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INSTRUCTIONS FOR THE OPERATION OF DUST COLLECTORS

GENERAL PLANT ENGINEERING DEPARTMENT

PROJECT - GEN-1457

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DUST COLLECTING EQUIPMENT

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General

These instructions for the operation and maintenance of Dust Collectors are intended to cover types more commonly used in Johns-Manville Corporation Plants. The collectors being considered are standard units arranged for ordinary applications. Collectors for special applications such as high temperature, moisture and for service where uniform resistance is required, will be dealt with by specific instructions for the job.

In Dust Collecting Systems where uniform air flow is required more frequent bag shaking should be provided. Interruption of production can be avoided by adopting a continuous automatic or similar type collector.

The type filter cloth used is an important factor in maintenance. Most collector manufacturers use sateen having a thread count of 96/56 and weighing one pound for every 1.05 yards of 5½ inch material.

The amount of cloth needed for a given air volume is controversial. There are so many factors involved that it is not possible to set a hard and fast rule. The dust loading (grains per cfm), particle size, particle shape, moisture conditions and velocity all affect pressure drop through the filter cloth and consequently air flow through the ducts. Requirements in a given system may vary from hour to hour because the factors that control the permeability of the cloth may vary.

Experience in J-M plants is that ratios of 2 cfm/sq. ft. of filter cloth has proven almost universally satisfactory. Ratio approaching 3 to 1 and greater almost invariably are unsatisfactory. These observations are for intermittent type collectors. When cloth is shaken every hour it is quite possible that greater ratios may prove satisfactory.

A velocity of 2 ft./min. through new cloth will produce a pressure drop of about .5" wg. After being in service for some time with moderate dust loading (1 grain per cfm) the pressure drop will rise to 3" to 4" wg. After shaking the bags, the pressure drop will return to about 1-1/2 to 2". The maximum and minimum pressure drops will gradually increase as the bags age. The increase in pressure drop and the time elapsed will vary with the dust and conditions.

Description of various types of wet and dry collectors together with an outline of inspection procedure are provided herein. More efficient performance and improved maintenance are the primary objectives.

Types of Collectors

Two basic types of dust collectors are employed throughout Johns-Manville Plants, dry type and wet type. In dry type collectors a fabric is used, usually cotton sateen, through which polluted air is drawn to remove the dust. A shaking mechanism is provided for dislodging dust collected on the surface of the cloth.

Wet type collectors or air washers depend upon impingement of dust particles on a wet surface and to a lesser degree on collision of dust and water particles. Dust removed from the air stream is carried off in the waste water.

There are many sub-types of both wet and dry type collectors, the amount of variation depending upon the ingenuity of the manufacturer. A number of each type is shown and described on the following pages. Application of the two basic types is shown on Page 48 and 49.

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Ductwork

The proper design of dust systems is of the utmost importance to the entire dust collecting system; proper carrying velocities (see OPED Standard D-401) and air quantities through the various branch ducts must be maintained. Any additions or changes to the dust system should be made with great care keeping the above in mind so as to retain proper hood suction and a balanced system.

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AMERICAN AIR FILTER COMPANY

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The American Air Filter, Type N - Roto-Clone shown in these views is a cascade type, used effectively to arrest paint mists.

It is equally satisfactory in separating dusts having an efficiency comparable to centrifugal washers of the Ducon type.

The removal of waste frequently is a problem even though a sludge ejector is used. Dusts that resist wetting and tend to float or remain in suspension eventually cause stoppage.

The initial cost is in the range of centrifugal types but the operating costs are higher because of greater resistance pressure.

In common with other washers, good performance depends on keeping the parts in contact with the air stream free of accumulated waste. The water eliminators in this washer are especially prone to plugging. Inspection and cleaning should be done as frequently as indicated by experience.

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ARRANGEMENTS AND CAPACITIES

The Type N Roto-Clone is [illegible] in three basic arrangements which are identical in operating principle but differ in hopper design and method of sludge disposal

Arrangement B—a flat bottom design for manual removal of collected material

Arrangement C—a hopper bottom design with sludge type sludge ejector for continuous automatic dewatering and removal of collected material.

Arrangement D—a hopper bottom design for continuous or intermittent sluicing of collected material to process or some disposal point.

The Design 2. Type N Roto-Clone is the basic unit in any of the above arrangements. It will function with constant efficiency over a wide range of exhaust volumes with minimum pressure loss for the percentage of dust removal. Capacity range is increased an additional 10% in the Design 2A by raising the operating water-level and increasing slightly the pressure loss thru the Roto-Clone. The Design 2A. Type N Roto-Clone is recommended where space limitations dictate, or where maximum capacity is required for unexpected additions to an existing Roto-Clone system. Converting Standard Design 2 to Design 2A can be done quickly in the field.

