessary on which to erect a station of such size as to give the most economical operating results. In other cases the land may be so expensive that the railway company would not be justified in making the outlay necessary to secure the minimum operating cost. A two-story or double-deck design (Figs. 1 to 3) is submitted to cover such cases. That is, to give a maximum of capacity for a minimum use of ground space. One design submitted (Fig. 4) is for a station which will have the minimum operating expense. A third design (Fig. 5) is for a station where the ground space is not the maximum, where the cost of handling through house will be about the minimum, but where the item of switching will be heavy.

The requirements of the ideal modern freight station may be listed as follows:

1. Economy—The savings to be effected in operation must be such as to at least pay the interest on the increased investment.

2. Minimum Switching—The switching must be reduced to a minimum, to do away with spotting and coupling cars and the consequent delays and damage to both cars and freight.

3. Minimum Handling—There must be a minimum of handling of goods, from the wagon bed or transfer car to the truck, and from the truck to the outbound car floor. It may be that in handling from business house to station (or vice versa) one handling could be saved on many classes of goods by the use of a carrier on wheels. This would be loaded at store or warehouse, pushed onto a wagon bed or frame, hauled to the station, pushed off (or lifted from wagon bodily by telfer) and taken direct to car, pushed into end of car, and then unloaded. All this would be done with only two actual handlings of the goods, except such items as must be weighed or have their weights check-

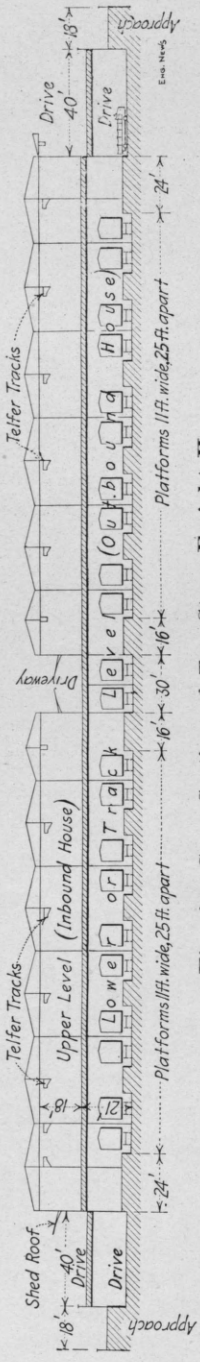


Fig. 1. Cross-Section of Two-Story Freight House. Outbound freight (and tracks and platforms) on lower floor. Inbound freight (and telferage system) on upper floor.

ed. In some stations the goods weighed may be small percentage, possibly as low as 10 per cent; while in other cases the proportion weighed may be even as high as 60 per cent. Where a whole carrier load is for the same destination and takes the same rate it can be pushed on the platform scales or weighed on automatic scales in the telfer track.

4. Rapidity—There must be ability to handle all the diversified articles which pass through a local freight station for L. C. L. shipments in the least possible time (either minimum distance or with rapid speed and minimum empty haul.)

fact that much inbound freight is held for one or more days on the floor of the inbound house before it is called for, or before it can be transferred to a storage warehouse and a storage fee charged.

6. Convenience for Drays—The station must be made as convenient as possible to drays, and must avoid unnecessary detention of the drays in delivering and receiving their loads.

7. Handling Steel and Iron—The station should include electro-magnetic hoists for unloading steel and iron products, and possibly also for transferring these products.

8. Unloading and Loading Cars—If cars

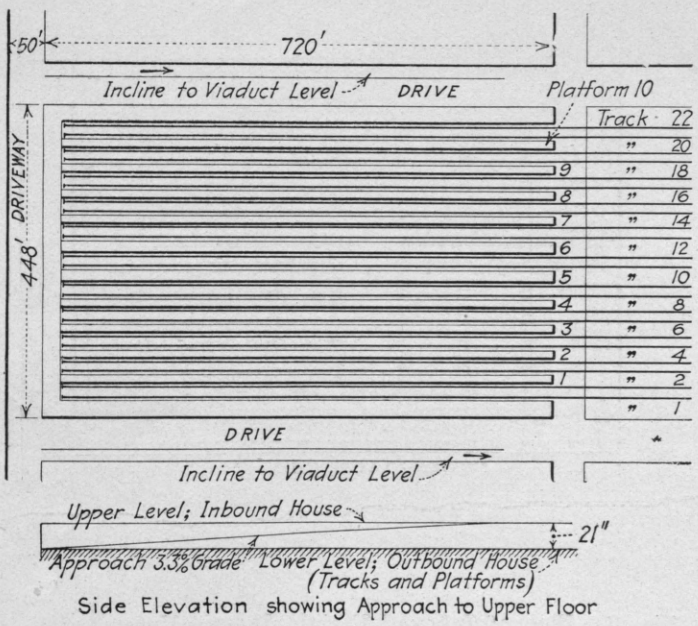


Fig. 2. Plan of Outbound Freight House (Lower Level) (No. of tracks, 22; 16 cars (45 ft.) to each track. Total No. of cars, 352. Floor space, 44,160 sq. ft.)

5. Minimum Space—The station must have minimum floor and platform space consistent with economical handling, and utilize this space to the greatest advantage. This means that the space required for trucking be reduced to a minimum, as for instance in a house operated by telfers. However, it cannot be hoped to entirely eliminate floor and platform movements of trucks. Here must be taken into account the

coming to the station with freight to be unloaded (either inbound or transfer) could be loaded where they are placed for unloading, a big saving in switching and an increased car efficiency could be effected. As a general proposition, however, this would seem to be impracticable for reasons as follows:

A—All cars to be loaded are placed in station order for the train they are to go out on,

so that if they can be loaded while coupled up, all that is necessary in getting out a train is for a track (or two or more tracks as the case may be) to be pulled and the engine coupled on and the caboose picked up.

B—The cars in which inbound and transfer freight are received are not always available for outbound merchandise loading, sometimes the car itself is not suitable; occasionally one is in need of repairs, and frequently it is a foreign car the home route of which is in another direction from that in which the goods are to be sent.

C—In all stations the outbound cars are given a series of numbers by carding (for instance, from 1 to 300 in a very large station), according to the position occupied. The car for a certain destination is given the same position and card number from day to day. Consequently it would interfere very materially with orderly and efficient handling of freight to have, in a string of cars which has just been unloaded and was to be loaded up for an outbound train, occasional foreign, crippled or unsuitable cars which were occupying needed space and would have to be switched out after the other cars were loaded, sealed and ready to leave terminals.

9. Flexibility in Use of Tracks—This means the ability to use an outbound, inbound or transfer track for cars for either of the other classes, if occasion demands. Also the ability to switch on any track in the station without interrupting work on any other track.

10. Compactness—The whole station (inbound, outbound and transfer business) should be under one roof and on same floor level.

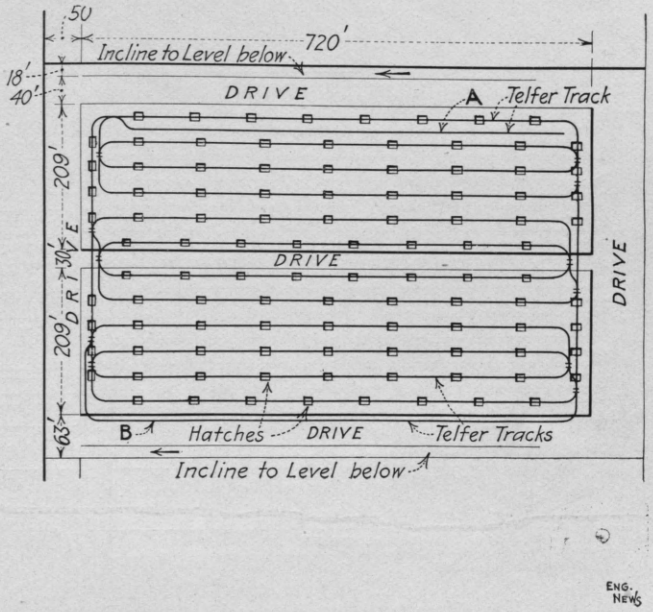


Fig. 3. Plan of Inbound Freight House(Upper Level)
(Hatches under telfer track, 10x18 ft. Floor space, 255,000 sq. ft. Telfer track A is a storage track for telfers. Telfer track B is for handling heavy articles direct from wagons.)

11. Trucking—Ability to vary trucking capacity in proportion to business up to the maximum.

12. Extension—Ability to increase capacity of station by extensions.

13. Methods of Handling Freight—The station to be so designed that it may be operated by telfers, hand trucks or motor trucks.

HANDLING FREIGHT WITH TELFER SYSTEM.

The ordinary method of handling outbound freight from dray to car is as follows: The goods are taken off the dray, checked as taken off, loaded on trucks; trucks pushed on scales and load weighed; truck taken to car and unloaded in car. Or if a large truck is loaded for several cars, the goods for each car are placed on a hand truck or laid on floor at door of car into which they should go and are placed in car by the stowman.

