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THE CENTRAL RAILWAY  
AND ENGINEERING CLUB  
OF CANADA



OFFICIAL PROCEEDINGS FOR MARCH, 1915

CONTAINS:—

REPORT OF MARCH MEETING

AND

PAPER ON "AUTOMATIC SPRINKLERS"

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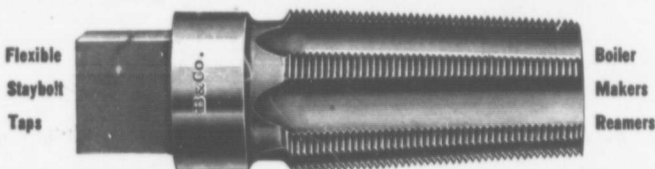
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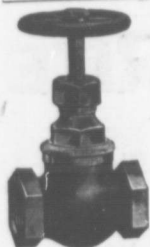
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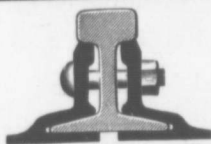
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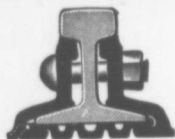
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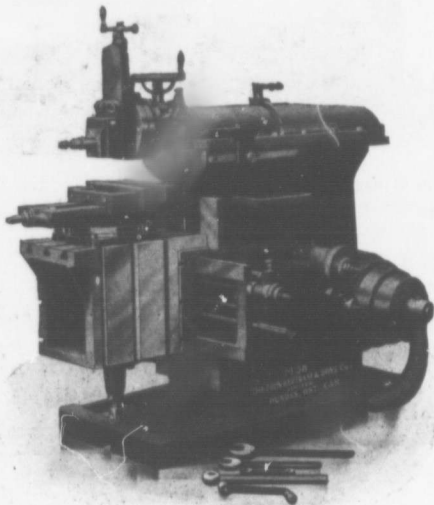
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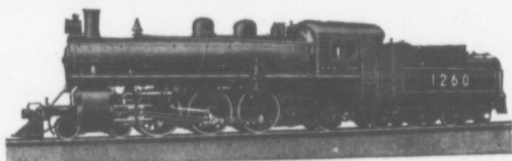
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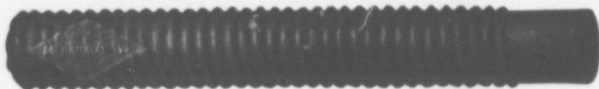
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OFFICIAL PROCEEDINGS



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TORONTO, CAN., March 23rd, 1915

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MEETING OF THE CENTRAL RAILWAY AND  
ENGINEERING CLUB OF CANADA

COMMITTEE ROOM, HOTEL CARLS-RITE,

TORONTO, Tuesday, March 23rd, 1915.

The President, Mr. Jas. Wright, occupied the chair.

Chairman,—

Gentlemen, if you will kindly come to order we will open our meeting.

The first order of business is the reading of the minutes of the previous meeting. As you have all had a copy of these minutes, it will be in order for some one to move that they be adopted as read.

Moved by Mr. G. H. Boyd, seconded by Mr. N. A. Davis that the minutes of the previous meeting be adopted.

Chairman,—

The next order of business is the remarks of the president.

The next meeting will be held on April 27th, when Mr. N. Quesnel, of the Boiler Inspection and Assurance Company of Canada, will read a paper on "Boiler Construction."

I might also state, some of you may perhaps have heard, our past president, Mr. Thos. J. Walsh, has lost his wife. It is with regret that I say this, and I hope as many of the members as possible will call at his home.

NEW MEMBERS

Mr. E. H. Wood, Division Car Foreman, C.P.R., Toronto.  
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Chairman,—

Gentlemen, I have much pleasure in calling on Mr. Sherman to read us the paper for this evening.

## AUTOMATIC SPRINKLERS

By C. G. SHERMAN

Canadian General Fire Extinguisher Co., Ltd., Toronto, Ontario

About all that can be said regarding Automatic Sprinklers and their installation has already been said; so much, in fact, that I shall try to avoid the mass of statistical information which is available and point out for your consideration a few of the simple, salient features of the sprinkler and its accessories, its adaptability and usefulness.

