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The Sanitary City



VIM, VIGOR, VITALITY

Although you think it can't be
done,
The Farthest Goal will yet be
won;
Despite your shrugs and little
jeers,
A bolder man will breast the
years
And live to hear his fellows'
cheers—
There are no barriers but fears.
Before God's will and human skill
There'll never be a halting hill,
No obstacle that can persist.
Turn to the past and read the list
Of mighty things we have
achieved
In better ways and fairer days
And looked where doubters could
not gaze.
Down from the dawns of time
they fought
Through savagery, and tilled and
wrought
Until the desert earth gave yield
Of secret forces and revealed
Its hidden stores of mine and field.
But if they all had been like you,
We'd still know just what Adam
knew.

—Herbert Kaufman, in
Indianapolis Star.

The following article is reproduced from the General Electric Review through the courtesy of the editor of that publication.

The Gas-Electric Suction Street Sweeper

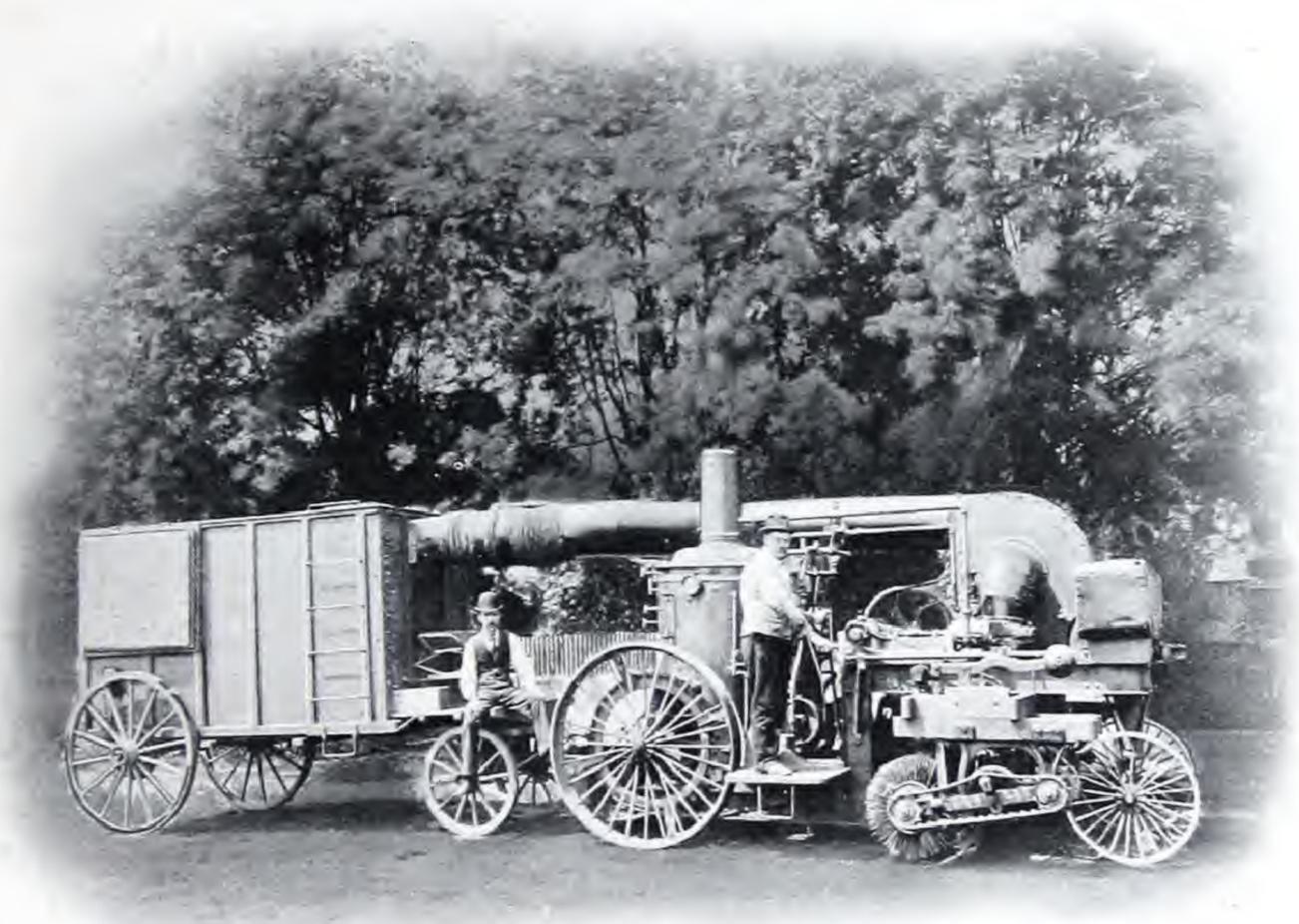


Fig. 1. Experimental Steam-Driven Machine

BY W. S. LEGGETT

CINCINNATI OFFICE GENERAL ELECTRIC COMPANY

This article is descriptive of the construction, operation, and results of the "Way-cleanse" street sweeper. The development of this device marks a decided step in advance over the hand broom, the horse-drawn sweeper, and the flushing machine, in that it not only removes all the kinds of debris collected by the earlier types of cleaning appliances but, in addition, removes the fine densely germ-laden dust.—EDITOR.



IT IS a remarkable fact that very little real progress has been made in the cleaning of city streets. Practically the same methods are used today that were in vogue a decade ago. To be sure, the cost of removing the heavy litter has been greatly reduced by the use of flushers and power sweepers, but the fact remains that no advance has been made in the gathering of the harmful fine dust. This dust is

left to be blown about by winds and fast moving vehicles.

Everyone is familiar with the common household vacuum cleaner. Since this device came into general use numerous inventors have tried to solve the street-cleaning problem with a huge vacuum cleaner, but with little success because of the great difficulty in separating the dust from the large volume of air that has to be handled. Water screens and jets, furnaces for burning the

The White Wing spends most of his time dodging automobiles. Recent statistics, show that 938 such employes of the New York Street Cleaning Department were injured while discharging their duties, which proves the method an extremely hazardous one.



Fig. 2. Gas-Electric Street Sweeper

refuse, and many other schemes have been tried in an unsuccessful attempt to surmount this obstacle. It remained for Mr. Bernard Kern to evolve a final design of suction street-sweeper that really works under all operating conditions. After many years of experimenting he has succeeded in solving all the problems pertaining to this type of machine, such as dust separation, gutter sweeping, and ease of control; and he now has in successful operation machines that are practical in every respect.

Mr. Kern's first experiment was made before the day of the automobile as we now know it. Therefore, it is interesting to note that he built a fairly successful steam-driven machine, shown in Fig. 1. This was purely an experimental machine and was discarded as unsuitable. His next attempt was