DUST CONTROL SYSTEMS

The Type N Roto-Clone which combines the functions of exhausting, separating and storing the dust needs only piping and service connections to become a complete dust control system. Such a dust control system can be designed from the comprehensive data included in Bulletin No. 270-A. The fabrication and installation of piping and hoods can be done better and more economically by your local blow-pipe or sheet metal contractor.

The cleaned air from the Type N Roto-Clone in many cases may be returned directly to the work rooms for the conservation of heat in winter or of conditioned air in summer.

ROTO-CLONE ENGINEERING

The technical "know how" of Roto-Clone engineers results from the knowledge and experience gained from more than 10,000 installations of Roto-Clones in all types of service. This "know-how" is reflected in the number of designs and arrangements in which the Roto-Clone principle of dust precipitation has been made available. The Type N which is but one of four basic types of Roto-Clone was developed to serve better a definite need in the broad field of process dust control.

TYPE N ROTO-CLONE ADVANTAGES

1. **HIGH DUST SEPARATING EFFICIENCY**—results from the scrubbing and centrifuging action in the Type N impeller and thorough inter-mixing of water and dust-laden air.
2. **RECIRCULATION OF WATER WITHOUT PUMPS OR NOZZLES**—water curtain created by induced air flow permits re-use of water without pumping, and distributes the water with extreme uniformity without nozzles or piping.
3. **SIMPLICITY IN DESIGN**—all interior surfaces are smooth; no projections, ledges or restricted passages for accumulation of collected material.
4. **EXHAUST VOLUME NOT CRITICAL**—automatic water-level compensating feature maintains high collection efficiency over a wide range of exhaust volumes with negligible change in pressure loss.
5. **NO SECONDARY DUST PROBLEM**—removal of collected material as sludge or slurry ensures dust-free disposal.

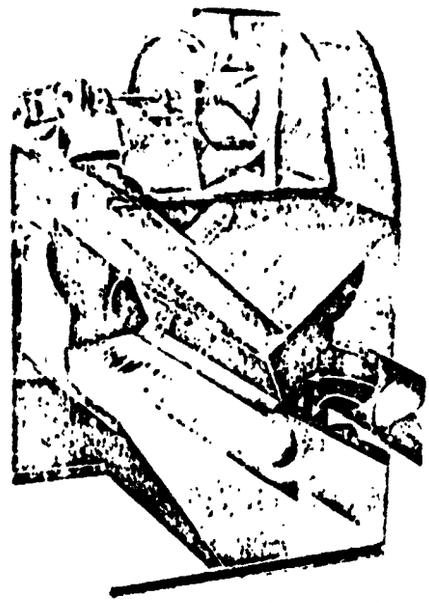


Fig. N 2. Cutaway of Type N Roto-Clone, typical for Sizes 1½ thru 6. Arrangement B with single impeller.

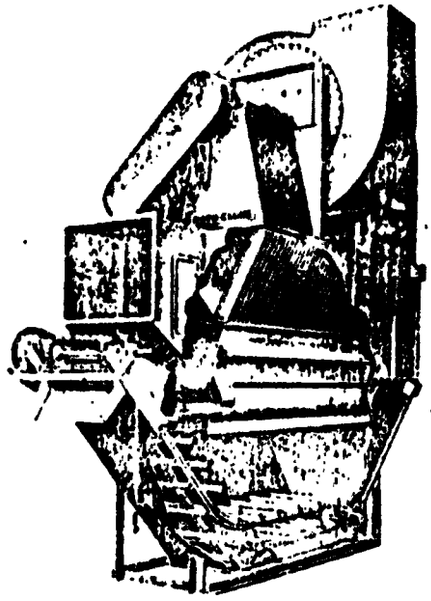


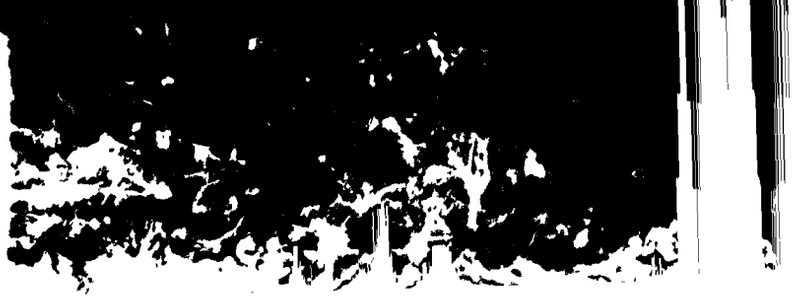
Fig. N 3. Cutaway of Type N Roto-Clone Arrangement C. Size No. 36. Type L ejector is employed on Sizes 24 and larger.

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The American Air Filter Company, Type "W" Roto-Clone combines the functions of fan and dust separator. Because of its dual purpose, the initial cost compares favorably with other wet collectors.

Water is introduced into the inlet and dust flung from the impeller is washed down to the sludge hopper. The Roto-Clone shown in Figures 1 and 2 are installed with a preseparator. It may be purchased without the preseparator if so desired.