The Automatic Sprinkler in its improved form is a fool-proof mechanical device, its operation being based upon the fusibility of metallic compositions at certain temperatures. The outlet under the water deflector is covered by a non-corroding substance, the most advanced form being the glass disc type, held in place by the solder composition. The deflector is a circular half notched, cap which spreads the water evenly over a limited area; in some sprinkler heads a moving lever arm attached between the water outlet and the deflector is said to accelerate the water spray. The actual operation of the sprinkler is extremely simple; the temperature around the head reaches or just passes the melting point of the solder arm, which immediately breaks down; the pressure under-

neath the closing disc raises it and the water flow instantly clears the frame of the sprinkler; the amount of water discharged by each sprinkler varies from seven to sixteen gallons per minute depending on the water pressure at that point.

It is much in order at this stage to define exactly what an automatic sprinkler, or the complete sprinkler installation, is intended to accomplish, and what cannot and should not be expected of it. Automatic sprinklers have never yet extinguished a conflagration, and until some new improvement or departure is made in them, they never will. The one object and subsequently its resulting intrinsic value, is that it puts out or checks the fire at its very start. The blaze may develop in the most un-thought-of places, but experience has taught us to put sprinklers in just those places, and the fire, if it is not entirely extinguished, is checked and held at that point of its development. The automatic sprinkler is essentially a fire preventative, the surest obstacle in the path of a conflagration; it attacks the dangerous little blaze in its incipient stage and in ninety-six per cent. of the cases it is a successful foe.

There are two standard forms of automatic sprinkler equipments called, in manufacturers' parlance, the "wet" and "dry" pipe systems. In heated buildings where there is no danger of frost the water is distributed under pressure throughout the network of piping, which has been aptly termed the veins and arteries of the system; this is the "wet" pipe system. Where heated conditions do not exist the piping system is filled with air under pressure, and the water is admitted only when the air pressure is released; this is the "dry" pipe system. The operation of the "dry" pipe system is controlled by an ingenious device known as the dry pipe valve, its principle of operation being one of differential pressures. The dry pipe valve is installed at the point where the main supply enters the building; the inside piping system is filled with air up to a certain pressure, seating inside the valve a diaphragm of a certain area; the water is then admitted into the valve as far as the water seat which is about one seventh of the area of the air seat. When the air is released the valve trips in some manner, depending on the manufacture of the valve, and allows the free passage of water through to the system. The reason for differentiating the two pressures is to overcome the necessity of constantly maintaining an air pressure considerably in excess of the water pressure, which would be necessary, and almost impossible on account of leakage due to vibration, water hammer and many other causes.

A particularly interesting feature of the sprinkler equipment and one which very largely eliminates the danger of excessive water damage is the alarm system. The alarm valve is installed in the same relative position in the "wet" pipe system



as the "dry" pipe valve in the "dry" pipe system. It is very like a swing check valve and may be set in either a vertical or horizontal position. The flow of water through this valve immediately operates either or both of the following alarms: the water motor gong is placed on the outside of the building; the movement of its rotary clapper depends entirely on the flow of water into the system, a pipe connection being taken directly from the system side of the alarm valve; the electric bell is placed at some point inside the building where it can be easily and constantly heard; its operation is caused by the pressure of the water flow on a brass diaphragm circuit closer, the wires from the bell passing through the circuit closer to a set of wet or dry batteries. Either the inside or outside alarms are also attached to the dry pipe valve, so that both the "wet" and "dry" pipe systems are subject to the same method of control, in so far as an alarm system can control them.

One of the most important additions to the main sprinkler equipment is the outside water curtain. Whenever the adjoining property offers a particularly hazardous risk, specially constructed heads are placed on the outside building wall over the window and door openings. In case of a nearby fire the exposed wall of the sprinklered building can be protected by practically a solid sheet of water and in addition to making it nearly impossible for fire to pass through, it also preserves the actual building construction from the intense heat. These outside sprinklers are not automatic; they are supplied from a separate main, and are directly controlled by a shut-off valve placed at some convenient location inside the buildings.

The question of adequate water supply for the automatic sprinkler equipment is one over which arises considerable diversity of opinion, and which constitutes one of the serious objections to proposed installations. The chief source of supply is the municipal water main, except in the isolated plants and in rare instances where the water service has not been developed. The insurance organizations, however, do not consider an equipment standard unless a secondary or auxiliary supply is provided. The secondary supply may be one of three methods: the gravity tank, the fire pump or the pressure tank; the gravity tank is recommended for large plants where the tank can be placed on a separate structure away from the buildings or on buildings where the structural conditions have been adapted for it; the fire pump requires two very essential accessories for its effective operation,—constant steam pressure and a large, and preferably unlimited, water supply for its suction, a combination which is rarely available. The pressure tank is the least desirable of the three methods on account of its size and the limited water volume, but it is

often used where there is room inside the building for its installation.