with an electric storage battery driven machine, but this was discarded because of a lack of power and mileage. Mr. Kern's final and successful machine is of the gas-electric driven type.

This latest development is designated the Waycleanse Suction Street Sweeper; it consists of a tractor and a trailer. The tractor carries the power plant, driving mechanism, and sweeping machinery: the trailer carries the dust separating mechanism and the dirt container. A better conception of the tractor and trailer will be obtained by reference to Fig. 2, 3, 4, and 5.

Referring particularly to the tractor, the power plant shown in Fig. 6 consists of a $7\frac{1}{2}$ -kw. 125-volt generator, direct connected to a 4-cylinder, 4-cycle, heavy-duty type marine engine. This

Statistics show that in certain cities of Switzerland where enough money and effort are spent to keep them clean the yearly death rate falls as low as six to the thousand while most European and American cities reach sixteen.

engine is governed to run at a constant speed of 900 r.p.m. This power plant supplies current to a traction motor, the dust-separator motor on the trailer, a fan motor for drawing cooling air through the engine radiator, and a compressor motor for supplying compressed air for gutter sweeping. This last motor is not common to all equipments, but to the ones that are especially fitted for gutter cleaning.

The traction motor is shown in Fig. 7 and is a series-wound automobile type motor. This motor drives the rear wheels through a silent chain first-reduction, and a worm gear second-reduction. The total reduction from the motor to the rear wheels is approximately 30 to 1 so that the available torque for heavy pulls and grades is enormous. As a matter of fact it has been impossible to stall the loaded machines on the most severe grades about Sandusky, which illustrates the importance of the large gear reduction.

The traction motor is controlled by an enclosed drum-type controller which is mounted directly beside the operator. Also, adjacent to the operator is a switchboard to which is run all of the wiring from the various auxiliary motors and lights. The operator is therefore able to control any part of the whole mechanism without leaving his seat. This would be impossible with any kind of drive other than electric drive.

It has been noted that the engine drives a generator which supplies current to various motors on the sweeper. This engine also drives a countershaft which, in

turn, drives the suction blower and the revolving broom through chains. The engine, being governed for constant speed at all loads, drives the broom and suction blower at the constant speeds which are most effective for sweeping. The drive is therefore a combination of gas-electric drive and straight mechanical drive, the gas-electric drive being applied to such parts of the mechanism as could not possibly be driven mechanically without great complication. In fact it would be impossible to obtain the wide range of vehicle speeds required by various pavement conditions, amounts of dirt to be gathered, etc., and the constant broom, blower, and auxiliary motor speeds with anything but gas-electric drive. This drive has proven a success in every respect. It has simplified the control, has eliminated change gears and other troublesome parts, and has made possible the operation of these sweepers by men not expert in the handling of gasoline engines.