In a case where every package of a load is to be weighed, the truck (carrier) would be placed on automatic scales and weighed, or if all trucks be made to weigh the same, the scales could be set to register zero for the weight of the carrier, then as each package was placed on the carrier its weight could be obtained and recorded. The telfer man would then come along and pick up the carrier, carry it around, and set it at the door of the car in which the goods belonged. The carrier would then be pushed into the car and unloaded as in case of a hand truck, or pushed from car to car, if it held goods for more than one car, leaving at each car's door the goods to go in that car.

With the trucks now in general use (principally hand trucks, but supplemented by four-wheel trucks handled by two men) the average load is about 175 lb. per man. With a telfer system equipped with carriers which will readily enter and turn in a box car (say 3 1-2x5 1-2 ft.) the average load should be raised to 700 lb. for outbound and transfer freight and 1050 lb. for inbound freight, at the very lowest figures. This is an increase per movement of 300 per cent. in the former case and 500 per cent. in the latter. Apparently this saving would be partially offset by the increased distance the freight must be moved. But as the speed of the telfer when in motion may be 1000 ft. per min. on straight track (with an average of half that), while the speed of the man with hand truck is 500 ft. per min. as a maximum (with 250 ft. and probably less as an average), there is in reality no offsetting disadvantage on account of increased

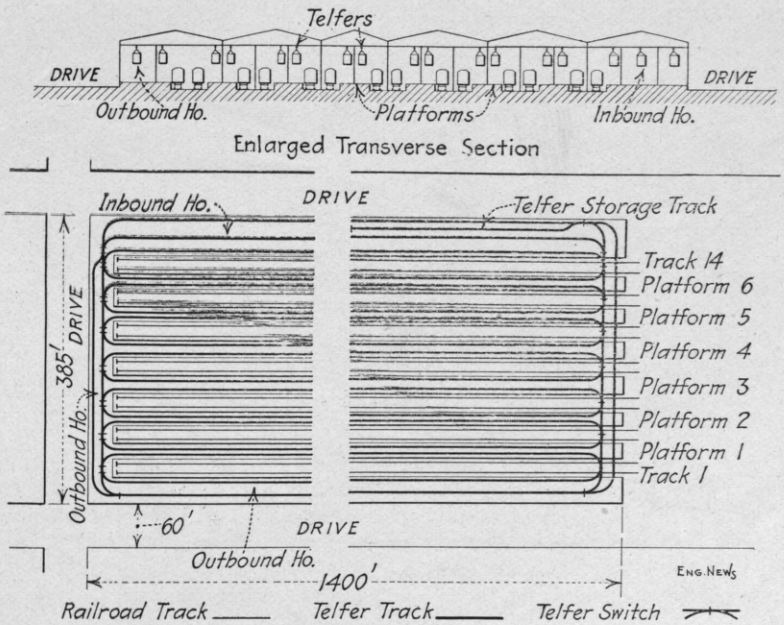


Fig. 4. Proposed layout of a large Freight Station with Telferage System. (Tracks in pairs; capacity, 420 cars.)

distance.

In order to waste no ground space, the platforms between tracks must be no wider than is really necessary. Such a width would seem to be about 18 ft., to give room for two trucks to pass each other while other trucks are also standing on the platform. The goods for peddler cars (cars which have goods for more than one station, to be unloaded by the crew of local freight) must be loaded in station order so that there may be no delays in the local train crew getting it unloaded. Thus, it will frequently be necessary for trucks with goods for certain points to stand loaded outside the car until the goods for stations further along the line have been loaded into the car. As many of the cars loaded at a large station are peddler cars, considerable platform room may frequently be needed for trucks which may not be immediately unloaded into these cars, otherwise the platform width could be made considerably less than 18 ft.

The idea was considered of having a space either at the end of the station, or an elevated platform over the tracks, but under the telfer runway for a sorting platform. This has not been included in any of the plans suggested, as it is thought the fixed charges on the extra expense of construction, and the expense of the additional handling which would be necessary for such goods as would go to the sorting platform, would be more than the expense of handling such goods by peddler trucks loaded for not to exceed five different cars and preferably for as many cars less than that number as will give a reasonable telfer load.

As the outbound house is merely for receiving and weighing the freight, which should be moved promptly to the platforms, the house may be narrow, 30 to 35 ft. in width being ample. The inbound house should be much wider, as a large part of the goods received is held on the floor for 24 hours, or even 48 hours and longer. In Figs. 4 and 5 the width is 35 ft. for the outbound and 55 ft. for the inbound house.

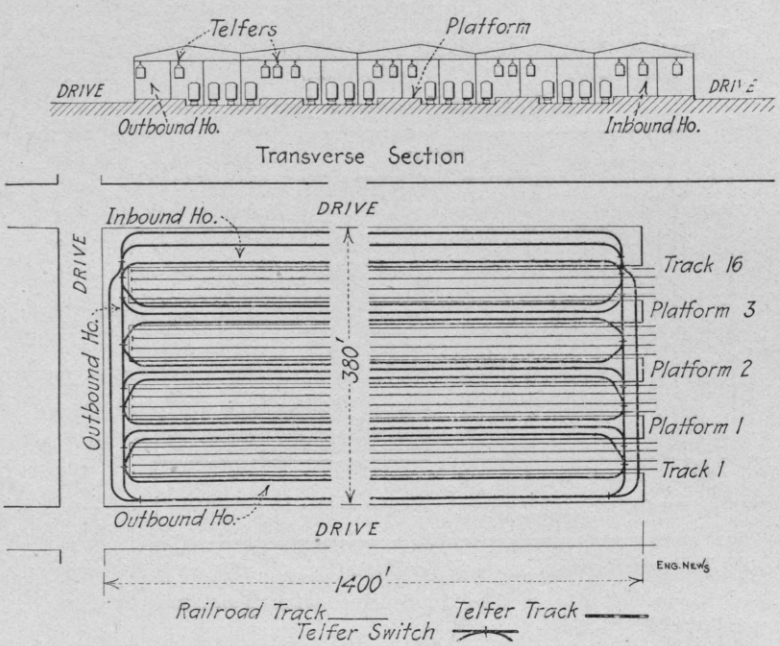


Fig. 5. Proposed layout of a large Freight Station with Telferage System. (Tracks in groups of four. Capacity, 480 cars.)

While it is not hoped to do away entirely with hand trucking, it will be reduced to a minimum. The use of the ordinary two-wheeled hand truck will be dispensed with almost altogether by the use of such a truck as suggested and the layouts proposed. The use of the hand truck will be limited principally to the following work: 1, moving heavy packages from the transfer cars to outbound cars when the distance is short; 2, unloading inbound cars where the cars are on the track next to inbound house; and 3, handling packages which have been sent to wrong cars.

The manual labor involved in the movement of the four-wheeled telfer trucks or carriers will be as follows: loading truck; pushing truck under telfer track after it is loaded, then after truck has been carried by telfer to the proper car, pushing truck into car and unloading it. In the case of some goods which cannot be carried on the regular carrier, but which must be carried in a sling (as pianos), the load can be deposited on a truck at the car door and then shoved into the car and unloaded. Other goods such as long pipe, rods, bars, etc., which are best carried in slings, can be usually deposited with one end at or possibly sticking into the car door so that the material can be readily carried or dragged in by the stowman.

Among the requirements for the telfer equipment are the following: 1, the carriers should be light, ball-bearing, on springs, small enough to push into end of car and capable of being loaded and unloaded with minimum effort. 2, The grapple (apparatus on telfer for taking hold of carrier or truck) should be such as can be operated entirely by the telferman without assistance. 3, The switches in track should be capable of being operated by the telferman while his motor is moving. 4, An extra track should be provided for telfers not in use or those to be repaired.

COST OF OPERATION.

In a station in which the business is large enough to require such a plant as shown in the layouts suggested, the cost per ton of handling by the present methods of hand trucking will run about 37c for inbound and 50c for outbound freight. The average will be above or below 43c, depending on whether outbound or inbound business predominates. Taking in detail a case where the average cost per ton was 45c, it has been found to be made up as follows (exclusive of the cost of the freight agent and his office force.)

	C
Supervision (foreman and assistants)	1½
Clerks receiving, delivery, revising and sealing foreman's (does not include clerks in agent's office)	11
Callers (men who handle goods from dray to truck)	7
Stowers (men who place goods in car)	5
Truckers	20
Miscellaneous (messengers, janitors, coopers, etc.)	½
	45

It is not to be hoped that there will be any material reduction in the cost of any of the items except trucking, and the probability is that at the beginning some of the others will be increased. However, there should be no permanent increase in the total of these other items and the cost of trucking should be cut in two by the construction of a modern station with such a system of mechanical handling, while in addition the cost of house switching should be reduced by more than 50 per cent.