There are hundreds of cases, however, where the installation of a secondary supply is not practicable and consequently the proposition is abandoned; but in most of these cases the municipal water service is reliable and oftentimes it is possible to get two connections from the service mains; and in these instances the prospective buyer shows short sightedness to give up the automatic sprinkler idea. In the tens of thousands of fires which have been extinguished or controlled by automatic sprinklers, statistics show that only about four per cent. have actually drawn upon the auxiliary supply; that is, sufficient water would have been supplied from the municipal service to accomplish the same results. The property owner who wants protection with a reasonable reduction in his insurance does not overlook the one source sprinkler equipment; and the progressive insurance companies are rapidly recognizing its value and efficiency and are adjusting their rates accordingly.

The installation of automatic sprinklers in fire-proof buildings is, and has always been, a debatable point, debatable solely from the arguments which invariably arise in determining what constitutes a fire-proof building. An empty all-steel-and-concrete structure, with blank fire walls, metal window-frames and wire glass, and the exposed steel, if any, thoroughly fire-proofed, may be truly said to be fire proof; if, when the occupancy of the building is completed, the contents are of an inflammable nature, the building is no longer fire proof. The recent fire at the plant of Thos. A. Edison in West Orange, New Jersey, illustrates the real protective value of concrete buildings against fire; at the same time it illustrates the failure of reinforced concrete to afford complete fire protection. The intense heat from the burning contents so seriously attacked the supporting columns in one building that a part of two floors collapsed, and in many places within the fire area the columns and pilasters disintegrated to the extent of splitting and shearing off. The Boston Manufacturers' Mutual Insurance Company have made a report on this fire; to quote from this report is summing up the situation quite completely: "Automatic Sprinklers should have been provided throughout all rooms of all buildings and fed by an ample gravity supply through an adequate system of yard pipes reinforced by large pumps installed for fire only." "No type of building is fire proof when it is filled with combustible materials and unprotected by Automatic Sprinklers."

A very important economic result derived from an installation of automatic sprinklers is the greatly reduced rates of insurance, which are offered on risks that have been equipped.

The sprinkler equipment reduces the actual fire hazard ninety-six and two-thirds per cent; this has formed a class of risks in which the danger of fire loss is practically eliminated. The insurance companies have not been slow to realize that a large volume of this class of business offers an extremely profitable investment. The result is that a general reduction in rates has been made, varying from forty to ninety per cent, depending on the individual fire hazard of the property and the reliability and quantitative value of the water supply. The sprinkler system as an investment to the property owner is an excellent one from purely a financial view-point. The saving in insurance premiums pays for the total cost of installation in from two to seven years; taking the equipment outlay as the investment and the yearly insurance saving as the dividend the resulting percentages figure from twenty to sixty per cent. It would not be difficult to find property owners and manufacturers who realize less than that on their actual capital invested.

In conclusion there is a word to be said about the quality of materials and workmanship in the automatic sprinkler equipments. Thousands and hundreds of thousands of dollars have been spent in the perfection of the sprinkler itself and its necessary accessories, and this expenditure has been made by comparatively a few people; they have placed the finished products on the market and are supplying with them trained men to install them. The number of sprinklers and sprinkler devices which are approved and accepted by the National Board of Fire Protection is comparatively few and the National Board is absolutely an impartial judge. An equipment of standard devices installed by expert mechanics assures the man who is paying for it that he is getting full value; but if he entrusts his work to trade apprentices and sidewalk contractors, he is going to get less than what he pays for by their use of inferior material and poor workmanship. Let it also be said that there are at least ten sprinkler companies in Canada and the United States who are putting in approved devices and doing thoroughly reliable work; the competition afforded by these companies is sufficient to satisfy the most exacting buyer.

Chairman,—

I may say, gentlemen, that the paper is now open for discussion. If any of the members wish to ask Mr. Sherman any question on the subject, I am sure he will be only too pleased to answer you.

Mr. Bly, I believe you are interested in this subject. We would be glad to hear from you.

Mr. G. D. Bly,—

There is not very much I can say on the subject, Mr. President. I have listened to the reading of the paper with a great deal of interest. I have, from time to time, had a little experience with automatic sprinklers.

I would like to mention something I noticed the other day in connection with the fire at Shepherd's on Adelaide Street. I noticed that the outside sprinklers of the Mendelssohn Piano Company next door worked for a while, then stopped. The thought came to me that there was something wrong.