The collector is one of the more efficient of the wet separators but because of its construction it is more limited in range of application. Poor performance usually occurs because of inadequate water supply and failure to wet the scroll and other impingement surfaces. Failure to continuously remove collected waste is another frequent cause of failure.



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1. AIR INTAKE—Where dust-laden air from exhaust system enters ROTO-CLONE Precleaner.
2. PRECLEANER—Consists of horizontal streamline scroll in which most of the heavy dust particles and some times air separated from the air by centrifugal forces.
3. FIRST SPRAY NOZZLE—Which coats Precleaner scroll surfaces with a flowing film of water in which the impinged dust particles are trapped, and washed down into hopper.
4. PRECLEANER OUTLET—Air leaving Precleaner scroll is discharged downward through crescent-shaped air outlet and impinges upon surface of water in hopper.
5. TRANSITION DUCT—Through which the air passes from Precleaner to ROTO-CLONE inlet. (When Precleaner not required—Arrangement A— the dust-laden air enters ROTO-CLONE inlet directly through special collodrical intake piece.)
6. SECOND SPRAY NOZZLE—Provides a protective film on all collecting surfaces in ROTO-CLONE and assures high efficiency by trapping the precipitated dust.
7. FLOODING NOZZLE—Assists in discharging sludge from impeller blades.
8. ROTO-CLONE IMPELLER—Functions as exhauster and precipitates the remaining fine dust particles on the wetted blade surfaces. Special shape of impeller blades forces dust laden water film into eliminator hooks. Blade tips at end of eliminator hooks deliver resulting sludge into annular sludge chamber.
9. ROTO-CLONE SCROLL—Collects the cleaned moisture-free air discharged by the impeller.

