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The Wisconsin Engineer

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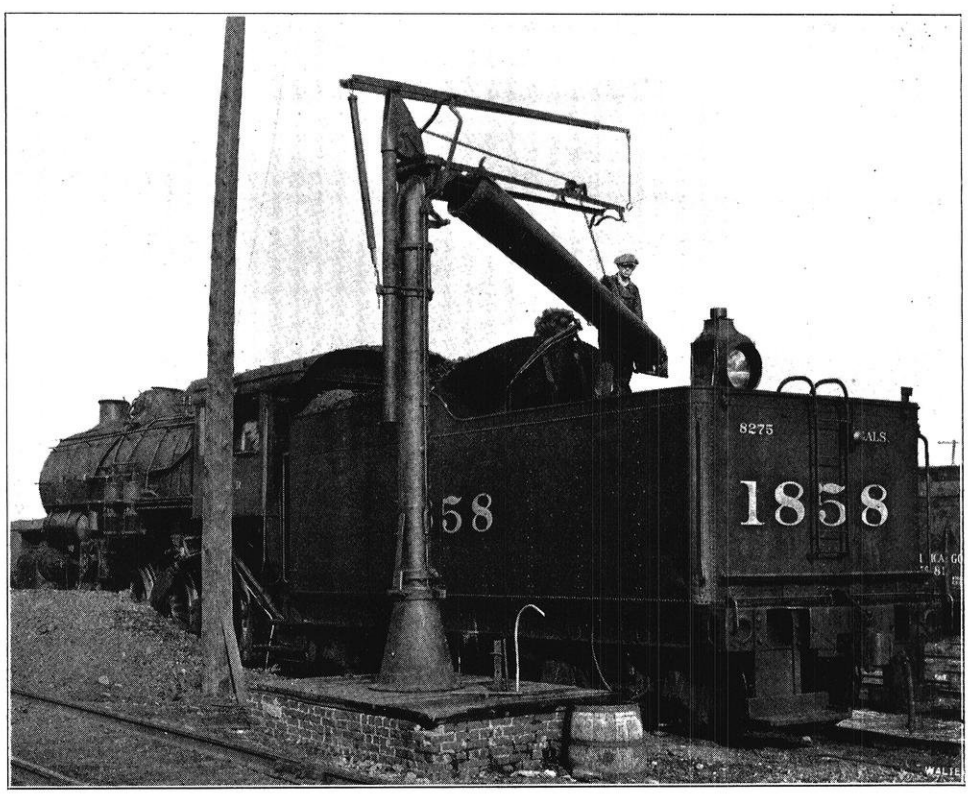
VOLUME XXXII NUMBER VI



MODERN LOCOMOTIVE WATER HYDRANT

PUBLISHED BY THE ENGINEERING STUDENTS
of the UNIVERSITY OF WISCONSIN

March, 1928

The Wisconsin Engineer

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The Wisconsin Engineer
UNIVERSITY OF WISCONSIN

VOL. XXXII, NO. 6 MADISON, WIS. MARCH, 1928

AFRICA AND THE DAY'S WORK

By R. J. ROARK, *Professor of Mechanics*

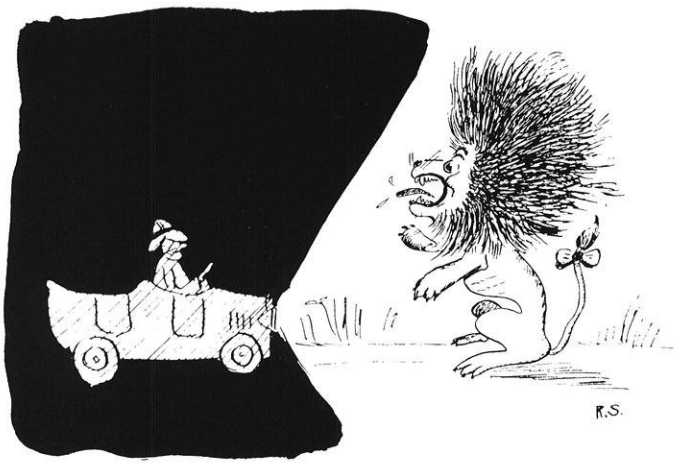
ABOUT a year ago the writer, with Dr. George Bryan of the Department of Botany, sailed from Antwerp on the good — but plain — ship *Jagersfontein* (a cargo steamer of the Holland-East Africa Line, equipped to carry five passengers and one dog and loaded to capacity) for Tanga. Tanga is in Tanganyka, on the East Coast of Africa and a long way from here. When we got there we proceeded by rail two hundred and seventy miles to Moshi, and from there fifty miles by automobile to Arusha, and from there a hundred and fifty miles on foot "into the blue", — as they so expressively say over there. Afterwards, having collected a great many botanical specimens, shot and photographed some wild animals, and had a very good time, we came home. Thereupon we were asked by reckless friends who didn't know what they were getting themselves in for, to tell all about it. Among these reckless ones were the editors of the *Wisconsin Engineer*, who insisted that the subscribers to that journal would enjoy reading something about the trip. The writer was skeptical as to that, but yielded — against his better judgement — and this paper is thus the result of an unequal conflict between live-wire journalism and good intentions.

The Good Ship "Jagersfontein"

On any trip to far lands so much is seen that is interesting, or amusing, or beautiful, or instructive, that telling something about it is a problem in discrimination, — a matter of selection and elimination, lest one try too severely the patience of the reader. A seven months' trip into the interior of Africa, with the miles of travel involved, the interesting contacts made, the many picturesque places seen, is sufficient to provide material and inspiration for an article on navigation, geography, contemporary politics, sociology, forestry, natural history, big game shooting and so forth and so forth, — assuming the traveler to know something about any one of these things and to be capable of writing an article. In fact, even these conditions are not requisite, as can be seen by glancing through the current magazines.

But when it comes to recalling anything in the experiences of such a journey that has to do with engineering, one is rather at a loss. Engineering, in quantity, does not seem to have reached East Africa. Jazz records, automobiles, and certain other contributions of western civilization they have, but not engineering. The Suez Canal appears to be about its eastern limit. I should not like to have this perhaps too sweeping statement come to the attention of the engineers who are building the new concrete docks at Port Soudan, nor of those who by now are probably surveying for the railroad extension in northern Tanganyka, nor of those who are striving zealously but hopelessly to make the remoter roads more easily distinguishable from rhinoceros trails. But these activities, though worthy, offer nothing out of the ordinary as strictly engineering problems. There may be enough, and more than enough, of the unusual involved. To have one's railway dump cars pushed off the embankment by an irritated rhinoceros, or one's telegraph lines broken

down by giraffes too tall to pass under, is annoying; to have to carry out diving operations in coastal waters infested by sharks, or work on roads where after dark one's headlights may be reflected with an awe inspiring glare from the eyes of a lion who thinks he was there first, adds interest to the job but is not conducive to



The lion thought he was there first

peace of mind. As to the jobs themselves, they are not especially noteworthy. They would excite little remark in a locality where concrete mixers and steam shovels and pile drivers are taken as matters of course.

But if the things that are being done are not in themselves of great interest, the way in which they are done is. For in this respect the difference between what one sees out there and here at home is very great indeed. And because, within the limits of a paper that must not be allowed to crowd the advertising out of the back pages of the *Engineer,* it is impossible to do more than touch briefly on some one topic, and because this question of how things are done is one which bears somewhat on engineering it may be well to make it the subject of these present remarks.

The one great factor that, more than anything else, explains this striking difference in the way of doing things is cheap labor. When it is possible to find plenty of people who are poor enough, or ignorant enough or good-natured enough, to be persuaded to do by hand and for nearly nothing almost any kind of work, no matter how hard or dirty or dangerous, that is, inevitably, the way the work is done. The fact that ingenious and expensive machinery is used to do the same work in other places becomes an interesting but quite irrelevant fact. And the result is that primitive methods persist where it might appear that machinery would long ago have replaced human muscle.

After all, human muscle — at least the muscle of other humans — does very well when there is enough of it. It is natural for the engineer to condemn as inefficient and uneconomical the performance of heavy work by strength of back instead of strength of mind, but not infrequently to do so is to err. At eastern ports one sees great ships being coaled by endless streams of men and women who run up gang-planks, dump their basket loads of coal into the yawning hold, dash back for more. It looks perfectly hopeless, the minuteness of each individual contribution is in such contrast to the enormous requirement. A visitor, pained by the spectacle of these Lilliputians struggling desperately to achieve the impossible, asks why modern machinery was not long ago installed. Then he learns that the coaling record for this port bears comparison with that of many where machinery is used. Furthermore, the men and women are already at hand while the machinery is not. And finally, the workers seem to rather enjoy it.

This same sort of thing is seen everywhere. Cars on sidings at the Port Soudan docks are pushed to and fro by men chanting weird choruses; at Zanzibar huge bags of copra are carried across the beach, through water waist deep, and loaded onto lighters by laughing black giants; perspiring natives push and haul heavily loaded carts through the steaming streets of Mombasa. It is all done more expeditiously than one might think, possible because there are so many men, and it is done more cheaply than one might think, possible because they work for next to nothing. A railroad contractor from Kenya told us that on excavation work, using native labor that worked by hand and carried the dirt in baskets to the dump cars, he was able to underbid and outstrip competitors who brought in steam shovels. They were probably not very big steam shovels, but they were the best available.

Of course to get such results one has to know the game. The natives don't have to work and very often they don't want to work. Formerly they could be forced to work, and this was often done by ruthless men who exploited their fear and ignorance in all sorts of ways. We were told of an occurrence that belonged to the good old days when a white man was a man and a native was only a nigger. According to the story there was a certain white man — a particularly hard-boiled individual — who, while way back in the interior somewhere, decided he must have a live lion. Probably he wanted a congenial playmate. He made his wishes known to the chief of the neighboring tribe, with the suggestion that the chief arrange the little detail of bringing the lion into port, so to speak. The chief, as might be supposed, failed to see eye to eye with his friend in the matter, but he had small choice. He was given the alternative of live lion or dead chief, and thus persuaded he rallied his warriors — a hundred strong — and set out in search of a lion. Eventually they found one, or one found them, and surrounding the astonished king of beasts, they rushed him bare handed. Twenty or more were killed, but finally the lion, appalled at the slaughter or smothered by sheer weight of numbers, surrendered and was tied up and delivered over to the white man. As I say, this story was told us (as were many others), and I pass it on without comment as to its scientific accuracy. It at least serves to illustrate the sort of thing that was conceived of as possible at one time.