In that case the outside sprinkler equipment was of practically no use. It seems to me that there should be some other way of getting around this.

I think, as the writer has said this evening, the double pipe system is much preferable to the pressure tank system. Of course, there are some of the high buildings where the city pressure scarcely reaches the top of same, and in that case it is necessary to have the tanks on the tops of the buildings.

There are a number of difficulties experienced with these tanks on the top of the buildings, particularly in the cold weather, when great precaution has to be taken to prevent their freezing up. It is necessary to heat the tank water from time to time, depending on the temperature. I know of a building near where I am, where the tank water froze, and they had to bore the bottom of the tank to keep it from bursting. This is one of the principal difficulties with the gravity tanks. However, there are now some firms installing heaters which work all the time and insure there being no possibility of the tank freezing. The original heater was a steam coil and was a long way from being fool proof.

The frames of the outside gravity tanks are frequently neglected and allowed to rust and they get very shaky, like some of the neglected fire escapes. I think the city should take hold of this matter and compel proper attention being given.

Mr. C. G. Sherman,—

About the first question; I think that the reason the outside sprinklers of the Mendelssohn Company were not working all through the fire was because they were turned off by hand. Outside sprinklers are hand-controlled; there isn't a possibility that the water pressure dropped to a point that would cause the sprinklers to stop operating.

I think that had there been any necessity for keeping them on, they would have done so, as they are supplied direct from city pressure.

About the outside pressure tanks freezing up. The old

system of heating these tanks to prevent them freezing, was by steam coil in the bottom of the tank. No water circulated from the riser through the tank; the exposure at the top and the small exposure around the side of the tank, caused the water to freeze almost invariably. The later systems have an individual tank heater which works identically the same as the hot water system in your own home. The water circulates through the tank riser and tank, then back to the heater through a smaller pipe. This makes it practically impossible for it to freeze, as the water is kept at a temperature of about 55 degrees, and this combined with the constant motion of the water entirely eliminates any danger of freezing.

Mr. G. D. Bly,—

The Protection Companies undertake to install a signalling device on your tank, and when the temperature drops below a certain point, you immediately get a call from them notifying you that the tank is in danger of being frozen up. You can also have a similar device connected with the tank valves, and when anything goes wrong, you will get a call from them. It might be a sprinkler head going off without a fire, or a possible leak.

I have had several experiences with sprinkler heads going off, where there was no fire. A peculiar thing happened some time ago. I was working on an exhaust steam pipe, and had the separator open and a small engine working, drilling some holes in the lid. After a time the watchman came up and said, "There is a lot of water coming out of the heating pipe down there." I started up the vacuum pump to pump the water out and thought nothing more about it. In a little while he came up again, and said, "You had better come down and see what is wrong."

The fault was that the steam coming out of the separator from the engine which I was running had put the sprinkler head off, directly over the steam pipe. This goes to show how sensitive these sprinkler heads are. Once before this, I had one frozen.

I remember a case where a sprinkler head cost the life of a man. He was burnt to death, through no fault of the sprinkler, the head being wrapped to keep it from freezing. It had been wrapped on Saturday or Sunday and the wrapping had never been taken off. When the fire broke out the wrapping prevented the heat from reaching the head and the man was so severely burned that he only lived forty-eight hours.

Mr. C. G. Sherman,—

There are several signalling companies in Canada, one of

which is operating in Toronto. In addition to the temperature alarm, they also have a method of determining when the water passes from the city main into the system. They connect up to the supervisor valve and should there be any leakage, etc., they will immediately notify you. This is particularly desirable where no night watchman is employed. There is also a device now used extensively for determining the height of the water in the tank, called the high and low water alarm, which signals when the water drops below a certain level.

Mr. J. Callanan,—

I would like to ask; is the dry pipe system as economical as the wet pipe system, and do the Underwriters recommend the installation of the dry pipe system in preference to the wet?

Mr. C. G. Sherman,—

No. Wherever possible, the wet pipe system should be installed in preference to the other. The wet system is more sensitive as with the dry system it takes from ten to twenty or twenty-five seconds for the water to pass through the dry pipe valve to the sprinklers, whereas, with the wet pipe system the water is right at the head. There is also a little less mechanism with the wet pipe system than the other, consequently less to inspect.