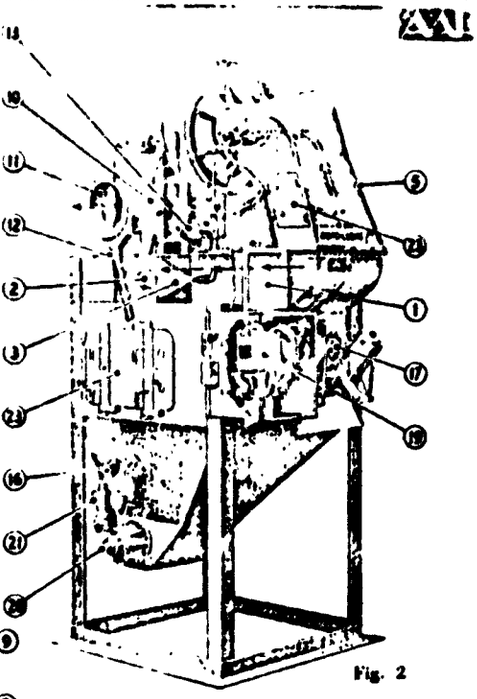


Fig. 2

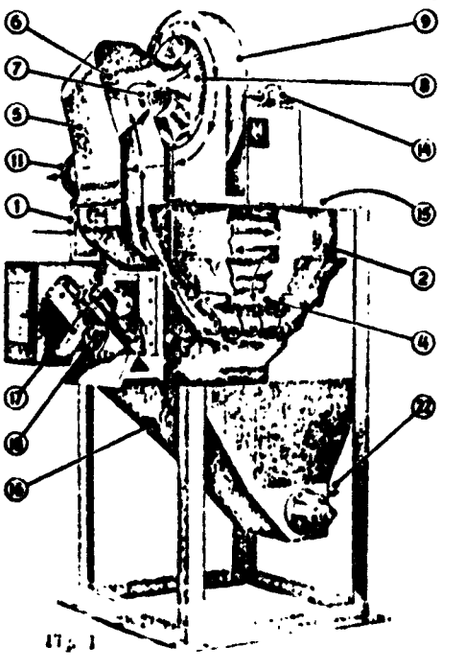


Fig. 1

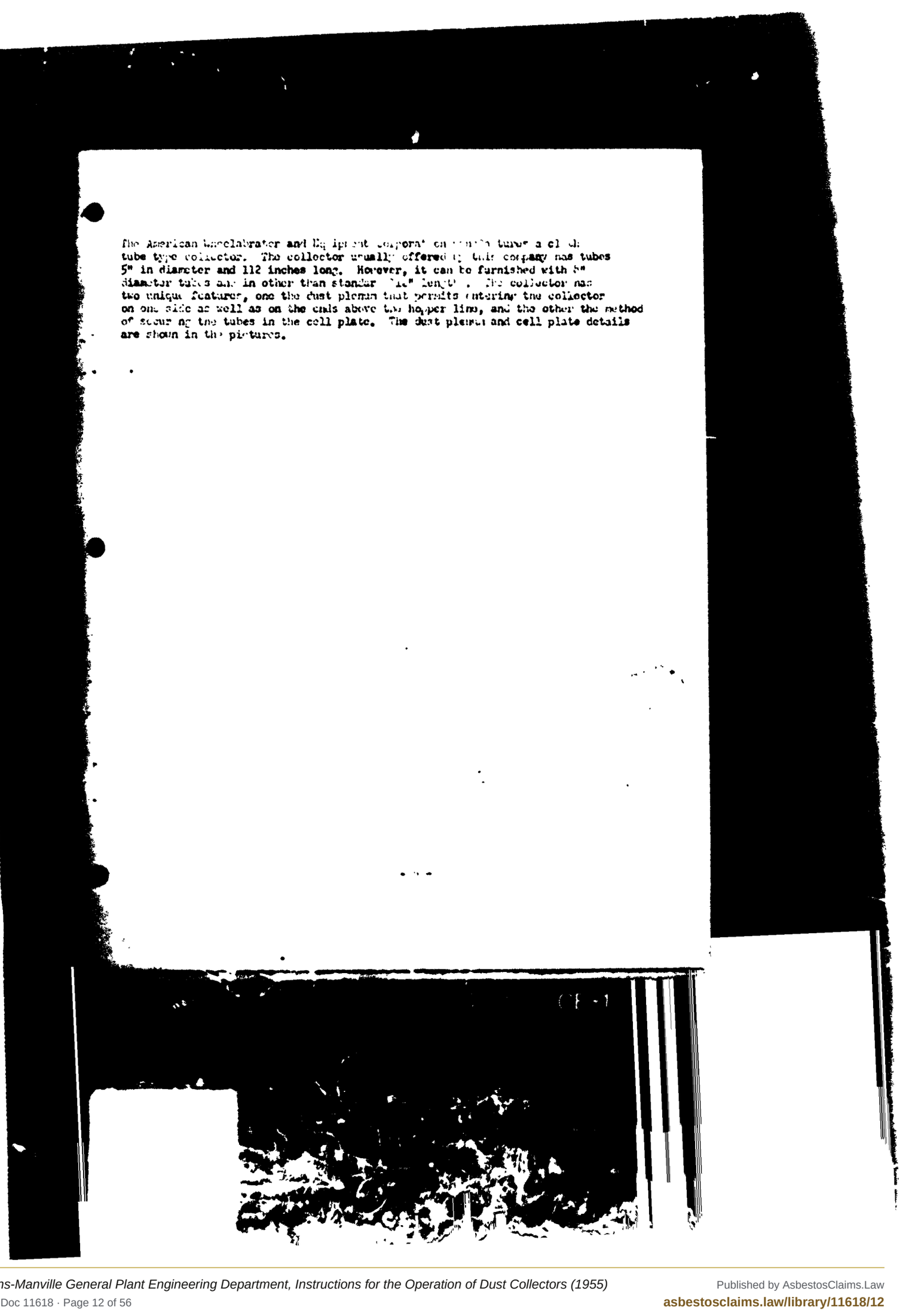
10. SLUDGE OUTLET—Through which sludge passes from ROTO-CLONE into Precleaner. (With Arrangement A sludge passes directly into sewer or settling tank).
11. AIR OUTLET—From which cleaned air is discharged by ROTO-CLONE.
12. AIR OUTLET DRAIN—Returns condensed moisture from air outlet to Precleaner.
13. STRAINER—In water supply line to prevent clogging of spray nozzles.
14. BEARINGS—Impeller shaft is supported on two over-size ball bearing pillow blocks.
15. MOTOR MOUNT—There is ample space on top of Precleaner housing for mounting ROTO-CLONE drive motor.
16. HOPPER—Arrangement C, permits settling of collected dust which is continuously removed, by automatic sludge ejector. (For hopper Arrangement B and D, see Page 9).
17. SLUDGE EJECTOR—A flight type conveyor which lifts the sludge from bottom of hopper and delivers it ready for disposal.
18. SLUDGE SCRAPER—Removes sludge from ejector flights.
19. EJECTOR DRIVE—A fractional horsepower motor with built-in gear reducer operates sludge ejector through chain drive.
20. LOWER EJECTOR BEARING—Outboard type with ball bearings and special grease seals.
21. OVERFLOW—Located to maintain proper water level in hopper.
22. DRAIN—For removing all water and sludge from hopper.
23. INSPECTION DOORS—To provide access to hopper or ROTO-CLONE inlet.

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THE AMERICAN [illegible] & EQUIPMENT CORPORATION

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The American Precipitator and Equipment Corporation manufactures a cloth tube type collector. The collector usually offered by this company has tubes 5" in diameter and 112 inches long. However, it can be furnished with 5" diameter tubes and in other than standard "12" length. The collector has two unique features, one the dust plenum that permits entering the collector on one side as well as on the ends above the hopper line, and the other the method of securing the tubes in the cell plate. The dust plenum and cell plate details are shown in the pictures.