But at present the natives' rights are well protected

by law, and generally speaking he knows it. Getting him to work is now an art. It can be done, but it requires finesse. And this ability to get natives to work and to keep them working is the chief requisite for one going into that country, whether as contractor, planter, safari conductor and professional hunter, or simply as a business man. One must know their language, their mental traits and limitations, their customs and prejudices. Many little things one learns by experience that would never occur to a newcomer. We drove over the Masai Steppes from Moshi to Arusha with an old South African railway contractor who had come up to put in a bid for the construction of a proposed railway extension between these two towns. We asked him if, in case he got the job, he thought he could gather sufficient labor from the nearby tribes. He said he would not try to do so, but would bring his men all the way up from the southern end of the province, hundreds of miles away. He explained that these men, brought in from a great distance, would not quit and run away, whereas labor recruited from near at hand was never satisfactory because the men would stop work and go home whenever they felt so inclined. The professional hunter who secured our porters for us explained that he always chose to get these men from a number of different tribes rather than from any one group, as they were then much less likely to clan together and become unruly or rebellious.

There are many other little things to look out for in selecting porters. Most of the natives are Mohammedans, and it is against their religious principles to eat the meat of any animal that has not had its throat cut while yet alive by one of their own faith. This means that the gun bearers must be one hundred per cent Mohammedans, otherwise no one will touch the game that is killed except the few Christians and the

Every gallant fellow for himself

out and out pagans in the company, and the sight of such unbelievers gorging themselves on meat which the faithful cannot touch is disturbing to the latter.

We saw and heard of many instances of shrewdness on the part of "old-timers" in taking advantage of native peculiarities. Of these the most ingenious was perhaps the expedient of a certain professional elephant hunter in Portugese East Africa. Women are rarely used as porters on hunting expeditions, and then, as a rule, only when men are not obtainable. But this particular hunter employed women only. His reason did more credit to his astuteness than to his chivalry. He knew from experience that if at any time the party was charged by a rhinoceros or buffalo or other un-

He operated the engine as though he had grown up with the machinery

pleasant creature of the sort, men porters, with masculine self reliance, would throw down their loads and dash for the trees or the horizon, every gallant fellow for himself. With women, on the other hand, the case was quite different. Relying on the hunter for protection they would cluster round, and he was thus assured of a first line of defense, as it were.

We sometimes think our labor unions are a bit fussy in drawing the line between what a member is and is not supposed to do. We are occasionally vexed because a plasterer will only plaster, a brick-layer refuse to do anything except lay an occasional brick, a tinner scorn to put his hand to aught save tin. But the thing has gone even further in Africa without the unions. The one social error that every African avoids is that of doing any part of a job that he thinks belongs to some one else; in this particular they lean backward. When one sets up an establishment, one discovers that the cook is a cook and not a dish-washer, that the boy whose duty it is to fetch wood expects to relax and recover from the strain when there is no wood to bring, that the boy who does the laundry is not supposed to polish boots. If there is but one boy he will cheerfully do any number of different things, but when another boy is taken on, there is at once a sharp division of responsibility, and for every additional boy a further subdivision. And not one will encroach upon anothers field of duty. This punctilio prevails in all activities. If, when hunting, you call your gun-bearer and set out to shoot a jack-snipe you must take along a porter. For you to make the gun-bearer carry anything except your gun and binoculars would outrage his professional dignity beyond words. For you to carry anything at

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RESISTANCE TO FLOW AND WATER HAMMER RESEARCHES ON LOCOMOTIVE HYDRANTS

By Lewis H. Kessler, c'22, CE'27

Assistant Professor of Hydraulic Engineering

FOR the past two years, the writer has been an active participant in researches studying the hydraulics of resistance to flow in locomotive water hydrants, the water hammer pressure developed due to the closure of the cylindrical valve as it stops the flow of water suddenly, and the hydraulic devices necessary to obtain relief from this water hammer. Initially the work started as a minor problem on a commercial scale, but the developments have been of such wide interest that a research program of some magnitude is being contemplated by various railroads in order to improve the water service installations in the field. With this point in view, the author made an extended trip in December, 1927, to study the hydraulics of locomotive hydrants, pipe lines, and water tanks on a main line railroad in Nebraska, and also at one of the largest round houses of a different railroad in Illinois, whose lines extend to the Golden Gate. It is the purpose of this article to point out briefly the part the hydraulic laboratory has played in this work, and the part that its staff can take in assisting the railroads in solving some of their water service problems.

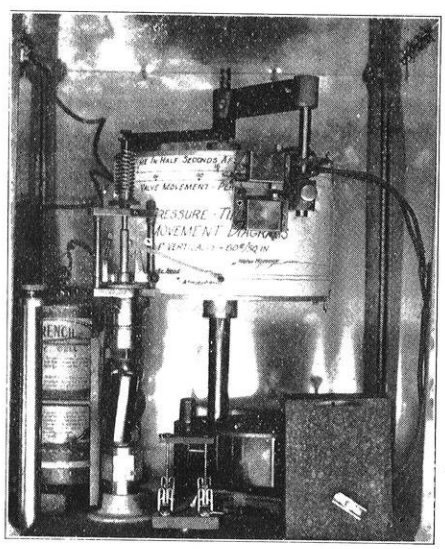

Fig. 1. *Water Hammer Pressure, Time, Valve Movement Recording Device.*

It is a well known fact, that railway service has not increased in speed for many years and although efforts are being made to do this, they must be governed, first by safety, second by low cost of installations, and third by low maintenance. Hydraulics plays an important part because for many years to come, steam will be the most certain means of operating rolling prime movers. Such service requires water in large quantities which often is costly in many parts of the country. The pumping of this water, the softening for boiler use, and the distribution by pipe lines to points along the tracks, calls for much engineering skill. But the problem of discharging water from these pipe lines into locomotive tenders has long been one of utmost importance to Water Service Engineers. Here is where the locomotive hydrant plays its part, occasionally efficient, but they may be destructive to installations to a surprisingly large extent.

Engineers have called the hydrants, water columns, water cranes, water penstocks and what not, but the

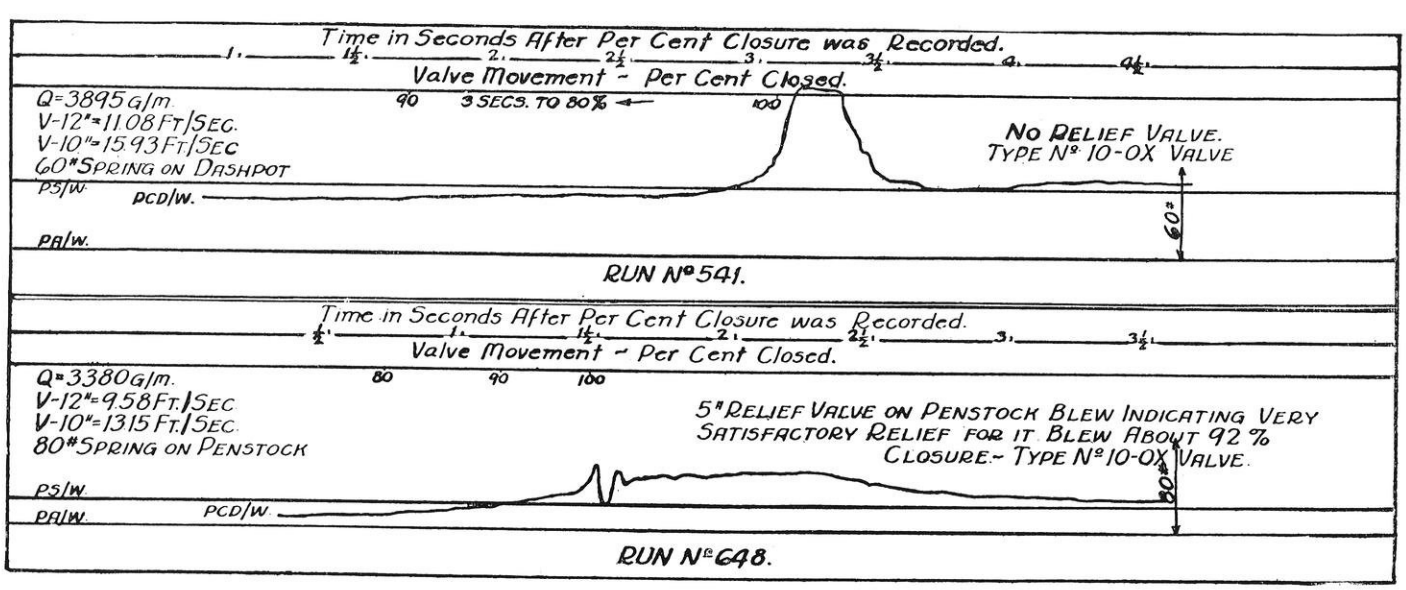

Fig. 2. *Water Hammer Diagrams Caused by Hydrant in Hydraulic Laboratory.*

writer can not find where a definition of one of these terms really describes the device unless it be the word hydrant. Briefly, the hydrant consists of a vertical cast iron riser with valve in base connected to the pipe line leading from the water tank. At the top of the riser and at an elevation higher than the water inlet to the tender, a spout conducts the water to the