In the case from which the above figures were taken the item of trucking was for 264 truckers whose daily wages amounted to $581. In a station equipped with telfer system handling the same business, the cost per day for trucking would be about as follows:

40 motormen @ $3 per day	$120
Electric current; 25 kw-hrs. per day per machine, 1000 kw.-hrs. at 2½c	25
Fixed charges; interest, depreciation, re-	

pairs, taxes and insurance, assumed as 15 per cent. on $306,000 (estimated cost of telfer system)—$45,900 per year, which per day is 149

Total $294

The business handled in the example is about 3000 tons per day, in which case the cost per ton with telfer would be 9.8c, which is practically half the cost of the present method for trucking. This would mean a saving of $300 per day, or $92,400 per year of 308 working days, or the equivalent of a capital investment of $1,848,000 at 5 per cent.

The saving in house switching (including interest, repairs, maintenance, etc., on engines) would be at least half of the present cost, or a reduction of 1c per ton. This is an additional annual saving of over $9000, in addition to which is the saving due to avoidance of damage to cars and freight through the jarring attendant upon coupling up long strings of cars. For stations of considerably smaller size the reduction in trucking expense would not be so great

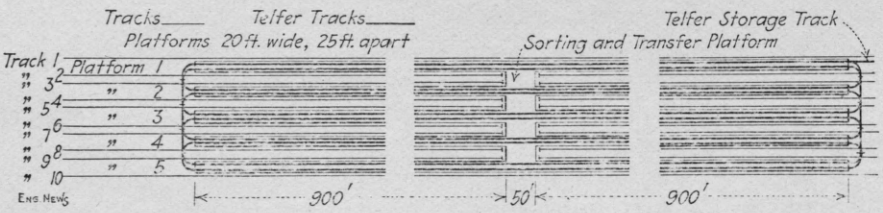


Fig. 6. Proposed layout of a Freight Transfer Station with Telferage System. (Stub tracks, in two groups. Capacity, 400 cars.)

per ton, nor even so great a percentage; but nevertheless it would effect a very considable saving. For any very large station (say 1000 tons per day and upward) the saving in trucking to be effected should be about the percentage shown, that is, 50 per cent.

ARRANGEMENT OF TELFER SYSTEM.

The ideal arrangement seems to be that shown in Fig. 4; that is, a U-shaped house with stub tracks. One wing to be for inbound freight, and the other wing and end to be for outbound freight. The tracks to be grouped in pairs with a platform between each two pairs of tracks. The platforms in this design are 20 ft. wide and 25 ft. apart. This arrangement is adaptable to any size of station and is not only best for the telferage system, but for any method of handling. The economy of this layout for hand trucking has been amply demonstrated in the station of the Grand Trunk Ry. at Toronto, and of the Lake Shore & Michigan Southern Ry. at Toledo. In the latter case, however, the tracks are single instead of in pairs, there being five platforms and only six tracks between the houses.

This arrangement of telfer tracks gives a long maximum and average haul, but it is also such as to give the fewest switches and curves, and to enable a motor on any track to set its truck down in front of the door of any car on that track. Arrangements giving a shorter haul required so many additional curves and switches that the complications, extra cost, slower average speed, etc., were considered as much more than offsetting the disadvantage of the longer haul of the plan suggested. It is intended that as a general rule there shall be no back-up movement of the telfers, the system being so laid out that any point may be reached by a forward movement. Of course, a limited back-up movement is permissible where a motorman can see that he will block no other movement.

Such a station as shown in Fig. 4 should be able to handle economically 6000 tons per day of 10 hours. To do this would probably re-

quire 60 motors, each to handle 100 tons per day. There would be approximately 25,000 lin. ft. of telfer track, and the maximum circuit would be 3600 ft. The maximum haul would be 4600 ft. and the minimum about 50 ft.

On account of the fact that much of the inbound freight is unloaded in the morning and most of the outbound loaded in the afternoon, the empty haul will be considerable, as most of the carriers will move empty one way. In order to have as little interference in operation as possible, and to reduce the empty telfer haul to a minimum, it would seem advisable to use only the alternate tracks for outbound cars; instead of every track in a group, as is customary in the present design of freight houses. This would leave every second track for transfer or inbound freight, each platform thus being used principally for inbound trucks in the morning and for outbound trucks in the afternoon. Some of the transfer freight would be merely moved across a platform to outbound cars, while much would require only a movement along and across a platform.

This arrangement of cars would give over each platform one telfer track for outbound and one for inbound and transfer. Or if the inbound business was in excess, one telfer track for inbound and one for outbound and transfer. Thus certain motors could handle outbound freight exclusively and others handle inbound, but at any time any motor could be shifted from inbound to outbound business(or vice versa) as business demanded. This would result in a minimum interference and probably maximum efficiency. However, if it were found desirable to use the tracks on one side of the house for outbound, those on the other side for inbound and the middle ones for transfer cars, there would be nothing in the design to interfere with such an arrangement.

Fig. 5 is an alternative design, with tracks in groups of four, instead of in pairs. Here the platforms are 30 ft. wide and 30 ft. apart. A comparison of the two designs is given in the accompanying table.

FEATURES OF ALTERNATIVE DESIGNS OF FREIGHT HOUSES.

	Tracks in Pairs	Tracks in sets of Four
No. of cars	420	480
No. of railway tracks	14	16
No. of telfer tracks	17	14
No. of platforms	6	3
Length of Platforms	1400 ft.	1400 ft.
Width of platforms	20 ft.	30 ft.
Width between platforms	25 ft.	50 ft.
Floor space, sq. ft.		
Outbound house	60,500	60,500
Inbound house	77,000	77,000
Platforms	163,800	122,800
Team frontage, lin. ft.		
Outbound house	1,600	1,600
Inbound house	1,260	1,260
Platforms	None	None

TRANSFER STATIONS.

For a station handling only outbound freight two designs are given in Figs. 6 and 7. In the former (Fig. 6) there is a transverse sorting platform in the center, about 50 ft. wide, with long narrow platforms (20 ft.) extending at right angles to it. Between these latter are the tracks in pairs with stub ends against the 50-ft. cross platform. Each alternate track is to be used for empty cars ready for loading; the track just across the platform is to be used for the loads which are ready for transferring. Each track should be long enough to hold the cars making up one outbound train, except where the tracks would be too long, under which circumstances they can be made the length of half a train. Such an arrangement, while making a long station and covering considerable ground, seems to provide a station where the operating expense would be a minimum. As transfer stations are usually built well outside the large cities, the cost of land is comparatively a small item of expense, so that the area of

ground occupied is not as important as in the case in the city freight station.

In the second plan for a transfer station (Fig. 7) there are no stub tracks and no cross platform. Each track runs through the station and is connected at each end to the yard tracks. Here also are narrow platforms, between and parallel with which are tracks in pairs. The platforms in both cases are 20 ft. wide and 25 ft. apart. The advantage of this latter plan (Fig. 7) over the first is that it does not extend over so much ground in order to give the same number of cars in a cut, and the maximum telfer distance would probably be little shorter.

As the cost in many transfer stations operated by hand is 20c (or less) per ton, it is not claimed that any lessening of cost would be affected by installing a telfer system in such a station. But where the cost is above 20c per ton, a material saving should be possible, besides which the capacity of the station would be increased.

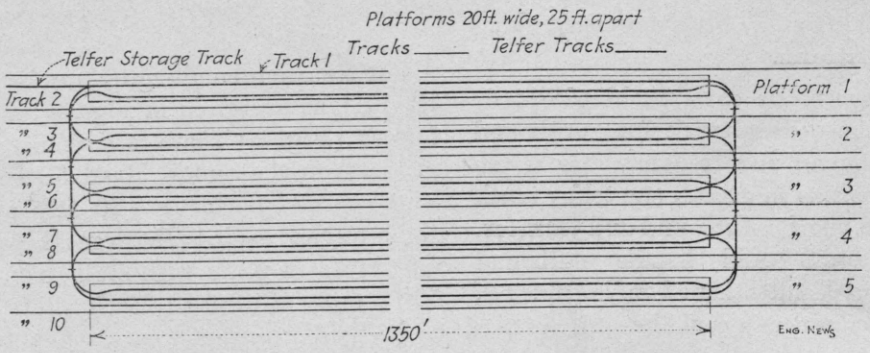


Fig. 7. Proposed layout of a Freight Transfer Station with Telferage System. (Through tracks. Capacity, 400 cars.)

TELFER DESIGN.

In telferage systems there are two forms of the so called monorail crane, or motor hoist, each having certain advantages. In one, the wheels are double-flanged and run on top of a single T-rail on top of an I-beam; in the other, the wheels run on two T-rails, one on each bottom flange of the I-beam. This latter is, therefore, in reality a two-rail track, the wheels of the telfer carriage having flanges on the inside only. The former has the advantage of fewer wheels and wearing parts. The latter is better balanced and probably capable of higher speeds and greater safety on curves, though some manufacturers of the former make the claim of higher speeds for their cranes.

If the use of the telferage system becomes general, it may lead to the development of a new style of box car; from which a section of the roof can be removed, so that loads may be deposited on or taken directly off the car floor. Such cars would be particularly adapted to L. C. L. business and to certain classes of carload business.

—From Engineering News.

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ALUMNI NOTES.

Herbert H. Boyd, '08, is connected with the engineering department of the Burlington Railroad at Centralia, Ill., in the capacity of assistant Engineer.