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Figure 1 Figure 2



Figure 3 Figure 4 Figure 5

Figure 6 shows a typical section through a Dustube Collector. The bags are suspended from the shaker bars by means of hooks that are threaded at one end to provide adjustment to suit individual bag length. This is clearly shown in Figure 6.

An excellent feature of this collector is the method of holding the bag in the cell plate. The bag is held by means of a flexible steel band sewed in the cuff at the base of the bag. To install, the steel band is collapsed and then sprung into recess machined in the cell plate. This operation is shown in Figures 1 to 5 inclusive.

Deterioration of the cloth usually becomes evident first at the base and at the top of the tube where it is held by the hook.

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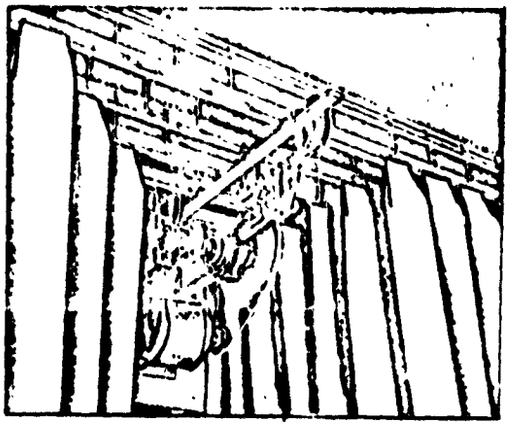


Figure 6

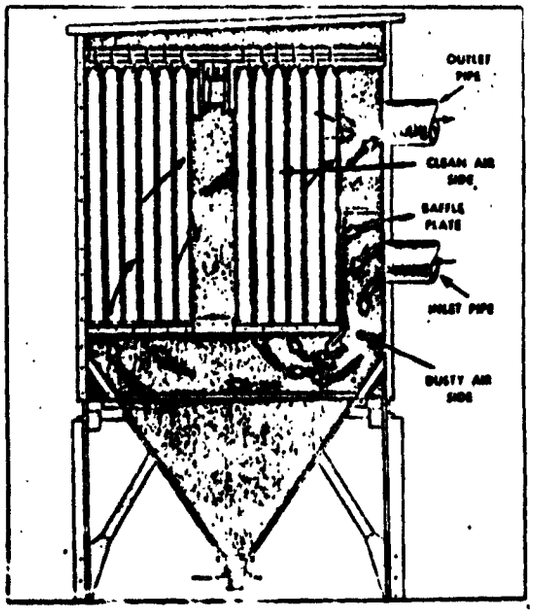


Figure 8

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The unit shown in Figure 1 is a Ducon standard washer equipped with one set of vanes to arrest dust and one set to eliminate water spray. For more difficult collecting applications one or more vane sections may be added.

Dust laden air enters the washer tangentially at the bottom, settling out the heavy particles in this lower section. The incoming air then passes through the restricted vane section, increasing its velocity and spinning the air against the outer shell. Water is injected into the collector above the vane sections and forced against the vanes and outer shell. Dust is collected by impingement on the wetted surfaces, and to a lesser extent by collision of dust particles with water particles. Access doors are provided at each vane section. Cleaning is easily accomplished by flushing vanes with a hose.

Most difficulties with this washer occur because of unreliable water supply. Water must be turned on before the fan is started.

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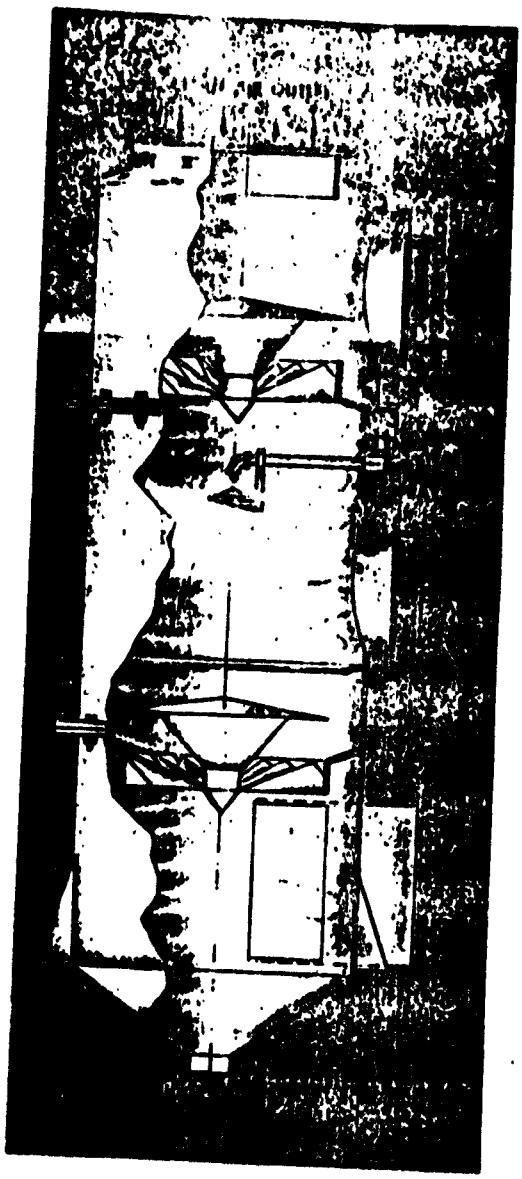