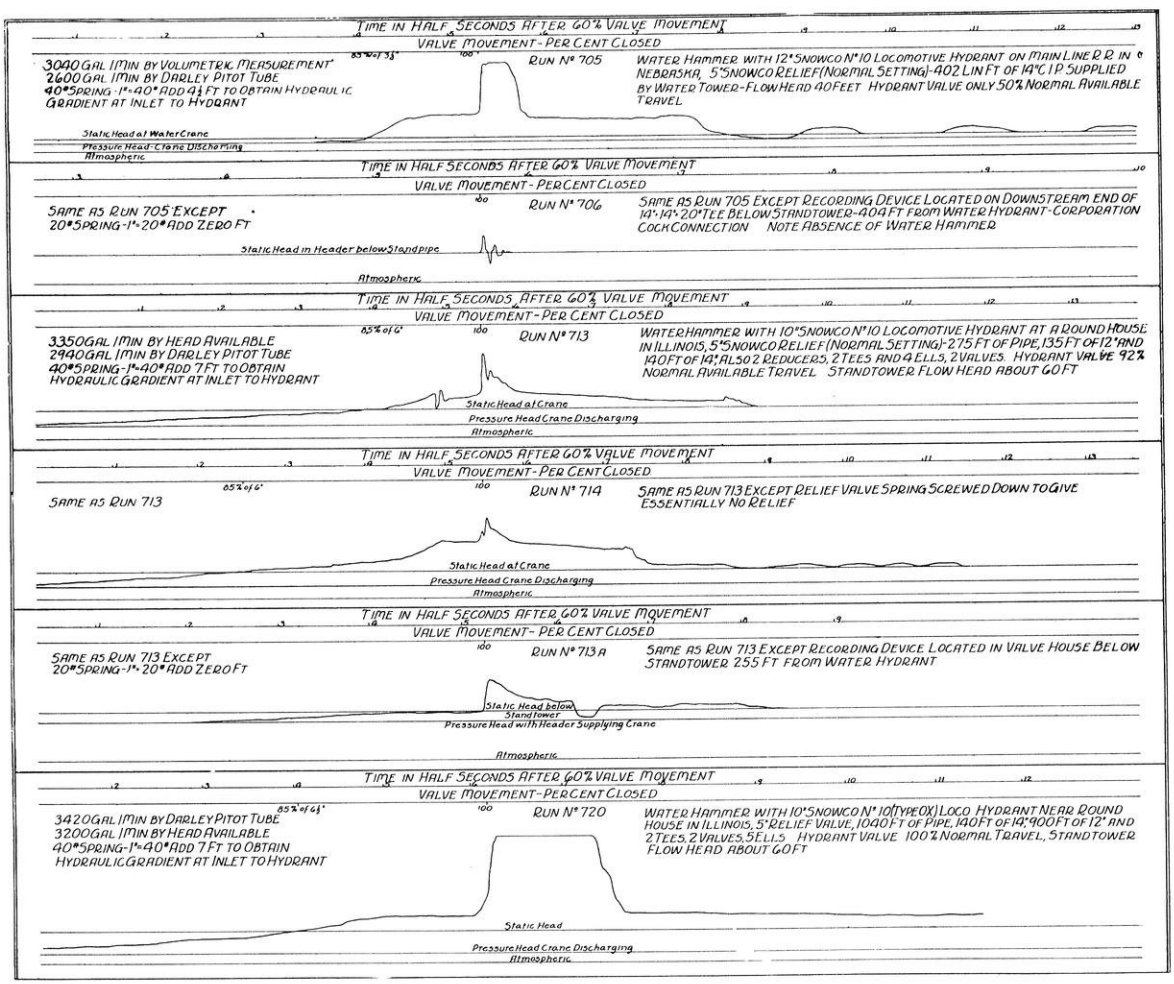

FIG. 3. *Water Hammer Diagrams of Field Water Service Installations.*

tender. The riser and spout can be rotated 90 degrees so that normally, when not in use, the spout is parallel to the track. Many companies score the riser so that in case the spring locks fail and the wind blows the spout over the track, the locomotive can break off the riser as it strikes it. Such a possible condition means that the valve must be located at the base of the riser and it must be closed by hydrostatic pressure; hence the tank will not be drained and track washed out in case of an accident. The hydraulics of the valve, riser and spout of various hydrants have been studied by Profs. A. N. Talbot and M. L. Enger and published in Bull. 48, University of Illinois, 1911. This is practically the only information published to date. The work of these eminent experimenters has helped interested manufacturing concerns to improve their designs and ultimate product. But considerable work can still be done.

The T. W. Snow Construction Co. of Chicago, whose first designs were tested at Illinois, shipped a hydrant which was installed on the 10" and 12" header in the hydraulics laboratory. Due to its large size, only three inches of headroom was available after erection. Resistance to flow or loss of head (energy) studies were made to determine the best possible hydraulic design at different flow heads. An attempt was made to separate the losses in the valve, riser, and spout; with such information, tables were computed and curves drawn to assist engineers of the railroads in making suitable installations at lowest possible costs relative to water tanks, and pipe line sizes. If a 10" pipe can be used where 14" pipe has been largely in use, considerable saving will be obtained in cost of supply tanks, pipe, and pipe laying. All work was conducted with the same degree of care and accuracy that accompanies research work in the laboratory. It afforded students the opportunity to handle large quantities of water safely and accurately and apply their knowledge of the elements of hydraulics. Discharges as high as 4300 gallons per minute were used under a head of 60 feet supplied by the 220,000 gallon concrete reservoir on the hill above the laboratory.

Water Hammer Recording Device

The problem of the water hammer developed by the closure of the valve in the hydrant when this high

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ENGINEERING SOCIETY OF WISCONSIN HOLDS CONVENTION

J. P. SCHWADA, c'11
President

THE Twentieth Annual Convention of the Engineering Society of Wisconsin, held in the auditorium of the College of Engineering at Madison on February 16, 17, and 18, easily surpassed all predecessors in point of attendance and interest. This is as it should be in view of the rapid growth of the society. The membership is now 380, an increase of 60 over the membership of a year ago. The opportunity for further growth is excellent as there are estimated to be over 2500 engineers and surveyors in Wisconsin.

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Joseph P. Schwada, city engineer of Milwaukee, who had been vice-president and chairman of the membership committee, was elected president for the coming year. Mr. Schwada was graduated from the civil engineering course of the University of Wisconsin in 1911 and was a member of the faculty of the College of Engineering from 1912 to 1916. His experience has included railway work, a connection with the Emergency Fleet Corporation on the design and construction of concrete ships, and state and municipal work.

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Other new officers include Prof. L. F. Van Hagan, vice-president; A. A. Oldfield, engineer of maintenance of way for the Wisconsin Power & Light Co. at Fond du Lac, Leon A. Smith, superintendent of water works for Madison, and G. E. Heebink, city engineer of Beloit and retiring president of the society, trustees; Prof. R. S. Owen, assistant secretary. Prof. L. H. Kessler was appointed by the trustees as acting secretary during the absence of Prof. C. I. Corp.

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The success of the convention was due largely to the effective work of Prof. Kessler, who stepped into the harness when Prof. Corp was suddenly ordered to the hospital shortly before the meeting. Under his management, the affair proceeded without any confusion.

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The students again assisted to make the wheels go 'round. Some of the seniors acted as reporters and covered the first three sessions completely. Chi Epsilon, the honorary civil fraternity, handled the registration.

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The social features were an important and enjoyable part of the convention. Over sixty members sat down to lunch together on Thursday noon at the University Club. On Thursday night, over eighty trekked to the Hydraulics Lab for a smoker. The program included a talk by Dean Turneaure on his recent trip to South America and some sleight of hand by Senor Bostock, who removed a remarkable collection of lingerie and liquor from the pockets of apparently respectable members of the society. Light refreshments and cigars topped off a pleasant evening.

L. F. VAN HAGAN, c'04
Vice President

The joint banquet with the Technical Club of Madison on Friday night drew a crowd of 226. A chicken dinner, music by the famous Mozart Club of Madison, and an excellent talk by Prof. D. W. Mead on the Mississippi Flood problem served to satisfy the physical, spiritual, and intellectual needs of those assembled. It was a large night.

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The first out-of-town engineer to reach the Engineering Building for the convention was H. H. Tubbs, city engineer of Elkhorn and an old-timer in the profession whose memory runs back to the days when Wisconsin was busy building railroads. Mr. Tubbs always manages to be present at every annual meeting and has established priority rights to his seat in the front row.

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Forty-seven city engineers and twenty-four county surveyors are on the membership rolls of the society.

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Among the regulars who were present though not on the program were Bob Connelly of Appleton, Gordon Daggett, C. A. Halbert, A. L. Hillis, W. P. Hirschberg, W. H. Kirchoffer, C. J. Popelka, A. J. Rabuck, George Randall, L. S. Smith, H. V. Tennant, F. W. Ullius, John C. White, and Karl Zander.

E. E. R. Tratman covered the convention for the Engineering News-Record.

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Under present conditions in Wisconsin, now that lake frontage is more important than timber and acreage, the application of the so-called "eighth-line rule" for quieting title to parcels of land lying between incorrectly-located meander lines and the actual shore lines of lakes is certain to have bad results, H. S. Tuttle told the convention in presenting his paper on Riparian Rights. This paper created the liveliest discussion of the day. Mr. Adolph Kanneberg, member of the Wisconsin Railroad Commission, and Prof. O. S. Rundell, of the Law School, presented the legal aspects of the problem and in so doing drew a lively fire from the engineers.

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Another lawyer, Mr. Clifton Williams, special assistant city engineer of Milwaukee, spoke Friday afternoon on *Some Legal Aspects of City Planning.* The legal side of city planning, he explained, must necessarily lag behind the engineering side. The engineer looks ahead and plans for the future and cannot understand why the lawyer cannot keep pace with him. The fact is that the law cannot anticipate the future as the engineer does. It builds up its doctrines slowly and haltingly. The regulation of building heights illustrates this. "At first," he said, "we supported such regulation on the basis that high buildings would throw unhealthful shadows on the streets; we didn't dare put forward the true reason, which was that high buildings cause congestion of street traffic because of the great numbers of people they house."

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A sentiment among the engineers and surveyors of the state strongly favorable toward the licensing of engineers was reported by the special Committee on Licensing. No action was recommended at this time as the committee has not completed its investigation. A license law, the committee points out, would eliminate only the grossly incompetent men from the profession. That there are such grossly incompetent men practising in states without license is indicated by the fact that examining boards in license states have rejected about ten per cent of those applying for registration. Experience in license states, the report says, does not support the claim that license would constitute a nuisance to the individual engineers. Sentiment in license states is strongly favorable to the regulation of the profession.

In order to get a report of the recent annual meeting of the Engineering Society of Wisconsin before its members at an early date, the Board of Directors has arranged with us for the publication of this preliminary report. The complete proceedings will be published in the July number of the Bulletin of the Associated State Engineering Societies. The seniors, under the direction of Professor Van Hagan, attended the gatherings of the society and present here an accurate cross-section of what took place. —*THE EDITOR*

There is no reason why architects and engineers should not prepare careful and detailed specifications for the acoustical treatment of auditoriums, J. P. Schwada stated in his talk on *Some Aspects of Acoustics.* Taking the auditorium in which the audience was sitting as a specific problem, Mr. Schwada went through the computations by which he determined the exact amount of a given material that would be required to give it the most satisfactory acoustical properties.