When in operation the sweeper moves along the street at a speed which may range from 2 to 6 m.p.h., depending on the roughness of the pavement and the amount of dirt to be removed. The revolving brush stirs up the dirt and litter, which is drawn into the dirt box in the trailer by the exhaust fan. Here the dust and dirt are completely removed from the air by an ingenious filtration process. This dirt separation is so effective that there is no dust in evidence whatsoever, even when the dirtiest of streets is being swept.

After a lifetime of effort and inventive genius applied to different problems involved, Mr. Bernard Kern, inventor of Waycleanse, has made possible the perfection and introduction to the world of an efficient street cleaning machine, durable and economical.

Government Reports show that during the fall of 1918, Influenza germs killed 500,000 people in this country alone. Microscopic examination of the dirt of the city streets indicate a daily deposit of innumerable billions of life destroying germs.

THE SANITARY CITY

Water and fire are the two greatest destructive forces in the world. Water is used in all the old street cleaning systems, but it eventually destroys the street paving.

The effectiveness of this sweeper is clearly demonstrated in Fig. 8, in which is shown the dirt that was removed from 27,290 sq. yd. of old brick pavement the day after the same pavement had been cleaned by the city in accordance with old methods. The load consisted of 6,580 lb. of litter, sand, etc., and 1,628 lbs. of fine flour-like dust. This goes to prove that the old methods of street cleaning are ineffective in that the dust and dirt are merely pushed from the smooth parts of the pavement into the depressions and gutters, from which the wind and the fast moving vehicles scatter it.

Fig. 9 shows a load of sweepings taken from 95,040 sq yds. of pavement after two days of rain. This proves that rain is not

a very good street cleaning agent, as is the popular supposition.

During a 29-day endurance test in Sandusky, 5 miles of pavement were swept daily. From this pavement a total of 129,000 lb. of dirt was removed; and of this total 21,500 lb. was fine flour-like dust.

It has long been realized that the fine street dust is the most harmful part of the street dirt. It not only is a nuisance, but it is a real menace in that it carries deadly germs. It is therefore interesting to note the following analysis of Waycleanse sweepings made by Dr. Schimansky of Sandusky.

Bacteriological examination of Sample No. 1 from asphalt pave-



Fig. 3. Gutter Sweeper & Follow Up Sweeper in Operation

ment showed a presence of 960,000 bacteria per gram.

Examination of Sample No. 2, consisting of heavy sweepings from asphalt block pavement, showed the presence of 4,300,000 bacteria per gram.

Examination of Sample No. 3, consisting of heavy sweepings from brick pavement, showed the presence of 3,200,000 bacteria per gram.

Examination of Sample No. 4, consisting of the very fine dust from all pavements, showed a presence of 5,600,000 bacteria per gram.

Street cleaning authorities are unanimous in their opinion that ordinary street cleaning methods are ineffective at best. They have found that flushing and scrubbing

do not remove the dust, but merely glue it to the pavement or wash it to the gutters. They have learned, too, that flushing is decidedly bad because it permanently injures the pavements and clogs the sewers. They have therefore come to the conclusion that the dry sweeping of the dust by some sort of a vacuum cleaner is the only solution of the problem.

Failure of Old Crude Methods

1. If you sweep dry with a power driven broom you load the street air with dust.

2. The same machine, used after sprinkling, plasters the dust, which has become mud, over the surface.

3. What is true of the power-driven sweeper is true of the

Since the adoption of sewer systems, our city streets have become the last remaining source of filth and disease germs which have killed more human beings than all wars and all accidents by sea and land.