Figure 1

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The Type CH Pangborn collector shown in Figure 1 is a standard six tier unit having six envelopes arranged one above the other. Standard four and five tier units are available also. The standard spacing between bags is one inch but by blanking off alternate envelope openings the spacing may be increased in increments of one inch. The envelopes are fitted over a wire mesh frame which is supported from vertical cell plates. Dust is removed from the cloth by the vibration set up by a beater rod arranged to rap the inside surface of the wire screen. This method of cleaning the cloth causes little wear since there is no contact of rapper and cloth. But the shaking of the cloth is not very effective and manual cleaning by brushing is often necessary.

Method of securing filter bag on the screen frame is shown in Figure 2. The screen frame and rapper is shown in Figure 3.

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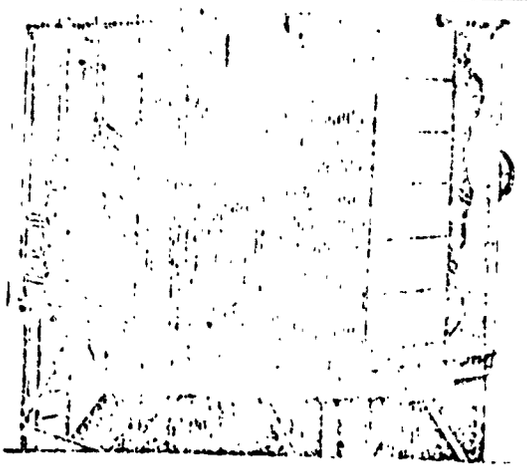


Figure 1

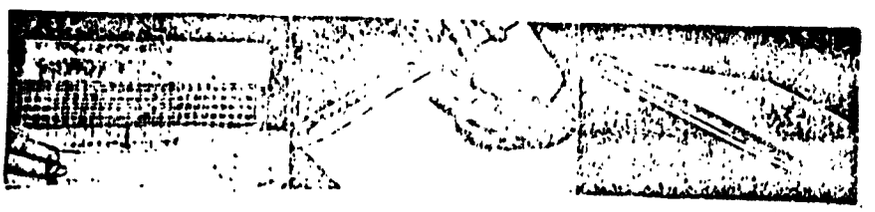


Figure 2

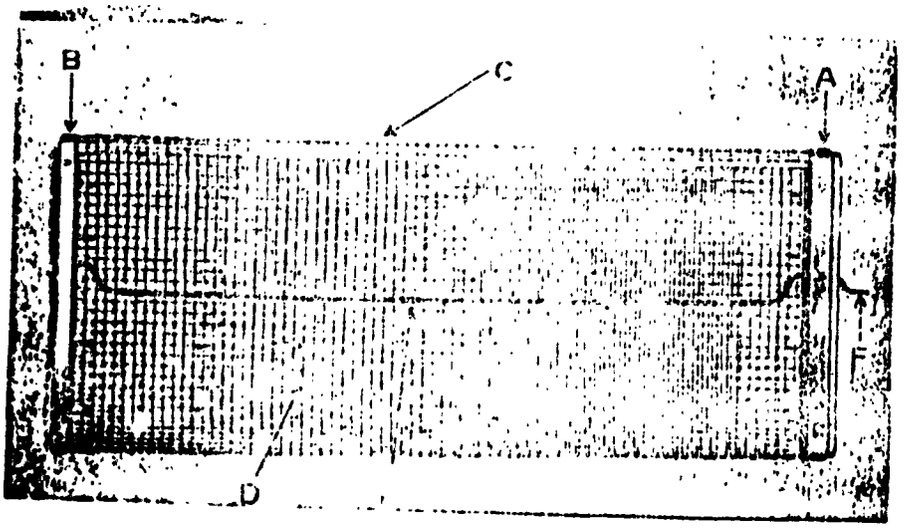


Figure 3

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The Pangborn Type CH is a bar or stocking type collector that has been developed recently. It is a multiple unit, the standard bag having six separate compartments. To install, an attachment (see figure 6) is secured to the bottom of the bag and then inserted and clamped to an oblong opening in the cell plate. The advantages claimed for this unit is speed of installation, accessibility and more cloth per floor area than some other types of tube collectors.

Figure 1 shows a completely assembled CH collector with part of the casing removed. Figures 5 to 13 show some of the novel features of this collector.