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The trustees met on Saturday noon at the University Club and laid general plans for the coming year. An effort will be made to build up membership in all fields of engineering and to make the conventions attractive to the various groups. The sum of $200 was set aside for the use of the Committee on Licensing during the coming year. President Schwada presented a plan for a series of sectional meetings throughout the year.

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Gases generated in the new sewage plant at Antigo are collected and burned under boilers, Frank Quimby, consulting engineer of Sheboygan told his hearers at the Thursday afternoon session. The heat, he said, is used to maintain proper temperatures in the digestion tank and to heat the pumphouse. Gas from the sewage has 640 B. t. u. per cubic foot.

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Milwaukee is said to require fewer policemen per capita than other cities of its class. Mayor Hoan believes that this is due in part to municipal playgrounds. He says that the playgrounds take the place of 200 patrolmen and that the money saved in salaries more than pays the interest on the investment in playgrounds. These points were mentioned by Gilbert Clegg, playground engineer of Milwaukee, who spoke on Friday. The term "playground engineer", he explained, was invented to fit the job and was conferred upon him by the city, although he is not an engineer.

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Before a water power development is undertaken, George P. Steinmetz, engineer for the Railroad Commission said in speaking about water power in Wisconsin, the economics of the project should be studied and the probable cost of water power should be compared with the probable cost of fuel power. Recent developments in the design for fuel power plants, he said, have reduced the cost of fuel power, which needs no stand-by equipment, to a point where it is more questionable than ever whether some of the water

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Campus Notes

THE ENGINEERING FACULTY BOWLS

Every Thursday night, the Engineering College faculty tries to show the Law school and L. and S. professors that engineers can also roll a bowling ball down an alley. H. B. Doke, instructor in drawing, has so far been the most successful in setting a good example. His high mark is 599 for a three game series. The other instructors and professors have yet to achieve greater accuracy.

Other Engineering College faculty members on the teams are: E. Anderson, Prof. G. J. Barker, B. B. Bridge, Prof. G. L. Larson, Prof. J. W. McNaul, Prof. A. V. Millar, W. M. Richtman, Prof. K. G. Shiels, H. L. Turritin, R. A. Trotter, Prof. L. F. Van Hagan, Prof. J. W. Watson, Prof. L. A. Wilson, and R. R. Worsencroft.

CONGRATULATIONS, GORDON!

Announcement has been made of the arrival of a son to Mr. and Mrs. G. A. Beebe on February 29. Mr. Beebe is instructor in topographic engineering.

COURSE FOR METERMEN CONDUCTED BY UNIVERSITY

A short course for electrical metermen was held at the university under the auspices of the department of electrical engineering, March 3 to 7. The meter school was a co-operative enterprize conducted jointly by the university extension division, the Wisconsin Utilities Association, and the College of Engineering. Professor C. M. Jansky who was director of the school was assited by the following men from the electrical engineering department: Messrs. Kelso, Koehler, Tracy, and Johnson.

The speakers included W. R. Hirst, safety engineer of Indiana; J. C. Langdell, Detroit, who spoke on "European Meter Conditions"; Professor Romell, Purdue University; and Mr. Paney of the Duncan Electric Co., who spoke on "Modern Developments in Metering."

FRESHMEN RECEIVE HONORS AND HIGH HONORS

The final first semester grades show that four freshmen have worked at high honor rate. To achieve this honor the man must make an average of 2¾ grade points per credit. The men are: Alexander Cowie, Norbert Steckler, Walter Karsten, and Raymond McCreary.

Seventeen freshmen, the grades show, have worked at honor rate, which means that they made an average of 2¼ grade points per credit. The highest ten men making this honor are: G. L. Fredendall, Howard Canfield, A. F. Langlykke, F. C. Ladwig, G. W. Gibson, O. C. Cromer, Donald J. Miller, G. C. Williams, William Penn, Leo F. Kosak.

First civil engineer: "How far were you from the answer?"

Second civil: "Two seats."

THE ST. PAT'S PARADE

St. Pat, having again given permission to postpone the celebration in his honor until the weather becomes warm enough for shamrocks to bloom, plans have gone forward for the best Engineer's parade yet given. After due deliberation, Polygon has decided that Saturday, April 21, would comply with St. Pat's order, and

accordingly that date was chosen as the day for the parade, the humiliation of the shysters, and the general exhibition of "plumbing".

Each of the Engineering student societies has elected a candidate to represent St. Pat. From these St. Pat's official representative, himself, will be elected by student

vote. The election days have been set for March 14, 15, and 16, and votes will sell at 10 for one cent. The money thus taken in will be used to defray expenses of prizes, and other necessities. Election will cease on the 16th at 5:30 P. M., and the 16th will also be the official St. Pat's day, because, as it happens, the 17th falls on Saturday, and St. Pat realized that the day could not be done justice to if it were celebrated on a half school day. Wherefore, he decreed that the 16th shall be the day of celebration. All loyal sons will obey his orders.

The following committees have been appointed by Polygon. General Chairman, H. E. Rex; Assistant General Chairman, L. J. Beck; Publicity, Marvin Hersh and O. E. Brown; Prizes, R. G. Garlock, D. W. Thompson, and C. H. Matson; Judges, Robert Roden, H. Smith, and Harvey Hyland; Police, L. A. Dodge, R. V. Brown, and Norman Breiby; Band, J. H. Kulp, W. W. Behm, and J. T. Haight; Posters, R. E. Greiling and D. C. Milton; Fraternity floats, and independent stunts, Don Miller and Arthur Kratsch; Finances, John Schutt and Walter Fuldner; Election, John Schutt and assistants.

ENGINEERS VISIT FOREST PRODUCTS LABORATORY

Over forty engineers took advantage of the opportunity to visit the Forest Products Laboratory on Saturday morning, February 25. The trip was sponsored by the A. S. C. E.

Besides visiting the main building where a model paper making mill was operated, the group was taken to another building where they inspected the results of cross-bending, shear, and impact tests which had been made on various kinds of wood. In the Soils Building, they were shown the apparatus for making tests of glued parts.

A. S. C. E. HEARS OF LOCOMOTIVE HYDRANT RESEARCHES

Professor L. H. Kessler, department of hydraulics, addressed the A. S. C. E. on "Locomotive Water Hydrants" on March 7. He demonstrated the apparatus used in making the researches, and explained the most recent developments. This talk by Professor Kessler was the latest information on the subject and is the first time that it was presented to any group.

WATCH FOR IT!

There will be a flash of shamrock on the hill Friday. Do your stuff, engineers. Back your patron saint and show his colors. That green feather will do it.

MODERN METHODS

Engineer: "I have an idea for a new car that I am sure will take the country by storm."

Manufacturer: "A six or an eight?"

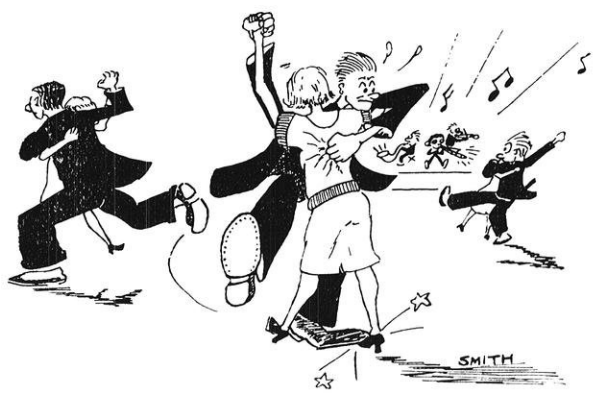
Engineer: "I haven't thought of those details yet, but I've designed the classiest radiator cap you have ever seen."

PROF. CORP ENJOYS CONVALESCENT VACATION

Prof. C. I. Corp has recovered sufficiently from his siege of illness to take a trip to the refreshing warmness of the Florida coast. Accompanied by Mrs. Corp, he left Madison February 13th and gives his present address as 725 Palm Ave., Big Bayou, St. Petersburg, Florida.

ENGINEERS ON MILITARY BALL STAFF

The date for the annual Military Ball has been set for Friday, March 30. Again the fete will be held at the State Capitol.



Among the engineers whom Robert Pike, chief of staff, has appointed are: Walter Fuldner, e'28, supply officer; Gordon Beach, e'28, signal officer; and Leonard Sarri, e'28, transportation officer.

SAINT PAT — HIS BIRTHDAY

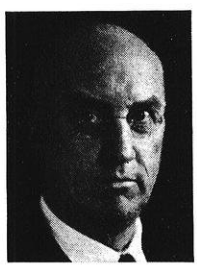
On the eighth day of March it was, some people say
Saint Pat at midnight, he first saw the day;
While other declare 'twas the ninth he was born,
And 'twas all a mistake between midnight and morn;
For mistakes will occur in a hurry and a shock,
And some blamed the baby and some blamed the clock,
'Til with all their cross questions sure no one could know
If the child was too fast or the clock was too slow.

Now the first faction fight in old Ireland, they say,
Was all on account of Saint Patrick's birthday.
Some fought for the eighth — for the ninth more would die,
And who wouldn't see right, sure they blackened his eye.
At last both of the factions so positive grew,
That each kept a birthday, so Pat then had two;
'Til Father Malcahy, who showed them their sins,
Said, "No one could have two birthdays but twins".

Says he, "Boys don't be fightin' for eight or for nine,
Don't always be dividin'; but sometimes combine;
Combine eight with nine and seventeen is the mark,
So let that be his birthday" — "Amen" says the clerk,
"If he wasn't twins, sure our history will show
That at least, he's worth any two saints that we know."
Then they all got blind drunk, which completed their bliss,
And we keep up the practise from that day to this.

Alumni Notes

C. M. Kurtz, c'97, assistant engineer in the chief engineer's office, of the Southern Pacific Railway, made his second contribution to the technology of his profession in his new book entitled, "Track and Turnout Engineering," published by the Simmons-Boardman Publishing Company of New York and London.



C. M. Kurtz, c'97

The book represents the results of 25 years of practical experience and about five years of work in preparing the manuscript. It contains new material, which has not heretofore appeared in any handbook on railway engineering.

It includes chapters on the designing of frogs, crossings, switches, definitions, etc., as well as chapters on practical mathematical treatments of all kinds of track layout problems and vertical curves. Complete solutions of examples, many of which were encountered in practice, are given. Original and short-cut methods are outlined and original tables therefore, as well as all the trigonometrical function tables, both natural and logarithmic, included.