William Henry Webster, '10, is a member of the Kennedy-Webster Company, of Chicago, dealers in electric specialties.

Mr. Chancey O. Lawrence announces the marriage of his daughter, Maud Ellen, to Ernest E. Garst, '11, Dec. 4, 1912.

Joe V. Davidson, '10, will shortly enter Ohio State University to study agriculture.

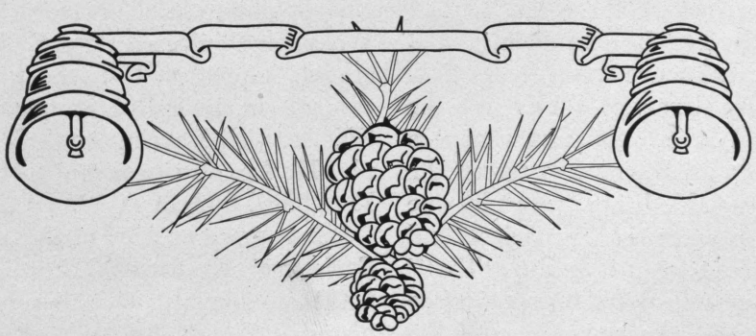
A daughter, Clarice Virginia Blair, was born to Mr. and Mrs. Marion W. Blair, '05, on Nov. 29, 1912, at Kushequa, Pa.

A daughter, Jennie Martin Lee, was born to Mr. and Mrs. A. W. Lee, '06, on Dec. 1, 1912.

The Cleveland Rose Tech Club held a very pleasant meeting on Nov. 23, 1912. Twelve members were present. The next meeting will be on Jan. 18, 1913, and an effort is being made to get some of the members of the faculty to attend.

The Louisville Rose Tech Club held a dinner and meeting recently and listened to a very excellent paper by Mr. R. N. Miller, '01, on "The New Power House of the Louisville and Interurban Railway." The next meeting will be held on December 30, and will be attended by Mr. Carl Wischmeyer, and the Louisville men who are in school at present, as well as the club members. Mr. Wischmeyer has promised to have some lantern slides to exhibit.

The club has intimated to Dr. Mees that at future meetings it will be glad to receive letters from the various student organizations, including the Student Council, on any and all subjects pertaining to the affairs of the Institute. These may be kicks, boosts, suggestions for the betterment of existing conditions, or letters of appreciation for the work that the school is doing. There will also be talks by the members and by outsiders. In this way, the club hopes to get suggestions from all sides, with the hope of using them to make Rose and Rose men stand for even greater and better things than they do at present. We wish to offer them our hearty support, commend them for their loyal spirit, and express to them the appreciation of the entire student body for work that they are doing.



THE A. TO M. RECEPTION.

ON Friday, November 14th, the ladies of the Faculty gave another of their delightful receptions to those Rose students whose names begin with the letters of the alphabet between A and M. However, this reception was more in the nature of a banquet than any before and took place in Herz's tea-room instead of the Heminway house, which has formerly been used for this purpose. The saying goes that the best way to reach a man's heart is through his stomach and certainly the look of contentment on the faces of everyone when the many courses had been consumed must have satisfied the ladies as to that respect of their entertainment.

By eight o'clock most of those invited had arrived and been greeted by the faculty and their wives so the next move was for the tea-room. Here prettily arranged tables met the eye of the guests and gave promise of what was to come. As soon as every one was seated the banquet was on, each table being served by one of our ladies who proved very proficient and accommodating without requiring any "tips." As to the "eats" themselves let it be sufficient to say that Max Hammel, who had charge of the dinner, is a Rose alumnus and he endeavored to outdo himself that evening.

Following the dinner proper President Mees acting as toastmaster, started the ball rolling with a short talk and then called on Mr. Ball, who responded in his usual interesting and humorous fashion. Next Brennan, Kaufman, Brauns and Leibing responded for their respective classes and Prof. Wagner for the faculty Then the gathering disbanded, every one voting the ladies royal entertainers and wishing they could change their names so as to "get in on the next one."

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THERE were several meetings of the various American scientific societies held during the Thanksgiving holidays, and Rose was well represented at all of them. Prof. Hathaway attended a meeting of the American Association of Teachers of Mathematics at Philadelphia, where he read a paper. Rose and Wisconsin University were the only western schools represented on the program. On his return, the Professor stopped at Steubenville, Ohio, to visit Farrington, '96, and other Alumni. He has also promised to pay a visit to the Rose Tech Club of Pittsburg later in the winter.

There was a meeting of the American Physical Society at Evanston, Ill., which was attended by Dr. Johonnot. Dr. Mees had planned to go also, but was unable to do so. Dr. Mees is expecting to be called east this month for a meeting of the Educational Committee of the American Institute of Electrical Engineers.

On Wednesday, Dec. 4th, Prof. Wagner went to Indianapolis to deliver a lecture before the convention of the American Gas Engine Manu-

facturers. His subject was "The Gas Turbine." The paper was praised very highly by the Indianapolis papers.

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FRESHMAN BANQUET.

THIRTY-NINE first year men attended the annual Freshman banquet on Wednesday evening, November 13. The affair was held at the Terre Haute House this year, and was preceded by a visit to the Varieties. After the show elaborate eats were served and were followed up by real cigars.

Afterwards, with Jack Barret acting as toastmaster, the following toasts and impromptus were responded to:

"Chicken" ..... "Dick" Feidler
"Athletics" ..... Carr Goldsmith
"Everybody Up" ..... "Pinkey" Dodson
"P'fessors" ..... "Bobby" Leinberger
"Mid-Terms" ..... Prof. Sage

Personal experiences occupied the remainder of the time, and "Pink Whiskers" Rolinson was very much in evidence at this period, while Prof. Sage proved himself a "real guy." The banquet broke up at midnight with everyone satisfied, although some muttered evil slanders concerning the age of the chickens served.

—M. E. MANSON.

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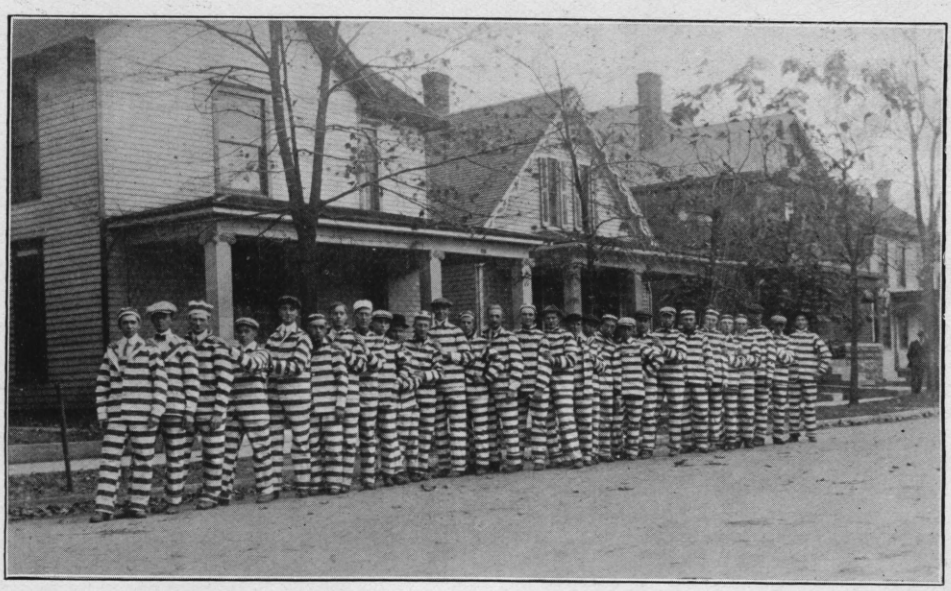
ON Tuesday night, Nov. 26th, the Phoenix Club was the scene of the first Inter Fraternity Charity Dance in Terre Haute. A program of seventeen dances was carried out, to music furnished by Breinig's orchestra.

The Grand March started at 9 o'clock, and consisted of nearly sixty couples. Throughout the evening ice cream and cake were sold by the ladies interested in the Boys' Club under the supervision of Mrs. Redman. At about 12:15 A. M. the dance ended with everyone satisfied that they had had a fine time. Mr. Van Raalte, superintendent of the Boys' Club gave a short talk, thanking everyone for the assistance they had given. The dance was given under the auspices of the several Fraternities of Rose Polytechnic and the High Schools, the proceeds going to the Boys' Club Night School for the poor boys of Terre Haute. —M.R.D.'13.



THOSE SENIOR SHOP UNIFORMS.

1915 MODULUS DANCE.

THE class of 1915 gave its first Modulus Dance on the evening of Friday, December 6th. The dance was well attended, about sixty couples being present. Every one there reported a very enjoyable time, and besides this, quite a good sum of money was cleared. The class hopes that the rest of the school will continue to support them in their whole undertaking of publishing the Modulus as well as they have in this first dance.