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FIG. 6—Nozzle placed upside down. Bag bottom pulled through the nozzle and retainer band inserted

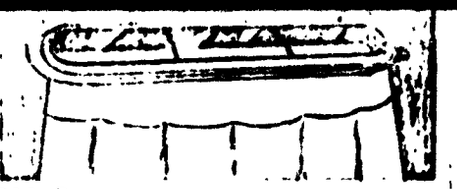


FIG. 7—Bag and retainer band pulled down into the nozzle, which holds the assembly in place.

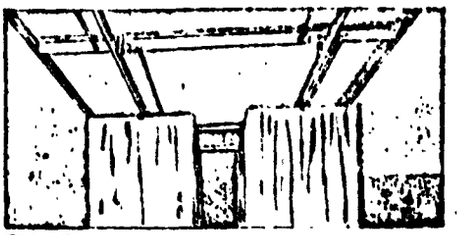


FIG. 8—Top assembly of bag attached to shaker channel. For detail, see diagram (Fig. 14) on page 6.



FIG. 9—Top of bag secured to shaker channel by tightening wing nut on bolt.

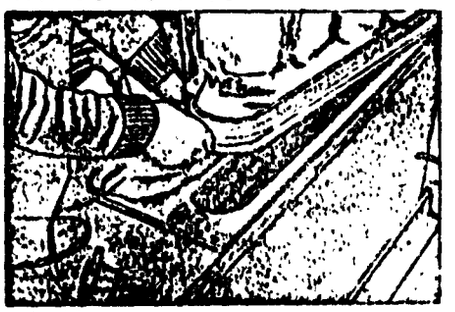


FIG. 10—Hinge end of nozzle fitted under hook at rear of grid plate and is ready to seat with hood knob lying on grid.



FIG. 11—Installation of bag is complete when knob is tightened.

FIG. 12—Showing one completely assembled bag installed

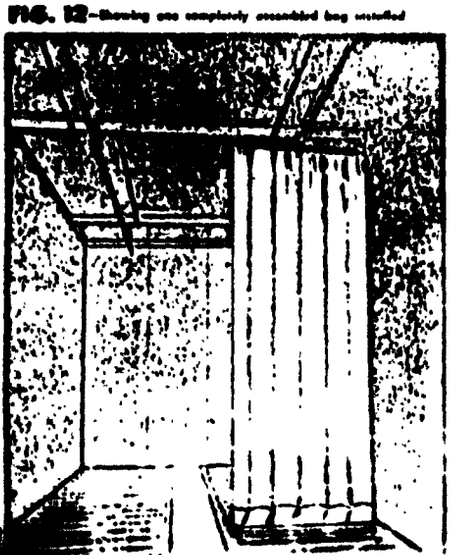
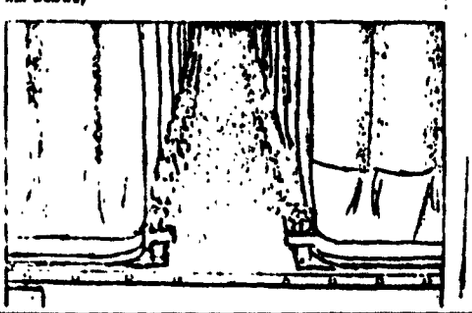
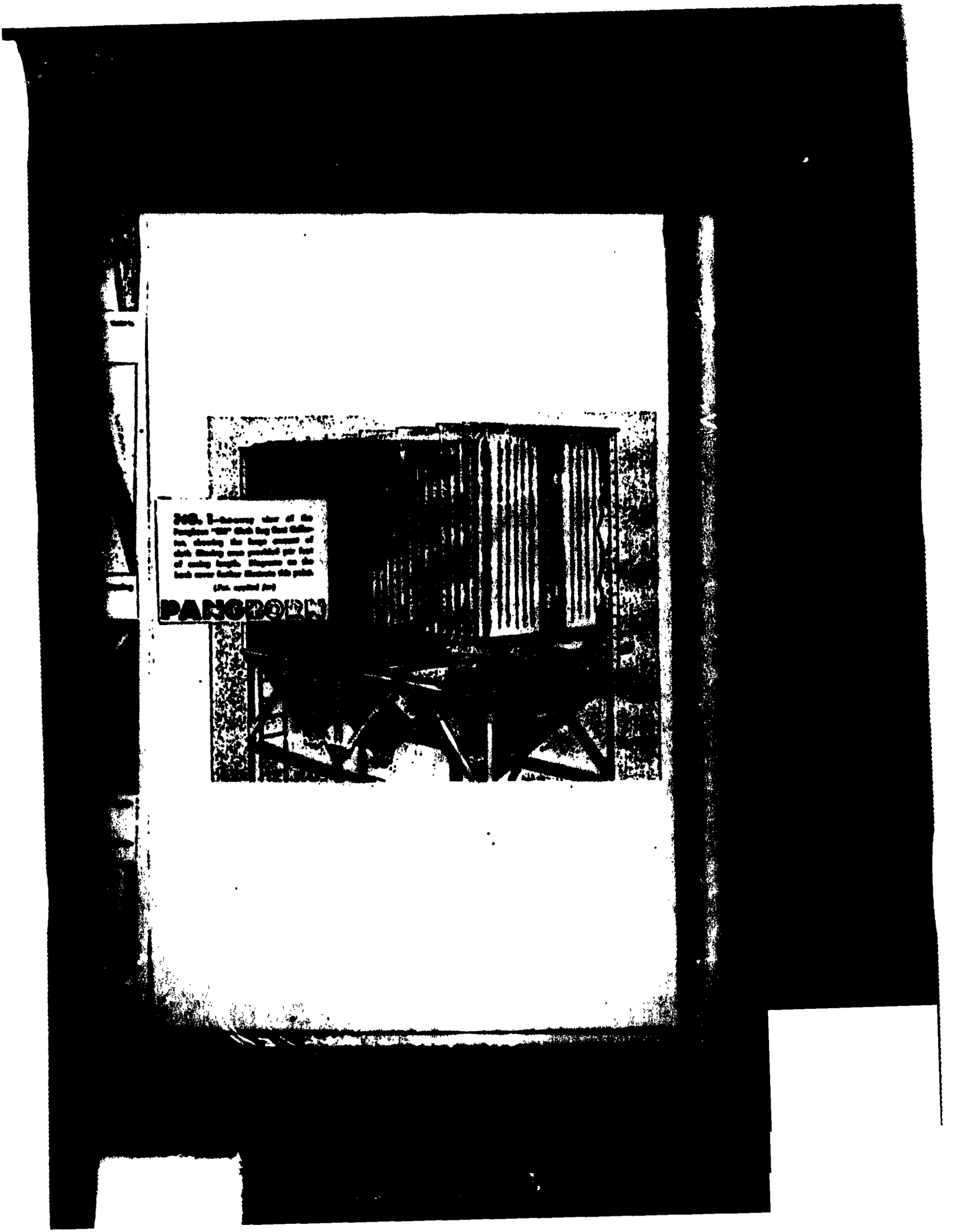