It is primarily published as a field and textbook to supersede the author's first contribution, "Modern Location of Standard Turnouts," now out of print, and which was used as a textbook by the University of California and other universities.

CIVILS

Abendroth, George H., c'25, was recently married to Miss Edna Walter, Madison, at the home of Mr. and Mrs. William Shoemaker, Philadelphia, Pa. They will live in Wilmington, Del.

Beasley, William Howard, c'08, is now president of the Whittle Music Company of Dallas. Mr. and Mrs. Beasley visited friends in Madison during the early part of February. Their home address is 3709 Dartmouth Street, Dallas, Texas.

Bingham, J. B., c'11, is with the Sherwin Williams Company of Chicago. His home address is 2256 W. 112th Street, Chicago, Illinois.

Dawson, James T., c'23, is now a second lieutenant with the 83rd Field Artillery at Fort Benning, Georgia. Before accepting the commission, Lt. Dawson was located at Lake Geneva laying out subdivisions.

Fensel, A. C., c'23, is co-author of a report on a study of highway construction, including an analysis of highway systems and design, prepared by the Municipal Research Bureau of Cleveland. The study was authorized by the Board of County Commissioners in December of 1925 and embraced the collection and correlation of data observed on some 7,000 miles of improved roads in Ohio, New York, Pennsylvania, Michigan, Illinois, Wisconsin, and Indiana, with particular attention given to the design, construction, specifications, and administrative practises of Wayne County, Indiana, Milwaukee County, Wisconsin, and Cook County, Illinois. Mr. Fensel, together with Mr. Cumings, another staff engineer for the Municipal Research Bureau of Cleveland, were directly responsible for the completion of the survey.

Cartwright, W. H., c'25, was married on February 10 to Miss Beatrice Olivia Monstad of New London. Miss Monsted graduated from the college of Letters and Science last year and has been taking graduate work up to the time of her marriage. Mr. Cartwright is assistant engineer with the Wisconsin Power and Light Company.

Crider, Harold E., c'21, has changed his address from 1010 Rebacca Ave., Wilkensburg, Pa., to 9703 South Throop Street, Washington Heights Station, Chicago, Illinois.

Gerlach, Thomas A., c'98, a member of the staff of the first Wisconsin Engineer, is connected with the Buda Company of Harvey, Illinois. His home address is 15409 Turlington Ave., Harvey, Illinois.

Gillette, Paul C., c'18, has just finished his valuation of the West Virginia Water Service Co. and is moving his organization to McKees Rock, Pa., to start an inventory and appraisal of the Ohio Valley Water Company. He gives his address for the next few weeks as 101 Island Ave., McKees, Pa.

Gilman, James M., c'04, is structural engineer with the Chicago and Milwaukee Railway. His home address is 2414 First Ave., Seattle, Wash.

Halbert, Chas. A., c'28, is employed in the office of the State Chief Engineer at Madison. His address is 214 South Allen Street, Madison, Wisconsin.

Hebda, Franz J., c'26, is with Graham, Anderson, Probst and White, Chicago. He has just finished the design of three concrete domes for the old Field Museum in Jackson Park, Chicago.

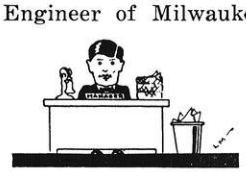
Hedges, Warren B., c'26, was married on January 12 to Anna Christine Stirling at Aliceville, Alabama. Mr. Hedges is connected with the Hedges-Weeks Construction Company of Aliceville.

Marshall, H. A., c'15, is a consulting engineer at Topeka, Kansas. His address is Room 6, Smith Bldg., Topeka, Kan.

Mead, Harold W., c'20, who is associated with the firm of Mead & Seastone, Consulting Engineers, Madison, is located in Winona, Minnesota, as resident engineer during the construction of an addition to the steam plant of the Mississippi Valley Public Service Co.

Owen, Ray S., c'04, Professor of Surveying at the University, was elected assistant secretary of the Wisconsin Engineering Society.

Schwada, Joseph P., c'11, was elected President of the Wisconsin Engineering Society. Mr. Schwada is City Engineer of Milwaukee, Wisconsin.



Johnson, H. H., c'09, is Superintendent of the Milk River irrigation project of Montana. This project involves the reclaimation of approximately 150,000 acres.

Smith, Leon A., c'12, was chosen as a trustee of the Wisconsin Engineering Society. Mr. Smith is Superintendent of Water Works at Madison.

Titus, W. J., c'13, is employed by the State Highway Commission of Indiana. His address is Capitol Annex, Indianapolis, Indiana.

Torkelson, M. W., c'04, has been awarded the contract to design plans and prepare specifications for the proposed new Fourth St. bridge at Watertown. The construction will begin in the summer. Mr. Torkelson is living at Madison at present.

Trester, Anthony M., c'06, is living at Shawano during the construction of a new hydro-electric plant on the Wolf River near Shawano. Mr. Trester, who is associated with the firm of Mead & Seastone, Consulting Engineers, Madison, is resident engineer on the construction for the Wisconsin Power and Light Company.

1928 DEVIL'S LAKE REUNION

CLASSES — 1911, -12, -13, -14, -19, -20, -21, -22

How about it. Have you made a date with your old surveying partner for the week end of June 30, - July 4 at the Civil Engineers' Reunion at the Devil's Lake Surveying Camp?

Write to Ray S. Owen and give him a little encouragement. This reunion will not be of the paper hat, brass band type. We want you to sit around and exchange views and experiences, advise the faculty, inspire the students, and hike over the bluffs, play golf, swim, fish, drive to Kilbourn or the Prairie du Sac power plant or take a party on topography out and show them how it is done.

Tschudy, Lionel C., c'23, suffered severe bruises and a fractured rib in an accident which occurred near Kansas City, when his car collided with another car. Tschudy was enroute to California, where he is employed by the Feather River Power Co.

Ulrich, S. E., c'27, is employed as bridge inspector for the Chicago and North Western Railway. His address is 5412 Ferdinand Street, Apartment 21, Austin, Illinois.

Van Hagan, Leslie F., c'04, C. E.'19, Professor of Railway Engineering at the University of Wisconsin, and trustee of the Wisconsin Engineering Society, was elected vice-president of the society.

Wasson, J. H., c'12, until recently field engineer for the Portland Cement Association, has accepted a position as engineer-representative with the newly formed Peerless-Egyptian Cement Company of Detroit, Michigan. His home address is 4844 Courtland Street, Detroit, Michigan.

Washburn, F. E., c'01, C. E.'09, is with the Missouri Valley Bridge and Iron Company at Leavenworth, Kansas. His home address is 616 S. Broadway, Leavenworth, Kansas.

Whinery, R. H., c'05, is an engineer and contractor in business at Los Angeles, California. His business address is 512 Grosse Bldg., Los Angeles, California.

Williams, Lynn A., c'00, is now with the Williams, Bradbury, McCaleb & Hinkle Company of Chicago. His home address is 1315-53 W. Jackson Blvd., Chicago, Illinois.

Youngberg, George E., c'14, after two years with the B. L. E. Realty Corporation, has been made chief engineer for their Venice, Florida, development. His address is Venice, Fla.

Zelonky, Benjamin, c'22, is employed in the office of Gustav E. Kahn, Civil Engineer and General Contractor. His business address is % Gustave E. Kahn, Goldsmith Bldg., 141 East Wisconsin Ave., Milwaukee, Wisconsin.

CHEMICALS

Agazim, M., ch'15, with the sales department of Rascher and Betzold, was in Madison on February 11 and visited some of his old friends on the campus.

Downing, R. C., ch'10, is now with the Lowell Gas Light Company. His home address is 81 Luce Street, Lowell, Mass.

Higley, H. V., ch'17, superintendent of the Ansul Chemical Company gives his home address as 2907 Parkridge Ave., Marinette, Wisconsin.

Reinhardt, J. A., ch'17, is employed by the Western Clock Company of La Salle, Ill. His home address is 2806 Seventh Street, Peru, Illinois.

Wahle, W. E., ch'17, is employed by the Cardinal Laboratories, Inc., of Chicago. He receives his mail at 6823 So. Chicago Ave., Chicago, Illinois.

MINERS

Kemler, H. J., min'22, is at present with the Roxanna Petroleum Company of Pampa, Texas.

Knoll, Waldemar A., min'14, Min. E.'22, gives his address as Bessemer, Michigan.

Reid, Byran S., min'13, gives his address as Riverside, Illinois, Box 25.

ELECTRICALS

Force, H. H., e'10, has changed his address to 511 West Hill Street, Oklahoma City, Oklahoma.

Frankenfield, Budd., e'95, the first graduate editor of the Wisconsin Engineer, is joint author with B. V. Swenson of a book on the testing of electro-magnetic machinery. His present address is 857 So. Wilton Place, Los Angeles, California.

Hartung, Ray C., e'17, is associated with the Griscom-Russell Co. of 285 Madison Ave., New York City, New York. Mr. Hartung is at present interested in ammonia transfer coefficients in heat conduction and also in transfer rates in condensers for moist gases.

Moss, Lester M., e'09, gives his address as 80 Prospect Street, Nutley, New Jersey.

Palmer, Carl W., e'22, gives his address as 344 Church Street, Wauwatosa, Wisconsin.

Purchas, R. W. T., e'14, is now connected with the Bylesby Engineering and Management Corporation in the Bankers' Bldg., Chicago, Illinois.

Brewer, R. W., e'21, who has been division commercial manager for the Pennsylvania Power and Light Co. at Williamsport, Pa., left that position December 1st to go to China. After visiting at his home town, Mineral Point, Wis., he sailed for Shanghai, on December 20th. He is going into business with his brother-in-law who has been there for several years. His new address is rates in condensers for moist gases.

Schmit, D. F., e'23, is employed in the engineering department of the E. T. Cunningham, Inc., manufacturers of radio tubes. Mr. Schmit's address is % E. T. Cunningham, Inc., 370 Seventh Ave., New York City, New York.

Schroeder, E. H., e'09, is with the installation department of the Western Electric in Philadelphia. His business address is 1312 Arch Street, Philadelphia, Pa.