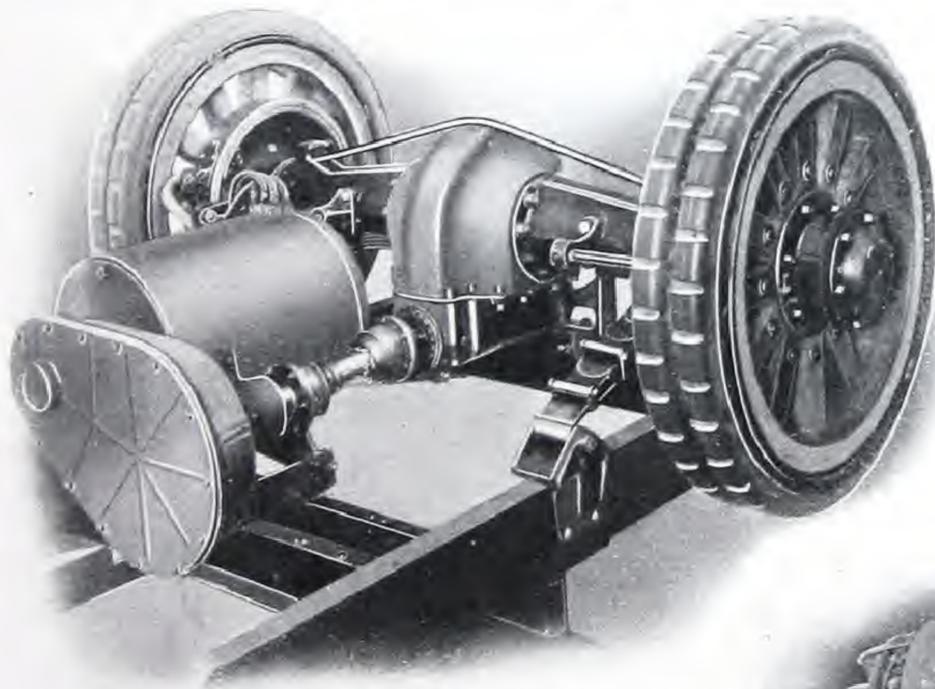


Fig. 4. Power Plant Consisting of Engine and Generator.

Gearing to Rear Axle.
Fig. 5. Traction Motor and Reduction

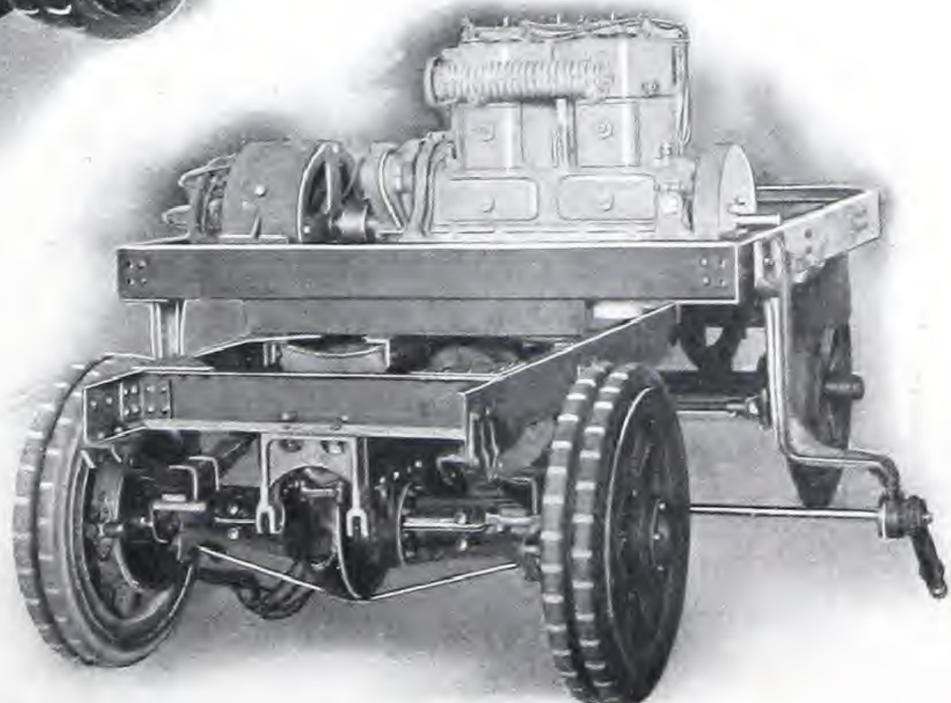


Fig. 6. Showing Method of Dumping Sweepings.



Fig. 7. Tractor and Trailer Uncoupled

"White Wing" and his work. Fine dry dust sifts through his brush. When wet he plasters it on the surface in the form of slime.

4. In all kinds of flushing the washing is from the middle of the street toward both gutters. The coarser material is carried into the sewers and blocks them, but as the stream of water runs down the gutter to the sewer inlet at the end of the block, the fine dust becomes water soaked settles to

the bottom. To do effective cleaning, the gutters must later be brushed and flushed at the same time, making the work prohibitive as to cost if done as frequently as is necessary to get an effective result.