Mr. I. Young,—

There is a question I would like to ask. How is it that there are not more of the one-source equipments, and less gravity tanks? There are a great many gravity tanks in some parts of Toronto, most of them for secondary supply to that which is obtained from the city main.

Could not sufficient pressure be obtained from, say, two separate city mains, or some other way, to get around this necessity for erecting gravity tanks at a great expense, let along their unsightliness. There are, it seems to me, enough tanks in some parts of this city to more than pay for another supply and having two city mains instead of one. Would not that be just as good?

Mr. C. G. Sherman,—

The Associated Factory Mutuals who carry the most of the highest class of risks on sprinkler-equipped buildings, in their requirements insist that the secondary supply be obtained from a gravity tank or pump, entirely separate from the municipal supply. I believe, however, that in the United States some

of the non-tariff companies are taking risks with one-source equipments at practically the same rate as the tariff companies will take a two-source equipment, but then a great many people are not inclined to place their risks with non-tariff companies.

Notwithstanding the Associated Factory Mutuals' requirements in respect to secondary supply being obtained from gravity tanks, or fire pumps, in 96 per cent. of cases, two city supplies are entirely sufficient, although the task of convincing the insurance organizations that they should take all these risks is one which I would not care to undertake.

So far as a gravity tank being unsightly, I do not quite agree with you there. In my opinion they look very, well—"business-like."

Mr. I. Young,—

When you approach any one regarding the installation of sprinkler equipment, the first question that you would be asked, is, "Will it pay?" In the cases of factories, warehouses, etc., the answer can safely be, "Yes," but take public buildings, such as hospitals, schools, office buildings, etc.; regardless of whether or not it would be a paying proposition, should not sprinklers be installed for safety's sake, more so here than in factories, warehouses, etc., as human lives are at stake.

The question is, should they not be installed, regardless of whether they are a good business proposition, and if so, how is it that some legislation is not put through compelling this.

Mr. C. G. Sherman,—

In hospitals, the danger of fire starting is very much less than where manufacturing is carried on. Practically the only danger of fire starting in a hospital is in the engine room, their heating plant, or where their electricity is generated.

The insurance on office buildings is so divided that it does not warrant the installation of this equipment. The building itself carries a very low rate of insurance ordinarily; the owner does not always feel inclined to safeguard the lives of the tenants of the building at a cost to himself.

Mr. I. Young,—

That is the reason for equipment not being installed, but the question is, should it not be installed, no matter if it is going to be a bill of expense to be borne by the owner of the building.

If they actually are required, then something should be done to compel their installation.

Mr. C. G. Sherman,—

I personally believe that every public building should be equipped with automatic sprinklers.

Mr. J. Callanan,—

How is it that there are very few sprinkler equipments in Vancouver, B.C.? A fire in the warehouse which our firm operates in Vancouver practically destroyed everything. I asked the manager about the sprinklers, as they have saved our Toronto factory three times, and I was told by him that so far as he knew there were only three buildings in Vancouver which were equipped with sprinkler systems. Would this not be an excellent field for an automatic sprinkler company to start up a business in? Is there anything wrong with the water supply there?

Mr. C. G. Sherman,—

Two years ago, Vancouver was an excellent field for automatic sprinkler people. Now, it would be an impossibility to sell any of this equipment, and make any money, due to business conditions. As far as the water supply is concerned; in Vancouver it is excellent. They take their water supply from the mountain across the bay four or five miles away, at an elevation of about two thousand feet above the city. The water is carried down in large steel mains, instead of cast iron, as in Toronto, and most cities in this part of the country. I think the only reason for lack of equipment of this kind in Vancouver is that it is absolutely a new country. I do know, however, that in the last four years there have been fifteen or twenty sprinkler equipments installed in that city, in warehouses, factories, department stores, etc.

Mr. G. D. Bly,—

About ten or twelve years ago we were tied up for sprinkler heads. There was only one firm in Canada that we could obtain them from, a company at Montreal. How is this matter now?

Mr. C. G. Sherman,—

I do not know who was responsible for the tie-up you mention; it does not seem probable that there really was one as ten years ago there were several sprinklers, the Grinell, the International, the Niagara and the Weracher, among others, which were all acceptable. Since that time there have been several new heads introduced, and approved.



Mr. G. D. Bly,—

What is your opinion of having the sprinkler systems under city supervision, the same as the electrical inspection which is just being inaugurated, or the plumbing inspection?

Mr. C. G. Sherman,—

The cases are not parallel; electrical equipments are one of the principal causes of fires; plumbing inspections are necessary to safeguard public health. Automatic sprinklers are inspected by those who are vitally interested, the insurance companies; municipal inspection is not necessary.