Expended by Athletic Association since Oct. 24	$1022.11
Expended by General Fund since Oct. 24	209.49
Expended by Symphony Club since Oct. 24	42.50
Expended by Rose Technic since Oct. 24	175.20
Expended by Y. M. C. A. since Oct. 24	172.25
	$1621.55
Received by Athletic Assn. since Oct. 24	$ 908.09
Received by General Fund since Oct. 24	117.72
Received by Symphony Club since Oct. 24	16.88
Received by Rose Technic since Oct. 24	177.30
Received by Y. M. C. A. since Oct. 24	25.50
Received by Scientific Society since Oct. 24	1.25
Received by Camera Club since Oct. 24	2.50
	$1249.24
Amount in bank on Oct. 24, plus $1249.24	$2595.01

THE JUNIOR HALLOWE'EN BUNCH.

REPORT OF FINANCIAL SECRETARY TO DECEMBER 6TH, 1912.

Amount in bank Oct. 24		$1345.77
Credit to Athletic Association	$ 366.34	
Credit to General Fund	456.65	
Credit to Symphony Club	121.50	
Credit to Rose Technic	213.78	
Credit to Y. M. C. A.	160.50	
Credit to Scientific Society	9.00	
Credit to Camera Club	18.00	
	$1345.77	$1345.77

Total expenditures since Oct. 24		1621.55
Amount in bank on Dec. 6		$ 973.46
Credit to Athletic Association	$252.32	
Credit to General Fund	364.88	
Credit to Symphony Club	95.88	
Credit to Rose Technic	215.88	
Credit to Y. M. C. A.	13.75	
Credit to Scientific Society	10.25	
Credit to Camera Club	20.50	
	$973.46	$ 973.46

ROSE closed a somewhat disastrous season on Thanksgiving Day by defeating Butler on Rose Field. The team was at its best in this final game and showed more spirit than in the DePauw game. The newspaper reports concerning the with-holding of "R's" and abolishment of football at Rose, in case this game was lost, were without foundation, but the team played like they felt that way about it.

Tech started the season with good prospects, but things kept going from bad to worse until it simmered down to a desperate try for the final game. The team had more than its share of bad luck in the way of injuries, and also suffered from withdrawals from the squad, some forced and some apparently voluntary. Those who stayed with the ship all season and played for all they were worth, even while in poor physical condition, deserve all kinds of credit.

The scarcity of material brought constant shifts as the season wore on, and this naturally hurt team-work. We have heard nearly everybody knocked, from Coach McKinney down to some of the subs, but this is generally a feature of a poor season.

As for the actual record of the team, Rose won two games and lost 6, and scored 78 points against her opponents' 260.

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PURDUE 91—ROSE 0.

Rose had no chance against the Boilermakers and went down to the worst defeat in several years. Purdue started scoring three minutes after time was called and kept the ball in Rose's territory most of the game. Tech's best chance to score came in the first period, when the ball was carried to Purdue's 15 yard line. A penalty put it on the 30 yard line, where a place-kick failed.

Purdue out-classed Tech in weight and speed and played straight foot-ball throughout. With five touchdowns and thirteen goals from touchdowns to his credit, Oliphant made 43 points, and was the star of the game. Joe Carter made the best showing for Rose: Line-up:

Purdue (91)		Rose (0)
Street, Ragerstra	L.E.	Baxter
Terry, Herdrick	L.T.	Gray
Ruffner	L.G.	Hegarty

Taylor, Says	C	W. Carter
Reath, Ussner	R.G.	Childs
Winston	R.T.	Stoms (Capt.)
Ball, Applegate	R.E.	Cox
Hutchinson, Lubker	Q.B.	Larr
Hannah, Phelps	L.H.	J. Carter
Oliphant, Purdy	R.H.	Deming
O'Brien, Ogan	F.B.	Hansen, Stevens

Officials—Kittleman, referee; Davis, umpire; Knight, head linesman. Touchdowns—Oliphant 5; O'Brien 4; Winston 2; Ogan, 1; Hannah 1. Score by periods—Purdue 21, 21, 35, 14; Rose Poly, 0, 0, 0, 0.

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ROSE 13—BUTLER 6.

Baxter started at quarter for Tech, with Hegarty at full and Stevens at guard. With these changes, and a determination to finish the season with a victory, the Rose team went into the Butler game and by fighting hard all the way, nosed out ahead, 13 to 6.

Butler scored first. Late in the first period Paul went over the line on a 20 yard forward pass from Summerlin. Up to this time the ball had see-sawed, mostly in Rose's territory.

Tech tied things up in the second quarter, but only after Butler had put up the stubbornest kind of defense. Three times Rose worked the ball up to striking distance, and three times the Butler line held like a stone-wall, twice on the five yard line. After the fourth march up the field, Stoms finally went across on a tackle—around play. He failed to kick goal and shortly afterward time was called.

After an exchange of kicks in the third quarter, Rose worked the ball to Butler's 35 yard line, where an attempt to place-kick failed. Right after this Joe Carter intercepted a forward pass from Summerlin and ran thirty yards or so for a touchdown. Stoms kicked goal. That ended the scoring, and neither goal was in much danger during the rest of the game.

Butler played a good game, with Pavey, Paul, Summerlin and Tabscott doing the best work. Lewis' kicking was a feature.

Every man on the Rose team played a hard, dogged, game. The whole back field performed well. Hansen replaced Hegarty for awhile during the second half and wound up a hard season's work with a brilliant game.

Jim Moore played another great defensive game, and Dolly Gray wound up his college football career with his best game of the season. Line-up:

Rose (13)		Butler (6)
Moore	L.E.	Good
Stoms, (Capt)	L.T.	V. Wise
		Kirkhoff,
Childs	L.G.	Lockhardt
W. Carter	C	Mullane
Stevens, Gwinn	R.G.	G. Wise
Gray	R.T.	Lewis, (Capt)
Cox	R.E.	Burkhart
Baxter, Larr	Q.B.	Summerlin
		Badger
Joe Carter	L.H.	Tabscott
Hegarty, Hansen	F.B.	Pavey
Deming	R.H.	Paul

Touchdowns—Paul, Stoms, J. Carter. Goals from touchdowns—Stoms. Referee—Davis, of Princeton. Umpire—Berndt, of Indiana. Head linesman and timer—Bigwood, of Culver. Time of quarters—Fifteen minutes.

———ooo———

Mr. Stephenson handed us the following summary of this year's work in cross-country runs:

Sept. 28—First run from gym. 1½ miles, 9 ment out.

Oct. 5—Start and finish at Jim Coltrin's. 3 miles, 5 men.

Oct. 12—Same place, but longer course, 4 miles. This was the first hare and hound run, and 18 were out, including 4 from Normal. Fine time, especially Coltrin's pears. Hares were Ransford and Shopmeyer. Time: Hares 30 minutes; Hounds 43 minutes.

Oct. 19—Hares and Hounds at Hulman Farm, fine country. Hares were Stuart and R.

Smith. They left a poor trail and delayed hounds 5 minutes at start. Ten men out. Rolinson's spurt furnished much amusement.

Oct. 26—Hares and hounds at Fresh Air Mission. Five mile trail through St. Mary's with only two girls in sight. Good trail until hares ran out of paper and had to finish with political posters. Plenty of hills. Eleven out. Hares were Pfau, Coltrin and Rolinson.

Nov. 1—Booster's Marathon, 4.8 miles. Ranford first, Shopmeyer second, Stuart fourth, Brooks eighth; time 32:42. Comparing team scores, Rose won, with 14 points to Normal's 22.

Nov. 16—Run from Gym over Inter-class course, 4 miles. Six out.

Nov. 23—Inter-class run.

Practice runs were held nearly every Thursday. The Saturday runs are to continue, weather permitting.

———ooo———

The Inter-class Cross County Run was held on the Saturday afternoon before Thanksgiving and resulted in a victory for the Juniors, although Stuart and the rest of the Freshmen made a gallant try and fell only one point shy of Shop, Coltrin & Co. The total score was: Juniors 23, Freshmen 24, and Sophomores 31. The Senior team had a bad ankle and didn't enter.

A cold wind slowed things up somewhat. The course started from the Country Club and covered 4 miles. Stuart, who finished first, made it in 25 minutes, 12 seconds. Coach Stephenson ran for the Sophomores and finished second. The balance straggled in at irregular intervals. Finally Ed Wallner's handsome face bobbed into view through the wagon gate, and as he jogged across the finishing line, "Marthy" pressed his stop watch for the twelfth time, and the first interclass run was over.

Order at the finish:

Stuart, '16, first, 25:12; second, Stephenson ('15), 25:14; third, Shopmeyer, '14, fourth, Brooks, '16; fifth, Klingman, '14; sixth, Whipple, '15; seventh, Ransford, '14; eighth, Coltrin, '14; ninth, Bordner, '16; tenth, Finley, '16; eleventh, Compton, '15; twelfth, Walner, '15.

———ooo———

By the time the Technic is out the inter-class games will probably be in full swing. From present indications the teams will be prety well matched this year and some close scores should result. The freshmen are an unknown quantity, but the other three classes all contain good tried material.