Results From Waycleanse Dry Cleaning

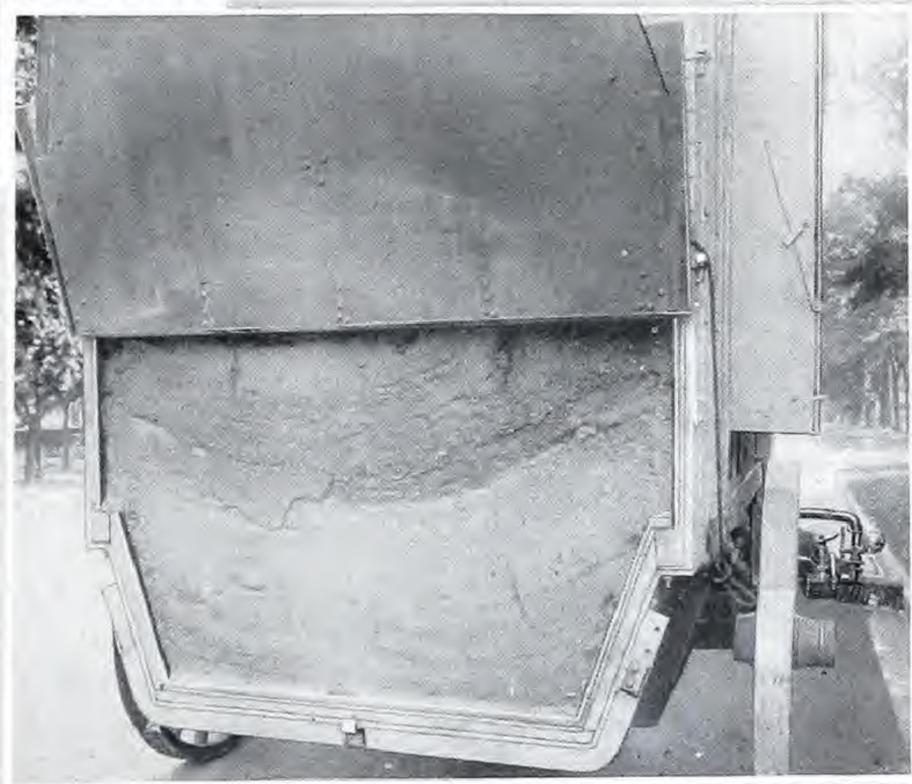
1. A remarkable improvement in sanitation due to the very complete removal of all street refuse



Fig. 8. Dirt Removed from 27,290 Square Yards of Brick Pavement One Day after Cleaning by Old Method.



Fig. 9. Load of Sweepings after a Two Days Rain.



and, particularly, the germ laden dust which people breathe and which settles on exposed foods.

2. There are, on shelves and tables in wholesale and retail stores of the United States many hundreds of millions of dollars worth of cloth goods. Where the old methods are used there is always a vast amount of dirt on the street and, consequently, in the air. This dust settles on goods and as soon as there is enough moisture present, the rotting pro-

cess begins. A very complete removal of the dust every night, as is possible only where the Waycleanse is used will result in tremendous saving here.

3. Waycleanse dry cleaning improves the traffic conditions. An automobile will not skid easily on a clean surface, dry or wet. A horse can pull more, and a truck secures better traction on a clean surface, dry or wet.

4. Waycleanse dry cleaning eliminates expense in the matter

Under all the old wet methods where the dirt is merely smeared on the streets or flushed into the gutters to be scattered again, the air is always loaded with fine dust. Dust plus moisture stains and rots goods.

of cleaning sewers and sewer inlets.

5. There is no inconvenience to pedestrians as in the case of sprinkling and flushing, either one of which must be used in all the old systems of cleaning.

6. Waycleanse dry cleaning adds tremendously to the life of a pavement. You put water on a grindstone if you want it to cut well. Water and fire are the two great destructive agencies. Water takes the life out of paving and helps the cutting and wearing process.

7. Way cleanse cleaning simplifies the problem of keeping clean houses, hotels, stores, and office buildings.

8. Waycleanse increases the value of real estate.

9. Using the old, crude methods there is, necessarily, a vast amount of dust left on the street, always. This dust gets in the air settles on cloth goods, and as soon as there is sufficient moisture in the air the staining and rotting processes begin. Waycleanse cuts down this dust to the lowest possible minimum.

Dry Methods versus The Wet

Mr. Edward D. Verry, former engineer of the New York City street cleaning department, and now a prominent sanitary engineer says: **"The real purpose of street cleaning is the removal of dust,** which has always been the difficult part of the proposition. The necessity of it has been emphasized by the introduction of the low bodied, fast moving, motor driven vehicles. Before this advent the only time that this dust proved a real

nuisance was when there was a wind of high velocity, but now it is ever present. The congestion of traffic, principally of the automobile variety, is making the work of the man "The White Wing," too hazardous to be of value.