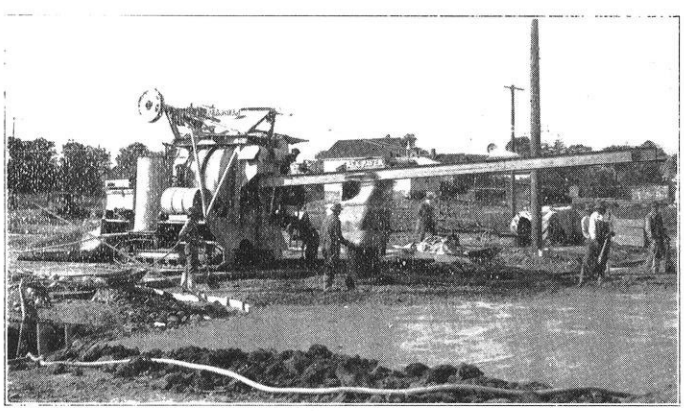
Smith, Harrison A., e'98, Consulting Engineer at 20 North Carroll Street, gives his mail address at R. F. D. No. 1, Maple Bluff, Madison, Wis.

(Continued on page 198)

Engineering Review

"MECHANICAL MAN" DISCHARGES 35 CU. FT. OF CONCRETE IN 8 SECONDS

One of the outstanding developments on Street Pavers is contributed this year in the form of a "Mechanical Man" on the new 1928 Rex Paver. The huge machine performs the entire cycle of mixing operations automatically by a one lever control. This result is accomplished by a simple mechanism; three cams and three levers — connected to the skip hoist, the water valves, and the discharge chute — perform all operations with sureness and accuracy. It works on a simple principle



A Modern Concrete Paver

used in all automatic machinery which performs thousands of operations daily without attention and without delay.

The mechanism is so made that by a simple adjustment of the three cams, the automatic timing of all operations can be varied. The "Mechanical Man" is so installed that if for any reason the mechanism failed to operate, the operator could continue the operation of the paver manually. Any single operation can also be performed by the operator if he so desires by a simple adjustment of the mechanism.

This automatic control insures a uniform batch of concrete each time. This is due to the discharge being shut at the end of either 8 or 10 seconds thus eliminating the dribble which always occurs at the last end of the discharge. The dribble at the end of the batch is a separation of the fine and course aggregates, and is one of the most noticeable faults of manual operation. The "Mechanical Man" is so adjusted as to stop the discharge before this dribble occurs. Recent field tests show that with sufficient concrete in the drum to permit the buckets to carry full during the entire discharge period, the Rex Paver will discharge approximately 35 cubic feet of mixed concrete in 8 seconds.

NEW ELECTRICAL POWER SHOVEL

A 15 cu. yd. electric power shovel, said to be the largest shovel in the world as to dipper capacity, physical size, output, and power, is to be built for use in open pit mining of coal. The operation of the shovel is of a simplified type so that it can be completly controlled by a single man. The total weight of the shovel will be approximately 1,350 tons. It will be mounted on four crawling traction trucks and will be self propelled, a recent development in large shovel design. The entire operation will be from an electric supply in the form of alternating current at four thousand volts.

—Engineering and Contracting.

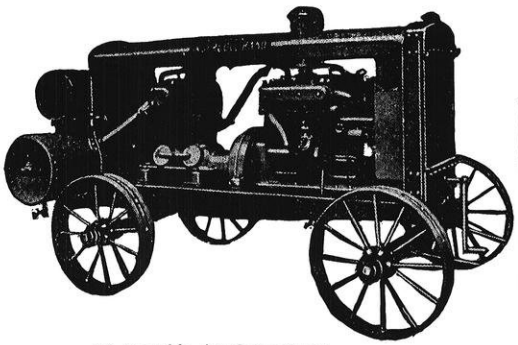
MODEL OF A FUELLESS MOTOR PROVES SUCCESSFUL

According to recent press reports, a small sized fuelless motor, invented by Lester J. Hendershot of Pittsburgh, Pa., has been operated successfully. The motor obtains its power from the terrestial magnetism of the rotation of the earth, thus making production of power possible over an indefinite period of time. The exact method of this conversion of energy is not known at the present time as the necessary patents have not as yet been obtained. A corporation, however, has been formed for the purpose of obtaining patents and for the further development of the motor. Stockholders in the corporation include the inventor, Major Thomas G. Lanphier of the U. S. Air Service, Col. Henry Breckenbridge of the Guggenheim foundation, and D. Barr Peat of McKeesport, Pa. The entire corporation is made up of men in the airplane industry so that there is no doubt but the first developments of the motor will be for its use in air crafts. The motor is still in an experimental stage, but if it proves successful as the tests indicate that it will, it will completely revolutionize all modern industry. At the present time, the inventor claims that a 45 horse power motor can be manufactured at a cost of only $12.50.

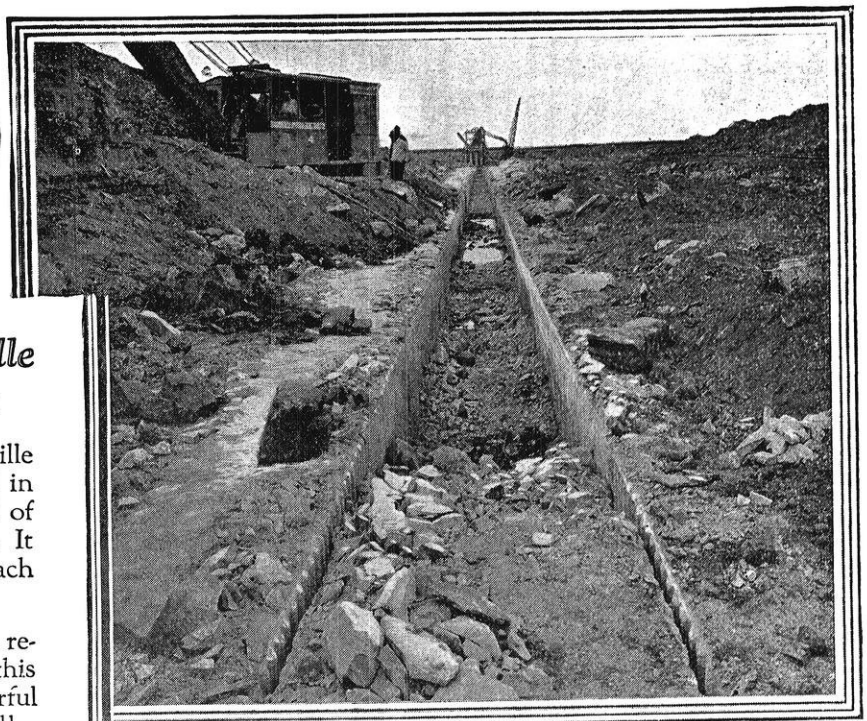
AERIAL SURVEYING

During the past year, developments in the art of aerial surveying has made it possible to make a reasonably accurate large area map with a comparitively short focal length lens used at a high altitude. This means that the map can be produced with very few negatives, and as the negative rather than the square mile is the unit of production and of cost of the aerial photographic map, a low cost map is secured which will serve most purposes.

(Continued on page 196)



I-R Portable Air Compressor



The $10,000,000 Louisville Hydro-Electric Project

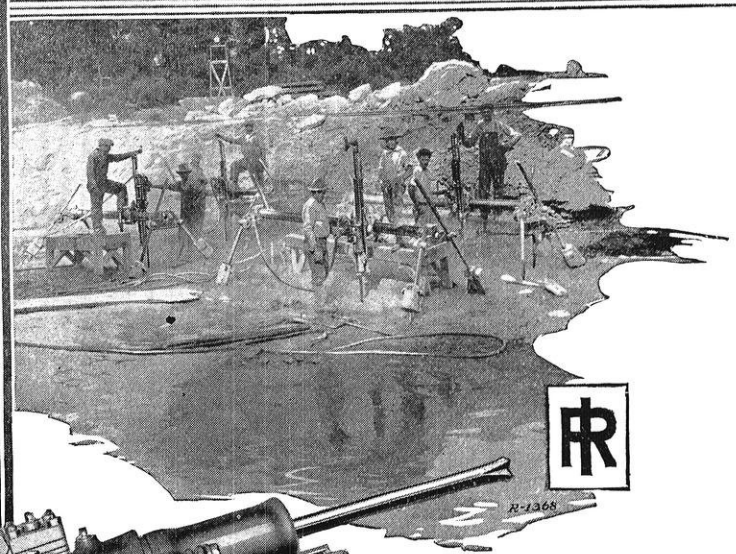
Actual work on the Louisville Hydro-Electric Project was started in the fall of 1926, and by the end of 1928 the plant will be in operation. It will ultimately have ten units, each of 10,000-hp. capacity.

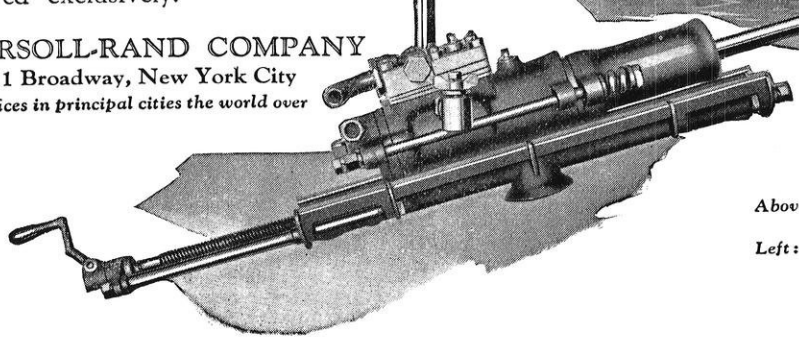
A 9,000-ft. keyway anchors the retaining wall. The channelling of this keyway was entrusted to powerful "Leyner-Ingersoll" Drifter Drills, which were mounted vertically on long quarry-bars. Under this method the work progressed far more rapidly than had originally been expected.

"Jackhamer" Drills were used in excavating for the powerhouse, while I-R blacksmith equipment was installed to handle the hundreds of drill steels required daily. Type Twenty Portable Compressors supplied the air.

On this, as on hundreds of other big engineering projects, Ingersoll-Rand compressed air machinery was employed exclusively.

INGERSOLL-RAND COMPANY
11 Broadway, New York City
Offices in principal cities the world over





Above: A section of the 9000-ft. keyway and a view of the drills at work.

Left: "Leyner-Ingersoll" X-72 Drifter Drill.