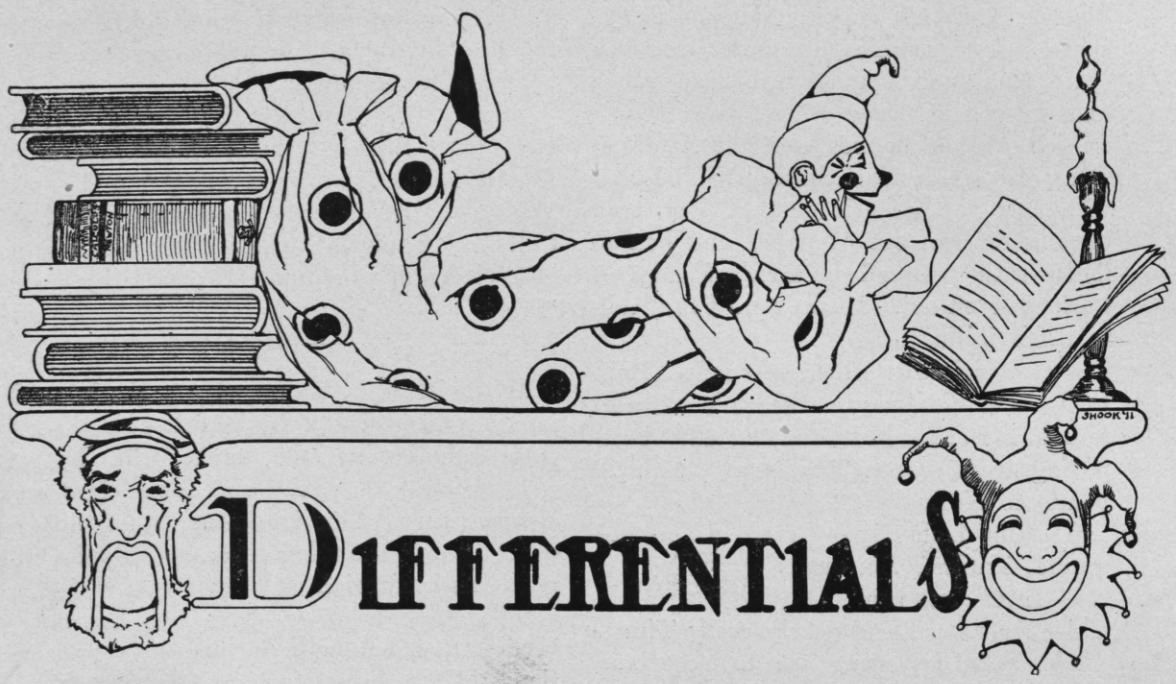
The question of varsity coach has not yet been settled, but with the present condition of the Athletic Association's treasury, it is likely that Captain Gray will be in charge of the squad. He has had experience, knows the game, and can probably turn out as good a team from the available material as a salaried coach. Rose is expected to retain the secondary championship which she won last year.

Manager Madison is working on the schedule and will probably give it to the daily papers before long.

———ooo———

I. C. A. L. MEETING.

THERE will be a meeting of the Indiana College Athletic League at the Dennison Hotel, in Indianapolis, at 11 a. m., Saturday, December 14th, 1912. J. M. Beauchamp and Dr. John White will attend from Rose. Besides regular business, several amendments to the constitution will be taken up. We hope to have a full report of the meeting in next month's issue.



Waggie, in Thermo—I will give you the formulas you need on the examination. In fact, I may give you several, and you can take your pick.

Slim—We may have to take our shovel, too.

* * * *

Smith, '13—Subtract the decimal point from the number.

* * * *

Waggie—The trouble is there are many things to keep on your mind.

Denny—What if you haven't any mind?

* * * *

Jo Jo—You can use either the thumb and finger rule or the corkscrew rule for determining the direction of the lines of force.

Harris—I prefer the latter.

* * * *

Ostrander—It is impossible to work that problem.

Waggie—How do you know?

Ostrander—I tried it and couldn't.

* * * *

Waggie—How did you work that problem, Mr. Novotney?

Schef—He worked it by ear.

* * * *

Senior Chemist—If a girl should refuse me it would break me all up, you know.

Junior Mechanical—Well, you're not very complicated. You'd be easily re-assembled.

* * * *

"What do you use that little note-book for? Surely it is too small for practical use."

"Not at all. I jot down my ideas in it."

—Ex.

* * * *

The thing so remarkable about the last meeting of the Scientific Society was that, in addition to the president, there were several men present who had no college degrees of any kind.

HE'S LOOSE AGAIN!!

For the benefit of those who were not present at the recent Faculty Dinner, we will say that the following verses were inspired (?) by a speech of Prof. Wagner's, in which he said that he had often wished that he could live to be a thousand years old, in order that he might learn all that there was to be learned. He also said that while a student at Michigan University, he at one time had the desire to go and explore the Amazon River.

When Waggie was a little boy
He used to wish that he
Might live to see a thousand years.
A great man he would be.

When he had finished Thermodyn,
And Electricity,
He'd study all 'bout languages,
And then geography.

When he was through with all of these
He'd try a different line,
And study medicine, perhaps,
Or be a lawyer fine.

But when he entered Michigan
He had an idea queer;
He'd go explore the Amazon
Just how is not quite clear.

When he was through with Southern wilds
He then would write some books,
And maybe give some lectures, too,
But not like Doctor Cook's.

But if he'd gone there—'way down south—
And never had got back,
Who would have taught us Thermo then?
Perhaps it would be ———*

Now gentle reader, think of this:
If Thermo's hard, don't curse;
It matters not how bad things are,
They might have been much worse.

*Three guesses allowed.

Fink—Confound (?) that referee.

Mac—Leave him alone, Samuel; he may have a gun.

Fink—I'm used to them.

Mac—No doubt you've been shot a number of times.

* * * *

"Wilberta seems to attract men, doesn't she?"

"Well, her father is a big steel magnate."

—Ex.

* * * *

The man that loves a woman is always elevated, and if he loves two he is sent up. —Ex.

* * * *

The following story from Everybody's is respectfully referred to the Rose Tech Club of St. Louis:

In St. Louis there is one ward that is full of breweries and Germans. In a recent election a local option question was up. After the election some of the Germans were counting the votes. One German was calling off and another was taking down the option vote. The first German, running rapidly through the ballots, said: "Vet, vet, vet, vet,—" Suddenly he stopped. "*Mein Gott!*" he cried:"*Dry.*"

Then he went on—"Vet, vet, vet, vet,—" Presently he stopped to mop his brow. "*Himmel!*" he said. "*Der son of a gun repeated!*"

* * * *

Knippy (in Electricity)—Gentlemen, you will find the information concerning the size of wires in your appendix.

Voice (in rear)—That lets me out, professor, mine was cut out last spring.

* * * *

Mary had a little lamp,
Which was well trained, no doubt,
For every time her lover came,
The lamp, bright thing, went out. —Ex.

* * * *

I drink no more, the Senior said,
And he was right, I guess,
But this he failed to specify—
He also drinks no less. —Ex.

Willie walked on the railroad track;
He didn't hear the bell;
The engine went to Halifax;
I know where you thing Willie went,
But he didn't, because he was walking
On the other track. —Ex.

* * * *

TOO TRUE.

"You certainly have a trim little waist."
I said as she put on her hat.
But she turned me aside and quickly replied,
"You're right—there's no getting round that."—Princeton Tiger.

* * * *

HOW'S THIS FOR AN EXCUSE?

Vice-President Sherman sent a page on the Senate floor on a recent Saturday to ask Senator Pomerene to come up and speak to him. When the Ohioan arrived at the desk, the Vice-President looked at him sympathetically, and said:

"Senator, I called you to ask you if you would mind presiding over the Senate this afternoon. My grandmother is very ill."

"Indeed! What is her temperature?" asked Senator Pomerene, sympathetically.

"Yesterday it was 3 to 1," responded the Vice-President.

Then he stepped down and made a bee-line for the bleachers, leaving the senator holding the bag. —Ex.

* * * *

For the benefit of those hammer wielders who think they could turn out a better Technic than we can, we submit the following:

'Most any one can be an editor. All an editor has to do is to sit at his desk six days in the week, four weeks of the month and twelve months in the year and "edit" such stuff as this:

"Mrs. Jones, of Lost Creek, let a can opener slip last week and cut herself in the pantry."

"A mischievous lad of Matherton threw a stone and struck a companion in the alley last Tuesday."

"John Doe climbed on the roof of his house last week looking for a leak and fell, striking himself on the back porch."

"Mr. White, while harnessing a broncho last Saturday, was kicked just south of the corn crib."—Boston Globe.

* * * *

There ought to be a law against such as these:

"Watt's yer hurry," remarked the commutator, as the circuit was closed.

"Aw, brush by, brush by," answered the current, as it rushed out on the line.

"Why is a tin tomato can tied on a dog's tail?"

"Because it's bound to occur."

"The cement show is a hard proposition."

"The electric show is a light subject."

* * * *

"It is six l-o-n-g miles from Richmond to Webster."—The Earlhamite.

How about it, Pat?

* * * *

THE JOURNAL REVIEW.

(With apologies to Chas. Wolfe.)