Reprint From Municipal Engineering

By Mr. George C. Warren, Boston, Mass.

I believe that such a system of dry cleaning is less costly than the antiquated street sprinkling, supplemented by the street sweeper trying to do the impossible—thoroly pick up the accumulation of mud. Even if dry cleaning were not cheaper, its great efficiency in keeping street surfaces in better condition for use by automobiles, horses and foot passengers, merits its adoption, to say nothing of the far greater durability of all forms of street pavement surfaces when dry than when wet. It is generally conceded that water is the worst enemy of all pavement surfaces. When the water is applied in the form of wetting down an accumulation of dirt subjected to steel tired traffic, we have the condition which from all ages has been known to wear the hardest steel and is therefore used in the grindstone and for sawing stone—to wit. the application of mud under a grinding process.

A simple object lesson is the fact that when, contrary to a practice of keeping pavement surfaces continually wet down by sprinkling wagons, a portion of the surface has become dry for a time, it is found to be clean, while

The mortality from consumption in occupations exposed to fibre dust averages 32.3, organic dust 23.7, street dust 27.4. Sewage disposal and street cleaning are the two greatest sanitation problems.

the still wet portions of the surface are still covered with a **nasty, slimy, slippery mud.**

The reason for this is that the fine dust has been left on the pavement.

I hope the day is not far distant when our cities generally will adopt a modern system of street cleaning without sprinkling, following the recent revolution from dirt street to modern pavements and from horse-drawn to motor traffic.

Reprint from St. Louis Post-Despatch

June 25, 1921.

Director Fisk also announced the inclusion of a new district in the area of streets cleaned by vacuum sweepers, beginning June 1. This will require the employment of two cleaners in addition to the two now in use. The present area lies between Fourth, Twelfth Walnut streets and Washington avenue. The new area will be bounded by Grand avenue, the western city limits, Easton and Oakland avenues. All streets paved with granite blocks are excepted.

Those streets between and including Grand, King's highway, Lindell and Delmar will be cleaned twice a week; the remainder, once a week.

Fisk said it had been shown that the vacuum cleaners do the work for 79 cents per 10,000 square feet, little more than half the cost by the old method of sweeping and flushing, and do it better. In particular, he said

their method of picking up refuse instead of flushing it into the sewers, keeps the sewers open. The machines are owned by the Waycleanse Co., of Sandusky, O., and the city pays a fixed sum for service.

An Electric Sanitary Street Sweeper

Bulletin of the New York Edison Co.

A Toledo man, Bernard Kern, Jr., is the inventor of an electric street-sweeping apparatus, which has been most successfully put through its paces at Fremont, O. It should revolutionize the street-cleaning departments in our cities. For cleanliness, thoroughness, celerity, and economy, it far surpasses the present antiquated methods.

Dust, which, when agitated by the ordinary street-sweeper's broom, is scattered broadcast, this machine draws up within itself by means of a suction-fan operated by an electric motor. Another motor causes the broom to revolve. Dirt and dust are sucked up from every crevice over which the broom passes, as well as from the mere surface.

The onward movement of the machine is rapid, and the work is done as quickly. Small operating expense, saving of time and labor, and the sanitary prevention of dust should commend this device to all municipal authorities, as the street-cleaning item in a city's expense-account is always a heavy one.

New York would be benefited by something like this.

Street cleaning authorities are unanimous in their opinion that ordinary street cleaning methods are ineffective at best. Flushing and brushing after sprinkling do not remove the dust, but merely glue it to the surface.

There is just about the same difference between the Waycleanse method of cleaning streets and the old methods as there is between the automobile and the ox cart as means of locomotion.

Report of Waycleanse Co.

of Missouri

DIRT REMOVAL

Work performed by Two Machines
Jan. 1, 1920 to Dec. 31, 1920.