Ingersoll-Rand

SEWAGE TREATMENT MUST HAVE FUNDS

Gone forever are the days when the outdoor privy stood in majestic grandeur in the back yard, when the family pig and the chickens consumed substantial portions of the culinary wastes, and when the suds were thrown into the garden. Today sewer systems are a standard part of any sizeable municipal plant. Many of these sewer systems do nothing more than conduct the wastes to a convenient stream into which they discharge it untreated, but the practice is becoming common, as the country becomes more thickly settled, of treating the wastes to prevent contamination of the streams. Many municipalities now have such plants, but, unfortunately, the plants are usually neglected as soon as they are placed in operation and quickly lose their effectiveness. An important factor in producing such neglect is the expense of maintaining and operating the plant. Proper operation costs money, and the city fathers do not like to provide the money out of taxes.

Now comes the Committee on the Operation of Sewage Plants of the Engineering Society of Wisconsin with a proposal to charge householders and industry a sewage rental just as they are now charged a water rental. The committee argues, logically enough, that the providing of water and the removing of liquid wastes are related services and that the removing of the wastes might well be paid for just as the providing of water is paid for. The first steps in this direction have already been taken by Ohio and Michigan, which have passed enabling legislation. The suggestion certainly has merit and deserves most careful consideration. The proper operation of Wisconsin's sewage treatment plants is a matter of life and death.

TO THE U. W. ENGINEERS

Your annual "St. Pat" parade today is one of the features of a college "town" that manages to keep even a crabby editor in the more amiable frame of mind which makes him known as a good fellow. The floats depict an imagination that is more often attributed to your bosom enemies across the hill, the lawyers, after they have begun to face the jury box. The humor of the collegian is now being recognized as the cream of the land. Maybe some day Flo Ziegfield will glorify the "St. Pat." parade in his annual biggest and best.

This open letter appeared in the *Capital Times* on April 23, 1927, the day of the parade last year. It is an expression of the attitude of the people of Madison towards the parade. It appears that they enjoy it as much as we do.

WHO MAKES THE EXECUTIVE?

The following gives the viewpoint of executives in fitting people into executive positions as expressed by Merlin H. Aylesworth, President of the National Broadcasting Company, himself an executive.

"In this day and age executives are selected by others. The board of directors of a great corporation is made up of men who are high executives in other firms. They keep their eyes open for promising material in their own organizations as well as in the concerns of which they are the directing heads.

"The way for the aspiring youth or older employee to become an executive is to do the job that is given to him without regard to the time that may be necessary, without regard to immediate physical comfort, and without regard to any other job that may be ahead. The employee must first prove conclusively to his superiors that he can hold the job that has been given to him before he can expect consideration for higher rank in an organization.

"The success of an enterprise depends on getting the right man for the right place. Those above are likely to know better than you do what they want from you. Let them have it until you have proved your superiority to the work that you are doing.

"My advice to ambitious youth is to be exceedingly careful before taking a new position, to look over its difficulties and disadvantages as well as its rosy aspects and not to leave a firm that you like and respect without being sure that the new one is equal in integrity, as sound, and will offer as permanent employment as the one with which you are associated.

"As for personal advice, I would say the best guarantee of success is to keep physically healthy while forcing your brain to be ever active and progressive.

"No man can choose an executive position for himself. If he shows courage, initiative and intelligence, and is willing to assume real responsibility he will find, however, that other executives will elect him to membership in their ranks."

"In what does the commander's superiority consist? In his mental qualities: insight, calculation, decision, eloquence, knowledge of men."

—Napoleon.

ENGINEERING SOCIETY MEETING

(Continued from page 187)

power sites in Wisconsin are worth developing.

There are 212 public sewer systems in Wisconsin and 85 of them have treating plants, according to the report of the Committee on Sewage Plant Operation, headed by Frank R. King. Many of the plants are improperly operated and for that reason do not give satisfactory service. The neglect is due primarily to lack of operating funds. The committee suggested the inauguration of a system of sewage rentals similar to water rentals and recommended a resolution demanding necessary legislation.

* * * * * * * *

Wisconsin's city-planning and zoning laws are adequate, according to Jacob L. Crane, Jr., of Chicago, who spoke on Friday, but there still remains the problem of making the plans effective. They will not work by themselves. There must be continuous attention to their application and constant readiness to readjust them as conditions change.

* * * * * * * *

Vibrolithic came in for some lively discussion on Saturday morning following the report of the Committee on Pavements. Prof. L. S. Smith pointed out that recent tests by the Bureau of Standards, which have been exploited as demonstrating the superiority of the process, are not at all complete and conclusive and leave many questions unsettled. His views received strong support from those present.

* * * * * * * *

For the first time in the history of the society, commercial aviation was reviewed in the report of the Committee on Transportation. The rapid growth of commercial flying is indicated by the figures for airplane prdouction. In 1925, about 800 commercial planes were built. The number rose to 2500 in 1927, and the prospects are that during 1928 there will be an output of 10,000 planes. The United States, however, is far behind Europe in this field of transportation.

ENGINEERING REVIEW

(Continued from page 192)

METERING PANELBOARDS

A new metering panelboard of the loose-wire type has been recently developed and put on the market. These new panelboards will handle any metering problems that confront the builder. Loose-wire connections replace the usual copper bus-bars directly lowering the purchase price and speeding up installation. Four main types are being featured differing from each other in capacity, switches, and manner of fusing. These are known as NJTPM, NJPM, NTPM panelboards. One notable feature is the adaptability of this new panelboard to service in apartments and office buildings where frequent change of tenants makes meter changing an important item.

ALUMNI NOTES

(Continued from page 191)

Beve, Cudworth, e'06, is with the Remington Rand Business Service. He is in charge of the correspondence education of the new student salesman, and has written twenty books on the subject of general and specialized salesmanship. His home address is 121 Clinton St., Tonawanda, N. Y.

MECHANICALS

Auby, L. C., m'22, has been transferred by the Illinois Power and Light Corporation from St. Louis to Hillsboro, Illinois, where he will be division engineer.

Alberts, Harry C., m'24, is now associated with the Law offices of Floyd and Alberts, at 38 South Dearborn St., Suite 1625, Chicago, Ill. His home address is 5553 Blackstone Ave.

Barkhausen, L. H., m'01, is with the Northwest Engineering Corporation of Green Bay. His business address is Northwest Engineering Corporation, Corner of Howard and Pearl Streets, Green Bay, Wisconsin.

Buese, Frank A., m'22, formerly of Beloit, has moved to 784 46th Street, Milwaukee, Wisconsin.

Elliot, Benjamin E., m'13, is a Professor of Engineering in the University of Wisconsin Extension Division.

Foster, Dean E., m'06, is a Petroleum engineer with offices in the Wright Building, Tulsa, Oklahoma. He has spent eleven years in Tulsa in the oil and natural gas industry, and, during that time, has been especially impressed with the need for systematized research. Mr. Foster states that the engineer is being appreciated more and more in the oil and gas industry, as much for his refined methods of analysis and his business ability, as for his technical knowledge.

Gerhardt, A. P., m'21, has changed his address from 274 Burton Court, Whiting, Indiana, to 212 Smith Street, Neenah, Wisconsin.

Gleason, Edward P., m'10, has Engineering offices at Port Edwards, Wisconsin. He is very much interested in the expansion program of the College of Engineering, which will accelerate the progress of Wisconsin University along engineering lines.

Phillips, R. S., m'23, is travelling for the Portland Cement Company with headquarters at 848 Washington Blvd., Oak Park, Illinois.

Schaal, N. J., m'21, is district engineer with the Continental Can Company of San Francisco. His address is 155 Montgomery Street, % Continental Can Company of California, Inc., San Francisco, Calif.

Schmidt, Herbert W., m'25, has changed his address to 427 Sixth Ave., Wauwatosa, Wis.

Thorp, George C., m'91, is with the Illinois Steel Company of Chicago. His address is 208 South La Salle Street.

Wiggins, E. R., m'08, died recently at Davenport, Iowa. At the time of his death he was connected with the French and Hect Manufacturing Company of Davenport. Mr. Wiggins was formerly a resident of Janesville, Wisconsin.

Zimmerman, O. B., m'96, M. E.'00, is the author of a paper on "The Application of Machinery to Agriculture" which appears in Mechanical Engineering of August 1927. The paper was first presented before the Kansas meeting of the A. S. M. E., April 4, 1927.

In the Experiment Department of the International Harvester Company, he has spent practically all his time on practical research in the field of internal combustion tractor development, especially as related to agricultural problems.

Hanson, Earl, m'22, writing in the Geographical Review for January, 1928, describes the "Renaissance of Iceland." This little country, which is now an independent kingdom with an area four-fifths as large as the city of Madison, is interesting for other reasons than its extreme northerly situation. "One extremely interesting phase of Icelandic Agriculture," according to Mr. Hanson, "is irrigation for warmth, using the numberless hot springs. The average potato crop alone can be doubled in this way, both because of the artificial lengthening of the season and also because of protection given against summer frosts." Natural hot water is also used to heat buildings. A large national hospital and two schools now under construction in Reyjavik will be heated entirely by this means. The possibility of heating the entire city with water piped in from hot springs fifty kilometers away is being considered, although it is not likely to be done until the city is much larger than at present.

Mr. Hanson is scheduled to give a paper on engineering progress in Iceland before the joint meeting of the Railroad division and the Metropolitan Section of the A. S. M. E. to be held on March 1st. While very young in years, Mr. Hanson is old in travelling experience. After graduating from the University of Wisconsin in '22, he spent three years with the Chile Exploration Company in Chile. Last year he made a trip to Iceland for the purpose of investigating the industrial and water power possibilities and collecting anthropological data for a number of educational institutions. He is a member of the Explorer's Club and a fellow of the American Geographical Society.

Johnson, E. W., m'27, gives his address as 266 Hancock E Street, Detroit, Michigan.

Kircher, R. N., m'22, is at present associated with the West Bend Aluminum Company of West Bend, Wis.

Peters, N. J., m'28, is employed by Damrow Bros. of Fond du Lac, Wisconsin.