Not a sound was heard, not a single word,
As his talk to conclusion he hurried.
Not a student asked a question strange;
It seemed that all interest was buried.

The room was as still as at dead of night,
Except for the gas loudly burning.
It was plain to "Doc" White, as day from night,
That the boys had, for knowledge, no yearning.

Not lightly he'll speak of their energy gone,
And for their sound snoozing upbraid them;
But little they'll reck, if he lets them sleep on
In positions ennui has laid them.

At last the unwelcome task was done,
And the clock struck the hour for retiring.
Sometime, when the chemist is taking a nap,
The boss will insist upon "firing."

—Anonymous.

They were sitting in the sand at the seashore.

"Cholly," she whispered, "you puckered up your mouth just as if you were going to kiss me, then."

"So I was; but I got some of this bally sand in my mouth."

"Swallow it; you need it in your system!"

* * * *

"Hath" had just finished a long list of problems, and had begun to walk his beat on the east side of the room, when one of those cute cut-ups from Brazil (Ind.) yelled:

"Say, professor, are you still dazed over the Democratic victory?"

* * * *

Freshman—Did you say that ether carries light?

Doc. White—I did.

And that ether is everywhere?

Yes.

Then, why can't you see through a brick wall?

* * * *

Prof. Hathaway—When I was at college, I was short-hand secretary to the president. I was compelled, at times, to absent myself from my classes.

Sleepy voice from back of room—Pretty soft, pretty soft.

* * * *

Rumor has it that Guy Stepp has translated the "Canal Song," a Martian serenade, to earth language. The rythm and melting pathos of the verse is unsurpassed. Charley Goffe, under the nom de plume Brutus Goffo, has written a soul-satisfying melody to suit the words. It is claimed by critics that the composer has out-shuberted Shubert.

* * * *

A young lady of ten was discussing her future with her mother.

"Yes, mommie," she said. "I shall get married and I shall have four children."

"That will be nice!" commented the mother.

"No!" continued the young lady after a minute or two of deep thought. "Maybe I won't have four children. I might marry a bachelor."

—Ex.

* * * *

There was a young lady from Kent,
Whose grammar was terribly bent,
She said to her flame
I'm so glad you've came,
But will miss you so much when you're went.

* * * *

"I understand there's a new fellow here this year by the name of Boyce—a great big tall fellow."

"Yes, but I don't think he'll stay long."

* * * *

SENIOR WIT.

Mary had a little lamb,
It's name was Influenza,
And every time she opened the door,
Influenza.

* * * *

SENIOR ROLL CALL.

Adams, Archibald, Bovell, Brown, Cooke, Donaldson, Farah, Garrard, Gildart, Grosvenor, Hardesty, Johnson, Messick, Milne, Newland, Newlin, Parker, Pendergast, Rohm, Roll, Royse, Schweers, Shearer, Sibley, Simmons, Staff, Wallick, Ware.

* * * *

Hoberg, in Civil—What kind of a bridge are you making, Lancet?

Lancet—A 170 foot span, triple expansion, multiple disc, float feed bridge.

Mac (about an hour later)—Hoberg, what is that bridge title that you have on that drawing?

Hoberg—170 ft. triple expansion bridge.

Mac—For goodness sake, don't leave out the six cylinders.

* * * *

Hoberg to Mac, on the afternoon before Thanksgiving—Professor, when we used to go to common school the teacher used to always read us a story on the day before Thanksgiving.

Tuesday—Mac appears at school in a very brilliantly colored tie, which he alleges is not red.

Wednesday and Thursday, a notice appears on the board something like this—"There will be no recitation in Applied Mechanics today, owing to the illness of Prof. McCormick."

* * * *

After most of the Seniors flunked the Applied Electricity exam, Knippy said that he had a Biblical quotation that would fit the class quite well, but he refused to tell it. Scheffel made one very good guess. For partuclars, see him.

* * * *

Sage—I was out last night at a church social and I helped the girls wash dishes, so I am tired to death today.

———ooo———

NEWS OF OTHER COLLEGES.

In a recent investigation of the pawn shops on Park Row, New York City, a number of Fraternity pins were found. The prices paid for these pins range from 75 cents to $10.00. The fraternity men scout the idea that the original owners found it necessary to put their pins in pawn, but believe that the pins were stolen or lost in most cases.

As a penalty for flunking at the University of Colorado, students are required to wear small blue caps with green buttons.

The first plutocrat to be initiated into Phi Beta Kappa is Webb Vanderbilt. He is said to be the first millionaire's son at Yale to be elected to this national scholarship fraternity.

A course in Scandinavian is included in the curriculum at the University of Minnesota.

Women excelling in athletics in Kansas University, will be awarded "K's" by the Women's Athletic Association.

The Freshmen at Reserve committed an unpardonable sin last week by raising their flag to the top of the campus flag pole. The halyards were cut, and it required the services of a steeple-jack to remove the offending "rag."

Michail Doeraz, a Greek, graduate from a college in Constantinople, has entered the University of Pennsylvania. He is now playing on the Freshman football team at that institution. In Greece he was a famous wrestler; he puts the shot forty-four feet. In 1908, he took second place for the javelin throw at the Olympic games.

The Freshman-Sophomore scrap at Yale was declared a draw. They haven't got anything on us!

Johns Hopkins University has night football practice. The field is illuminated by several acetylene lights with giant reflectors.

Two hundred and fifty candidates reported at the first meeting of the musical club of the University of Pennsylvania.

The "ad" rustlers and student salesmen of the University of Utah are organizing a salesmanship and advertiser's club for the purpose of studying their line of work, and secondly for the purpose of aiding Utah undergraduate activities.

The University of Cincinnati has established evening courses in all branches. The entrance enrollment was about 600.

The average age of members of the Freshman Class of Lehigh on September 18th, the opening day of college, was 19 years, 2 months, 21 days.

Syracuse possesses what is considered the finest rowing tank in the world. A shell is moored in a large pool, and by means of gaso-

line-driven propellers, the effect of a river current is produced. There are various devices for the measurement of speed and strength of stroke.

Class scraps take a great variety of forms in different colleges. Syracuse has some of the most unique kinds in the country.

The flour fight is perhaps the most interesting for a spectator to watch. The Freshmen and Sophs line up at the ends of the football field. At a pistol shot, they rush out and soak each other with small sacks of flour for about an hour. There is no decision given, and when the hour is up the fight is all over and everybody is satisfied.

Another of similar nature is the molasses fight, which consists of trying to carry small mugs of molasses the length of the football field, through the opposition furnished by the other class. When a Freshie and a Soph get stuck together the fun is at its greatest.

The new Ohio State Directory shows 3303 students enrolled, of which 3077 come from Ohio. 1035 come from Columbus alone; Cleveland sends 75, Dayton 60, Toledo 59 and Cincinnati 35. Thirty-two states and eighteen foreign countries are represented.

Incandescent lights have been installed on Ohio Field, to enable the football squad to practice after dark.

A new $80,000 Science Building has just been finished at Ohio University. It is said to be as ample and complete as any in the state.

Cornell University is considering the establishment of a new five-year course in forestry.

ALKALI ACTION ON CONCRETE.

IRRIGATION engineers in the Western States, in designing concrete structures, are confronted by two problems: First—The excessive transportation charges for material, and, second, the destructive action of alkaline soil and waters. Extensive tests have been made to determine the feasibility of the general class known as sand-cement, made by certain proportions of inert materials (such as rock or sand) available at the sites of these structures, the mixture being ground to a greater fineness than that of the original cement, has from the first, been of special interest to those investigating the subject.

The first difficulty has been overcome by using from 50 to 70 per cent. as much Portland Cement as would otherwise have to be used, and using various materials, finely ground, such as granites, basalts, limestone and tufas to fill out the remainder.

Tests of such a mixture seem to compare very well with that of the pure Portland cement and the results of five year tests on these cements show that at the end of this period its tensile strength is quite as much as that of Portland cement of the same period. However, taking it as a whole, it has not been deemed advisable to resort to this method unless the expense of obtaining the Portland cement is far too high.

In the case, however, of a single structure requiring a large amount of cement and located at a point where the cost of Portland cement is high, it would appear that this mixture can be safely made, provided proper care is used in the selection of materials and in the process of manufacture, with a considerable saving in cost of the structure as a result.

The general term "alkali" is used to include a varity of substances, of which the salts of sodium and potassium are among the most common, however salts of calcium and magnesium are included in the general term.

It is known that sodium and magnesium sulphides, either singly or together, are the principal salts acting to cause the disintergation of a concrete structure. The chemical action involved is not exactly known but is considered to be something similar to the action of sea water on concrete. This action tends to tear down the structure of the concrete, and in this way to reduce it to powder.

The conditions most favorable to attack appear to be where the concrete in small structures such as culverts, etc., is subject to the action of seepage water coming through the soil at the back, or of water which has become highly saturated and concentrated owing to light and sluggish flow in the water courses in which these structures stand. Also conditions of alternate exposure to water and air as produced by a varying flow in these water courses are especially favorable to this action.