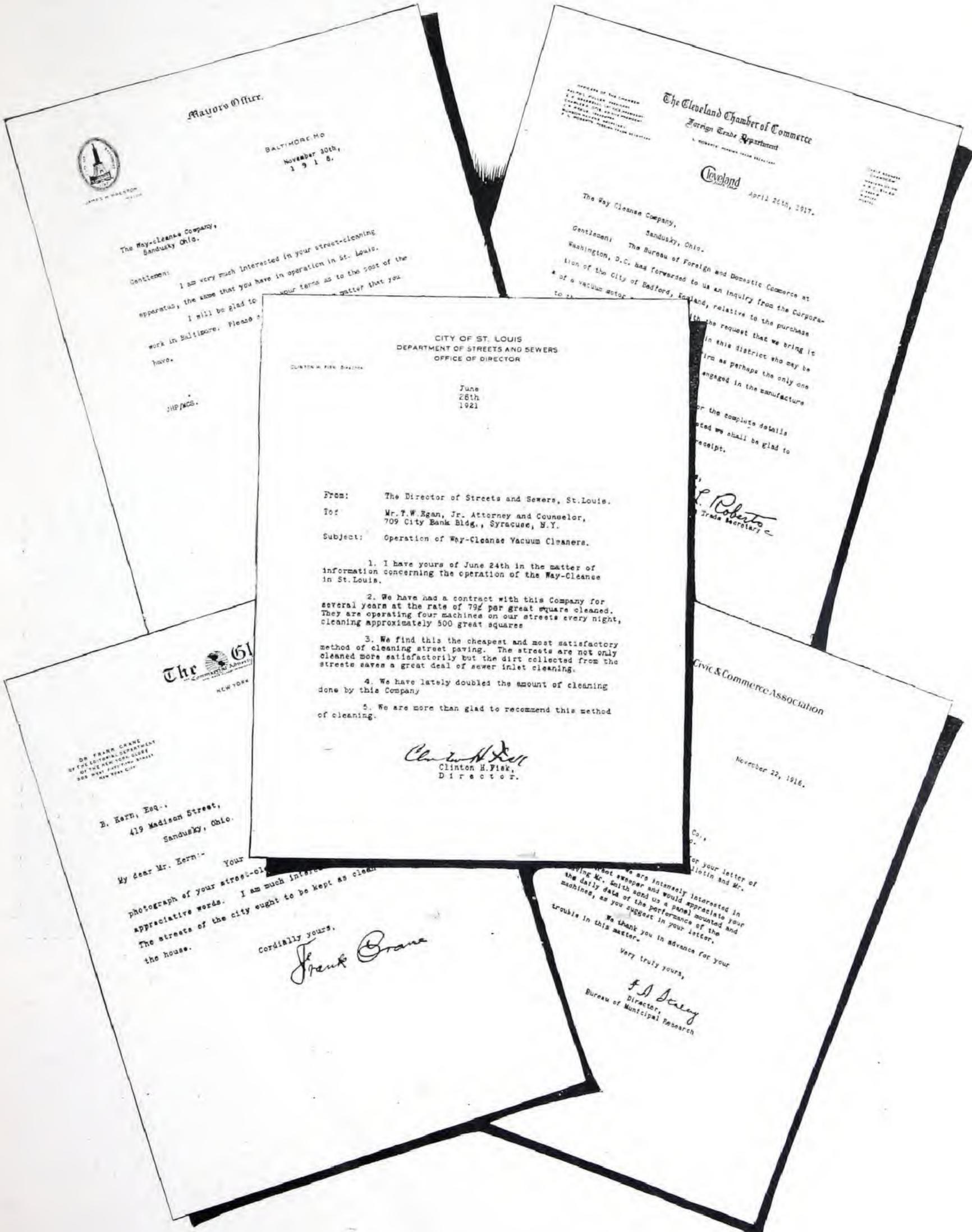
MONTH	DAYS WORKED	POUNDS DIRT REMOVED	GREAT SQUARES CLEANED
January	7		962,784
February	18	548,794	4178,463
March	14	311,678	3934,916
April	21	425,612	6639,175
May	21	431,222	5734,139
June	24	514,318	6189,313
July	26	540,022	6948,018
August	23	486,506	6102,123
September	23	476,476	6428,020
October	22	465,324	5915,757
November	22	478,754	6047,376
December	14	304,188	3867,292
	235	4,982,904	62,947,374

Our route is approximately 275 great squares per night. Figuring on this basis of 62,947 squares for the year, we got in 228 full nights or an average of 19 nights per month.

Note

St. Louis is now using four Waycleanse machines, and wants sixteen more. Twenty machines, on the above basis would remove approximately fifty million pounds of street dust each year.

THE SANITARY CITY



Mayors Office



BALTIMORE MD
November 30th,
1918.

The Way-Cleanse Company,
Sandusky, Ohio.

Gentlemen: I am very much interested in your street-cleaning apparatus, the same that you have in operation in St. Louis. I will be glad to work in Baltimore. Please send me your terms as to the cost of the apparatus. I will be glad to have.

JHP/MCS.

The Cleveland Chamber of Commerce
Foreign Trade Department



April 26th, 1917.

The Way Cleanse Company,
Sandusky, Ohio.