RESISTANCE TO FLOW ON WATER HAMMERS

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discharge was stopped almost instantly, proved most interesting. Recording devices were necessary to obtain on an indicator card the exact history of Water Hammer Pressure, Time, and Valve Movement. Fig. 1 shows the culmination of several devices as designed by the writer and constructed by O. A. Romare, College of Engineering Mechanician. A cut in the Wisconsin Engineer of April, 1927, page 226, shows the original device constructed. An electric motor drove a rotating drum, and a seconds pendulum was used to operate recording magnets for measuring time. Since water hammer pressure waves travel from the valve back to the reservoir at a rate equal to the velocity of sound in water (about 4000 feet per second) a sensitive device is needed. In Fig. 1, a special Diesel Engine indicator with low inertia effect is mounted so that the device can be connected a few inches above the inlet pipe of the hydrant. A clock works with governor rotates the revolving aluminum drum so that a pressure

trace can be made on the paper. A clock with electrical connections operates one of the small magnets with pencil arms so that half seconds can be marked on the paper. The other magnet is connected in series with a make and break circuit at definite intervals on the valve rods along side of the riser of the hydrant. As the valve travels upward in its closure, the pencil of the magnet arm makes dashes to record per cent valve movement. The travel of the revolving drum can be varied from $\frac{1}{8}$ inch in one half second to 3 inches in one half second, which insures good history cards, regardless of the length of pipe line studied in the field. It is portable, well built, and sufficiently rugged in construction to keep alignment and stand shipping. A technical man or student of average intelligence can learn to operate it successfully after a little experience. The apparatus is so self contained that it can be taken to the remotest installations where only small pipe fittings will be required to connect it to the hydrant.

Water Hammer Diagrams

Fig. 2 shows only two cards of some 650 tests made in the laboratory. While the hydrant discharges, the pressure is below static head because some of the head is needed to cause flow in the supply line. At 85% valve movement, the water hammer pressure builds up behind the valve to that equal static head and then it increases rapidly to a maximum value at full 100% movement. By controlling the movement of the final 15% closure, or by suitable relief valves which open automatically at or near 92% movement, the writer can obtain most any type of card engineers would like to see from a standpoint of safety. (See Runs 648, 713, 713A, 714). He believes water hammer exceeding twice static head is a destructive hammer and is liable not only to break pipe joints and cause intense surges in the water tanks, but it may also break pipe lines as it did in the laboratory. This instrument should indicate the relative safeness from destruction of a water service installation. The loss of water by leaky joints often amounts to 20 cents per 1000 gallons, and the writer believes the railroads cannot overlook research work that can effect this saving. Some hydrants operate 200 times a day, so the tremendous stress and repetition of same becomes of unusual hydraulic importance. At this point the writer wishes to add that as the tender becomes nearly filled, the air in it cannot escape fast enough since the water spout obstructs the passageway. Much "foaming up" results and to keep the decks from getting icy, the water must be shut off suddenly. The fireman usually pulls the valve open again to fill the tank and he wants the valve to close quickly to keep water waste a minimum and the track from washing out, after the tender is full.

There seemed to be an opinion among engineers that this was "laboratory work" and would not apply in the field. The experimental line was 314 feet in length (longer than many field lines) and it included many fittings. So at their request, as has been stated, field work has been done. Fig. 3 shows some of the cards

obtained in zero weather with a thirty mile gale blowing. Kindly note the similarity even under adverse conditions of Runs 541, 705, and 720. It was necessary to thaw out the indicator after each run, for the water froze so fast. Note that where the lengths of the supply headers are the same, the pressure wave holds its peak for the same length of time. Also that a perfect card was obtained on the hydrant with 1040 feet of supply pipe (Run 720) and that the length of pipe affects the time under which the pipe will remain stressed with water hammer. Distinct clanks or ringing sounds, much different from those in the laboratory, were heard as the valves closed. Hence the name water hammer which resembles the sound that would be obtained by a heavy sledge striking the pipe. Since most of laboratory piping is above ground the sound characteristics would probably be different. Observe how relief valves cut down the water hammer peaks in a satisfactory manner. No engineer would think of stopping a fast moving train of cars instantly without destruction, yet that is what is going on in a pipe line of flowing water which is suddenly stopped. Because it is underground and can't be seen, one is apt to forget this almost irresistable force of mass and acceleration. Much work remains to be done and it is hoped certain scholarships in hydraulics will be established by the railroads to further this interesting, spectacular, and useful research work.

Location of Leaks

This is merely to be construed as a preliminary statement which will be discussed in a later issue of the Wisconsin Engineer. The device of Fig. 1 should locate leaks in pipe lines. As the valve closes, the pressure is built up as shown in Run 720 and the pressure wave travels to the reservoir. A pipe 2000 feet long should take total water hammer for one second unless relief measures are provided and leaks are present (wave travels to reservoir and returns to valve). If there are leaks, as the pressure wave stikes the leak, the recording device should record a drop in pressure. The distance from 100% valve movement measured in time units to this drop in pressure, would indicate the distance along the pipe at which this leak or drop in pressure occurred. It works in the laboratory. Whether the present device is sufficiently sensitive for field work remains to be observed.

AFRICA AND THE DAY'S WORK

(Continued from page 183)

all yourself is out of the question. There must be a porter for the jack-snipe.

While the great bulk of native labor is suited only to tasks of the simplest sort, such as carrying loads or pushing carts or digging, it would be a mistake to suppose that many individuals cannot be trained to do work of a more advanced nature, — to use tools and farm implements, and even operate machinery. At Port Soudan, for instance, all the unloading of cargo is done by native labor, under the direction of one of

the ship's officers and a foreman. It is an incongruous sight to see half naked, fuzzy headed blacks that look as though they had just climbed down from the trees operating steam winches and cranes as though they had grown up with machinery. Some of the natives make fairly good automobile drivers, too, but they could scarcely be called chauffeurs.

As a rule, working with their own tools and according to their own methods, they are ingenious and skillful. We once asked our headman to build a *boma* (a platform in a tree from which to watch for lions and leopards at night) and in an afternoon a dozen men, with no tools except their machete-like *pangas* and no materials except the timber and bark obtainable on the spot, even without nails, they constructed a large, substantial platform, with a double rail all around and a serviceable ladder by means of which to reach it. At another time they made, in a few hours, a very good grass hut.

It must be admitted that as a place for an ambitious young engineer to start his drive for fame and fortune East Africa is not so much. The most important activities in Tanganyka are, perhaps, sisal and coffee growing. There are many large plantations of each, and fortunes have been made by some of the growers, but such undertakings require heavy investments and yield no returns for several years. A considerable number of young Englishmen and Germans find positions as superintendents on these plantations or at the plants where the sisal hemp is prepared, but the developments, necessarily on a large scale, call for the resources of a syndicate and are not suited to individual enterprise. One meets a number of representatives of European and American manufacturers of farm machinery, tractors and automobiles, but this field is limited and development is not rapid at present. Perhaps the most promising individual enterprise that a man can engage in independently is motor transportation, as there is a considerable movement of goods that must be carried on either by automobile or man power, horses and mules being barred from most of the country by the tsetse fly. The writer met a former representative of the International Harvester Company, an American, who was making a success of this business, alternating it with ivory hunting. We also met a young chap who said he was making more than a hundred pounds a month at placer mining for gold. He hired a hundred or so natives at a shilling a day to look for the gold, and they turned over all they found to him. He was, it should be added, a Scotchman.

But it must not be supposed that life is necessarily uncomfortable over there just because there is a lack of the conveniences that engineering has given us in such abundance. Engineers are justly proud of their contribution to civilization, but it is easy for us, as it is for those of any other profession, to think of our work as perhaps more nearly indispensable than it is. It is wholesome to occasionally come in contact with

someone who holds a point of view that puts us on the defensive. The writer heard such a point of view expressed with perhaps more force than fairness by a man in Tanga.

"You think," he said, "that your country is such a wonderful place in which to live. I've lived there and I don't think so much of it. You think machinery can do everything for you. Your corporations tell you — I've seen their advertisements — that every American has so many horse-power working for him. They figure out that this is equal to such and such a number of slaves, and the answer is supposed to make everybody happy. Well, what does it get you, I lived in New York, and what kind of life does the average New Yorker lead? He is jarred out of bed in the morning by an alarm clock, bathes in a hurry, dresses in a hurry, eats in a hurry and dashes for the sub-way station. He hangs onto a strap all the way to town, scrambles out from underground like a mole, and dodges through traffic till he reaches his office. There he grinds away all day, stopping for a few minutes at noon to lunch on milk and crackers. When it's time to go home he dodges worse traffic and more of it, is jammed by brute force into an already overcrowded sub-way car, and chloroforms his mind with a tabloid newspaper while being half crushed and half smothered on the ride home. That evening he gets the modern romance that science has brought you, — jazz on the radio or Felix the Cat at the movies. All evening he has been rushed about like a Ford part on a conveyer belt. He hasn't had a minute of decent unhurried leisure, hasn't seen a ray of sunshine, hasn't had his feet on anything except steel or concrete, hasn't even had a drink. He has been breathing coal dust and poison gas all day; he has been bullied and insulted by the sub-way guards, the street-car conductors, the traffic police, — the very men he pays to serve him. His body is tired from standing in crowded cars, his mind is numbed by the tabloids, his collar is smudged by the soot. That, broadly speaking, is what he gets out of his share of all that horse-power.

"Now take Tanga. A white man in Tanga wakes in the morning according to the due course of nature. A boy brings him a cup of coffee while he lies comfortably in bed. Another boy prepares his bath and lays out his clothes. He dresses in white ducks that a local tailor makes him for five dollars a suit and that his boy keeps immaculately laundered. He breakfasts in decent leisure. Then he goes to work feeling like a gentleman, in his car or in a 'ricksha'. Like the man in New York, he works all day — with time out for a cup of coffee at ten, and an hour or so for luncheon at noon, and time for tea at four. After tea it is cool enough for tennis or golf or bathing, and by the time that's over it is past six and time for a sun-down. (A "sun-down" may be anything from a single whiskey and soda to a party lasting two hours or more, attended by all the local gentry and involving the unrestricted but orderly consumption of any and all known varieties of liquor. It is, in the tropics, a very popular institution.) After dinner, he isn't too tired to enjoy bridge, or dancing, or a good book. All day he has behaved as an individual and not as a cog in a machine; he has been out-of-doors more than half the time; he has been treated with courtesy and deference, has had pure air to breathe, and hasn't even soiled his white ducks. He has a decent day's work done and has had a good time. He has had about four man-power working for him and it has kept him comfortable."

The gentleman, in making these remarks, was undoubtedly influenced somewhat by his personal feelings and prejudices. His sketch of New York life would seem to be a little overdrawn, and the description of life in Tanga, while essentially true as to the facts alleged, conveys somewhat exaggerated idea of the felicity of existence in the tropics. But there is, in what he said, some food for thought.

"I didn't begin with askings,
I took the job and I stuck;
And I took the chance they wouldn't,
And now they're calling it luck.

—*Kipling.*