The character of the concrete has a marked effect on the extent to which the destructive action will take place, a dense, well-made grade of concrete being of course more impervious and less readily attacked than concrete of a less dense, porous nature. Along with this the workmanship, and the materials used in the making of the concrete have their importance in this matter.

Briefly the best method of remedying the difficulty, it would seem, is to produce a dense and impervious concrete, such that seepage of the alkali waters through the concrete will be prevented. As to whether this can best be brought about by the use of a specially prepared rich and dense mixture without any other form of treatment, or whether some form of waterproofing will be the best solution is a question now under investigation. —S. N. C.

———ooo———

THE THEORY OF ENGINEERING DRAWING.

(By Alphonse A. Adler, B. S., M. E.)

D. Van Nostrand & Co., N. Y., Price $2.00 net.

THE above is a text book for use in descriptive geometry and general engineering drawing that has been published recently. The work is divided into four parts—The Principles of Parallel Projecting-Line Drawing, Geometrical Problems in Orthographic Projection, the Principles of Convergent Projecting-Line Drawing, and Pictorial Effects of Illumination.

The general treatment of the subject in Part I is excellent. Oblique, orthographic, and the various forms of axonometric projection are taken up carefully and thoroughly. A classification of these various projections is given that should help the student greatly in fixing clearly in his mind the differences between them. A very careful distinction is drawn between axonometric projection and axonometric drawing. Numerous questions are given at the end of each chapter, including many practical problems.

Part II is in reality a text book on descriptive geometry. Rather more than the usual amount of space is devoted to curved lines, curved surfaces, and development and intersections of surfaces. The development, by approximation, of non-developable surfaces, such as the sphere, is taken up. This seems to be more or less unnecessary and impractical. The system of nomenclature is adequate, though it is not the best that might be used. While the third angle is recommended as being the one in most general use, the practical problems given are not confined to it. This might be a good thing for the student, in that it trains him to use all the quadrants, but we rather believe that it would only serve to confuse him when he entered practical work where the use of the third was demanded. As in Part I, numerous problems and original exercises are given.

In Part III the question of perspective is treated logically and concisely. Part IV, on the Pictorial Effects of Illumination, takes up very carefully a subject that is usually somewhat neglected. The question of shades and shadows as applied to both orthographic projection and perspective drawing is gone into very carefully.

The many illustrations used throughout the book are of a uniform degree of excellence. Numerous carefully compiled classifications are given. Some of these tell more at a glance than several pages of ordinary reading matter. The book is very thoroughly indexed, and the material in it is therefore very easily available for reference. —A.F.B., '13.

———ooo———

TESTS OF TURPENTINE SUBSTITUTES

THE test committee of the Railway Master Car and Locomotive Painters Association made an interesting report of tests on turpentine substitutes at the recent convention at Denver, Colo. An abstract of the report follows:

The test consisted of 8 substitutes and pure turpentine. The panels were exposed June 9,

1911, and examined June 1, 1912, with the results in favor of the pure turpentine. The eight samples really represented three general types of turpentine substitutes, viz., wool turpentine, petroleum spirits from a parafin base, and petroleum spirits from an asphalt base. One or more of these three formed the base for the bulk of substitutes on the market at the time the tests were started.

The excellent showing made by the eight substitutes after 12 months of exposure is remarkable. Sample A is the pure turpentine, and it gave the best result. It seems to make no difference as to what the base of the substitute was, for they all stood up remarkably well for instance, sample E finished second in the test, and it was made from petroleum spirits from an asphalt base; sample G finished third, and it was made of petroleum spirits from a parafine base; sample B finished fourth, and it was made from a wood base. The very little difference in the result obtained from these three kinds of substitutes would indicate that the base of the substitute has little to do with the quality of the finished product.

Looking at these three substitutes from a flash point standpoint we have sample E with a flash at 96 deg. F.; sample G with a flash at 114 deg. F.; and sample B with a flash at 98 deg. F., which would indicate that the flash point is not a proper gage for determining the relative value of a substitute. The specific gravity of the three samples E, G and B were respectfully .823, .831, and .843 while pure turpentine runs about .866. This also proves that it is necessary to have a practical test in order to determine the real value of the material. The working qualities of the samples B, C, D, I were similar to that of pure turpentine with the exception that neither of the samples flattened out like the pure turpentine. Samples E. F, G, were much slower drying than the pure turpentine. At the time those tests were made the cost of turpentine was 98 cents per gallon, while that of the substitutes ran from 38 to 15 cents per gallon, but since then turpentine has gone down to about 50 cents per gallon. At this price turpentine can well be afforded to be used in preference to the substitutes at a slightly lower cost per gallon.

—*Railway Age Gazette.*

———ooo———

FIRE TEST OF CONCRETE FLOOR.

A fire test of a reinforced concrete floor system was recently conducted under the direction of the British Fire Prevention Committee, London, England. The requirements of the test were that the fire should last for three hours at temperatures ranging from 1800 to 2000 deg. F. and should be immediately followed by the application of water for five minutes. The limiting conditions for the floor were arequired area of not less than 200 sq. ft. and a loading of 280 lbs. sq. ft.

The floor tested was 334 ft. in area and was divided into three bays. At the sides of these bays were floor beams made up of 15 in. rolled steel I-beams incased in concrete. The concrete beams were 14 in. deep and 8 in. wide, flaring out to a top width of 16 in. They had clear spans of 15 ft. and were spaced 7 ft. 5 in. on centers. The floor slab was 5 in. thick and was reinforced with American Steel and Wire Co.'s Style 40 trangular mesh. This reinforcement was placed in sheets 46 in. wide and gave a nominal cross-section of 0.283 sq. in. of steel per foot of width. The concrete was composed of 1 part of Portland cement. 2 parts of sand, and 3 parts of furnace clinker, and was tested when it was thirty-four days old.

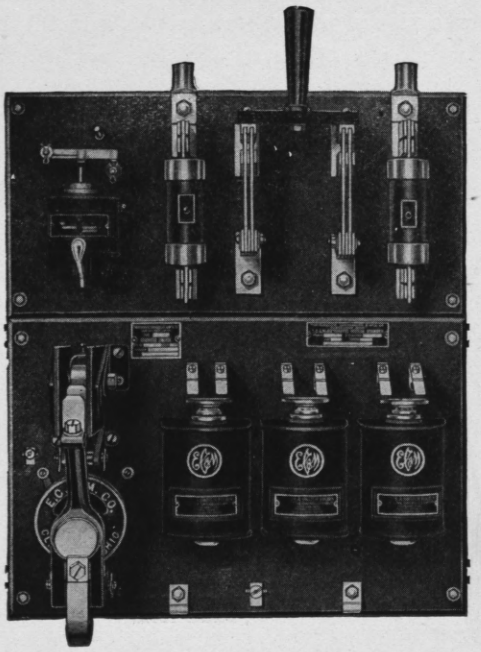
The test was conducted in a specially designed brick chamber at the Committee's testing station. The fuel used was mainly gas, with a small amount of wood. During the firing, levels were taken at different points on the floor to determine its deflection. The floor commenced to deflect about 10 minutes after the firing started, and continued to do so until the end of the test, the maximum deflection being 4 3-4 inches. When the water was applied

to the soffit of the beams and the floor the force of the jets knocked off the concrete in places exposing the reinforcement. When the load was removed the permanent set of the floor above the beams was found to be about 1-2 in. and the permanent set of the bays was about 2 1-2 in. The upper surface of the floor showed various cracks, but neither fire, smoke nor water passed through the floor. As a result of this test the classification of "Full Protection" Class B, was given to this construction.

The middle bay of the same floor was further subjected to an additional loading after the fire test amounting to about 560 lbs. per sq, ft. Previous to this loading struts were placed beneath the two beams supporting the bay. This loading was placed in increments of about 90 lb. above the initial loading of 280 lbs. per sq. ft. The results show a total deflection at the center of loaded panel of 1.7 in. below its position subsequent to the fire test. The panels on either side showed center deflections of 0.8 and 0.1 in., respectfully.

—*Eng. Record.*

Throwing One Switch Starts or Stops the Motor



NO CONTACT BUTTONS OR SERGMENTS TO BURN OUT OR ROUGHEN UP.

NO MATTER HOW CRUDE OR IGNORANT THE OPERATOR MAY BE HE CANNOT BURN OUT THE MOTOR

IF YOU USE THE E. C. & M. AUTOMATIC MOTOR STARTER

It is absolutely simple in construction. It embodies one or more magnetic switches connected in series with the motor, which automatically close their contacts **only** when the motor current is below a predetermined value.

Theses switches will "lock out" and will not close until the current has been reduced by the speeding up of the motor. More, by means of push bottom, float or pressure operated switch, automatic starting of motor may be simply obtained from any convenient point, no matter what the relative position of motors and driven apparatus may be.

The E. C. & M. Automatic Motor Starter will positively protect the motor and driven machinery against too quick acceleration. It requires no special skill to install or maintain.

There are no contact faces or buttons which burn, pit and roughen. No spring return ar mto stick or hand. No relays. No small control contacts.
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