Mr. I. Young,—

Speaking of sprinkler heads going off unnecessarily. There are some of these sprinkler heads that have a protruding attachment. It seems to me that there would be considerable liability of their being struck and opened unintentionally, and in this way, in some warehouses, say where they were silks, or some other very damageable materials, the water would do as much damage as a small fire. Also, take a sprinkler head which might happen to be over a motor. If the same were to go off it could cause considerable damage and trouble.

Mr. C. G. Sherman,—

As far as installing sprinklers over motors and electrical equipment, this is not being done. There has been too much damage done by the sprinkler heads going off from overheated conditions and they do not any longer install same in such places. If there is a certain amount of care taken in the original installation of the sprinklers—proper positions selected for placing them,—there is no trouble. If there is a large amount of machinery, shafting, belting, etc., there certainly is a liability of the heads being struck and broken. There is one sprinkler, the Grinnell, which has no moving parts. It is absolutely self-contained and protected, and when the solder composition between the deflector and the water outlet melts, there is nothing left but the frame.

Chairman,—

Mr. Sherman has given us a good illustration of the sprinkler system. It has been very edifying to me, and it will now be in order for some one to move a vote of thanks.

Mr. G. D. Bly,—

I take much pleasure in moving that a vote of thanks be extended to Mr. Sherman.

I think that the sprinkler system is an A-1 proposition for any firm to put in. I have had some little difficulties with them, but they were only to be expected.

Mr. F. Smith,—

I second the motion that a vote of thanks be extended to Mr. Sherman.

Chairman,—

Gentlemen, you have heard the motion, all in favour please signify in the usual manner. Carried.

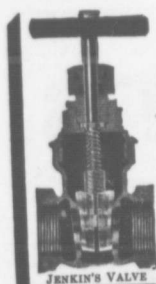
Mr. C. G. Sherman,—

I am sure it has been a great pleasure to me to come here and read the paper to-night.

Chairman,—

Before we adjourn, I would like to ask that as many of the members as possible turn out for the next meeting, April 27th, when Mr. Quesnel will read a paper on "Boiler Construction."

Moved by Mr. N. A. Davis, seconded by Mr. C. D. Scott, that the meeting adjourn.



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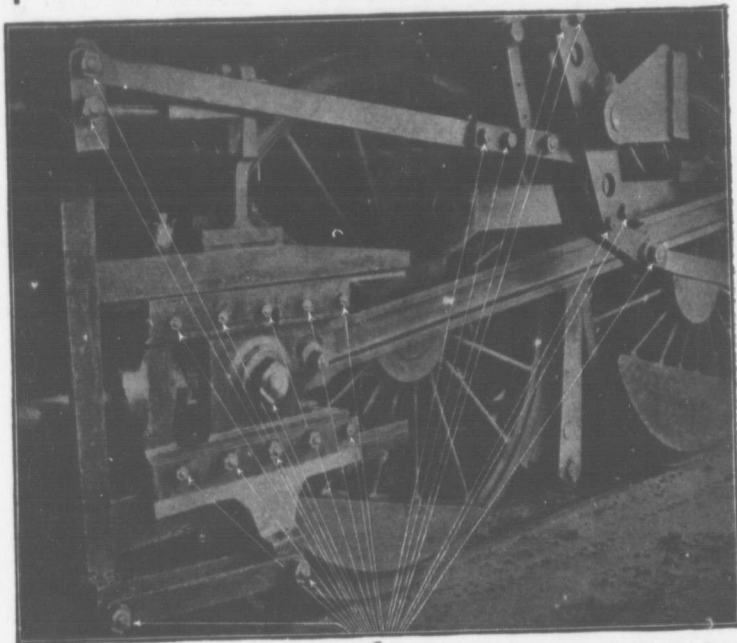
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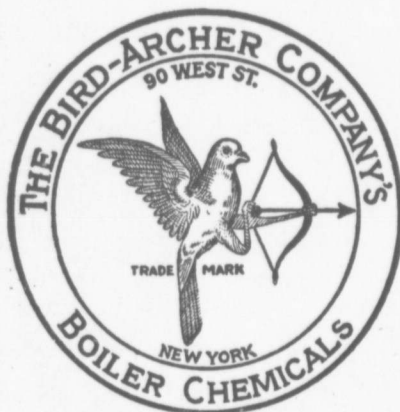
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