Gentlemen: The Bureau of Foreign and Domestic Commerce at Washington, D.C. has forwarded to us an inquiry from the Corporation of the City of Bedford, England, relative to the purchase of a vacuum motor. We are intensely interested in the request that we bring it in this district who may be firm as perhaps the only one engaged in the manufacture of the complete details. We shall be glad to send you a receipt.

L. Roberto
Trade Secretary

CITY OF ST. LOUIS
DEPARTMENT OF STREETS AND SEWERS
OFFICE OF DIRECTOR

June
28th
1921

From: The Director of Streets and Sewers, St. Louis.
To: Mr. F.W. Egan, Jr. Attorney and Counselor,
709 City Bank Bldg., Syracuse, N.Y.
Subject: Operation of Way-Cleanse Vacuum Cleaners.

1. I have yours of June 24th in the matter of information concerning the operation of the Way-Cleanse in St. Louis.
2. We have had a contract with this Company for several years at the rate of 79¢ per great square cleaned. They are operating four machines on our streets every night, cleaning approximately 500 great squares.
3. We find this the cheapest and most satisfactory method of cleaning street paving. The streets are not only cleaned more satisfactorily but the dirt collected from the streets saves a great deal of sewer inlet cleaning.
4. We have lately doubled the amount of cleaning done by this Company.
5. We are more than glad to recommend this method of cleaning.

Clinton H. Fisk,
Director.

The Commercial Society
NEW YORK

DR FRANK CRANE
OF THE EDITORIAL DEPARTMENT
OF THE NEW YORK GLOBE
300 WEST 42ND STREET
NEW YORK CITY

B. Kern, Esq.,
419 Madison Street,
Sandusky, Ohio.

My dear Mr. Kern: Your photograph of your street-cleaning apparatus is most interesting. I am much interested in the streets of the city ought to be kept as clean as the house.

Cordially yours,
Frank Crane

Civic & Commerce Association

November 22, 1916.

We are intensely interested in the daily data of the performance of the machines, as you suggest in your letter. We thank you in advance for your trouble in this matter.

Very truly yours,
F. D. Tracy
Director,
Bureau of Municipal Research

THE SANITATION PROBLEM

The lower death rate in cities with clean streets indicates that if there is a method of securing clean streets everywhere a million lives can be saved annually in the United States alone.

If a commission of experts was convened to determine what is the greatest innovation, the greatest invention of man in all time, it is more than probable that the vote would favor the sewer.

The sewer can be accredited not only with the saving of billions of human lives, since its

ing authorities in the United States alone buy millions of dollars worth of street cleaning machinery that finds its way with unfailing regularity to the scrap heap or the junk dealer.

The city of St. Louis seems to be the only one which has found and demonstrated an effective solution of the street cleaning problem, using a dry process, a suction street sweeper employing the double method of a powerful



Home of the Way-Cleanse Suction Street and Industrial Sweepers (Irvington), Newark, N. J.

The dry cleaning of streets saves 80% of skidding accidents. A horse can pull more and a truck secure better traction on a dry, clean surface.

adoption, but with making our modern civilization possible.

Since sewers were put into use by far the greatest remaining sanitary problem has been the cleaning of our city streets.

That there is a demand for an effective method and that no real progress has been made is attested by the fact that manufacturers annually turn out and street clean-

brush which loosens everything which should be detached from the surface, and an immediately contiguous suction that takes up all dirt, dust, and debris, also accomplishing a very complete filtration of the air, so that not even the finest dust escapes.

This machine is the invention of a Mr. Bernard Kern of Sandusky, Ohio.

The Way-cleanse Corporation

desires to call the attention of street cleaning authorities everywhere, to the Waycleanse.

Ever since the general adoption of cement or macadam streets, those well informed on the subject have admitted that the most satisfactory, the most effective and economical cleaning method would be a dry one, and that the only feasible dry method was by suction if the tremendous difficulties could be overcome.

We desire to herald to the world that Bernard Kern perfected a suction street sweeper six years ago.

But that in order to prove his machine, beyond the question of doubt the Way-Cleanse Corporation built ten of them at a direct cost of \$60,000 some of which have been doing five years and five months of work under contract with St. Louis, while the others have made demonstrations under all sorts of test conditions. The machines have proven long lived, economical and efficient.

WAY-CLEANSE CORPORATION

Manufacturers of

Waycleanse
REG. U. S. PAT. OFFICE

**SUCTION STREET AND INDUSTRIAL
SWEEPERS**

CAMBRIDGE BLDG.,
5TH AVENUE AT 33RD ST.,
NEW YORK.