FIG. 13—Complete installation of bags looking down the central walkway



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The Parsons Oval Bag Dust Arrester is a tube or stocking type collector. The one original and identifying feature of this collector is the oval cup or flange to which the bottom of the tube is attached. The advantage claimed for this shape is that the filter cake will crumble and fall off as soon as pressure on the bag is relaxed and the bag assumes a normal oval shape. In reality there is no advantage over round bags because round bags also flatten when deflated.

One other feature used only by Parsons is the tension spring tube suspension. One disadvantage of all stocking or tube type collectors is change in length of bag due to variation in moisture conditions and its bad effect on shaking. The tension spring suspension tends to compensate bag length. Another feature of this collector that is a disadvantage as well as an advantage is staggering of the cups in the cell plate. This layout permits greater filter area per square foot of floor space, but the bags are close together and difficult to get at in event of trouble. The method of attaching the bags to the cell plate is not the best and bags occasionally pull away. The shaking mechanism, however, is very good and on the whole the collector is quite serviceable.

The tension spring bag suspension and shaking mechanism is shown in Figure 1. The oval cups for holding the lower end of the bags are shown in Figure 2. A standard Parsons discharge valve is illustrated in Figure 3. Cell Plate, stockings and shaker bars are shown assembled in Figure 4.

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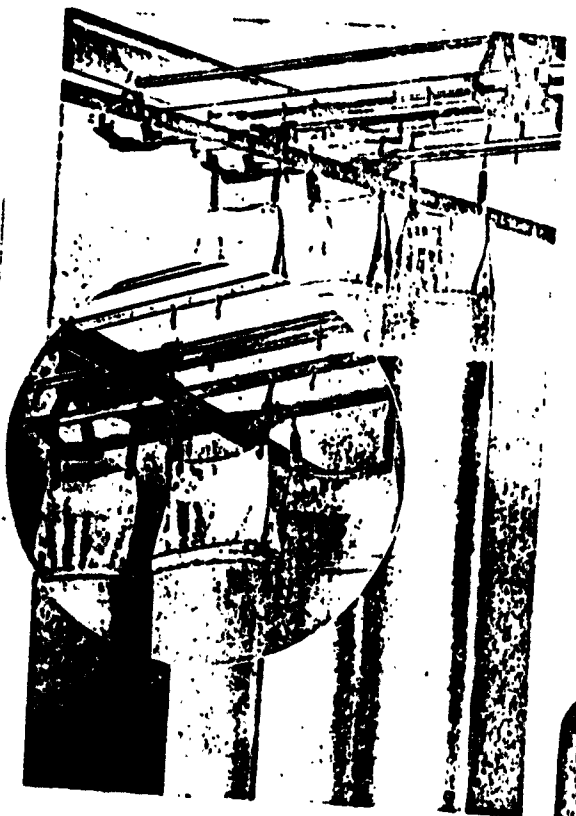


Figure 1

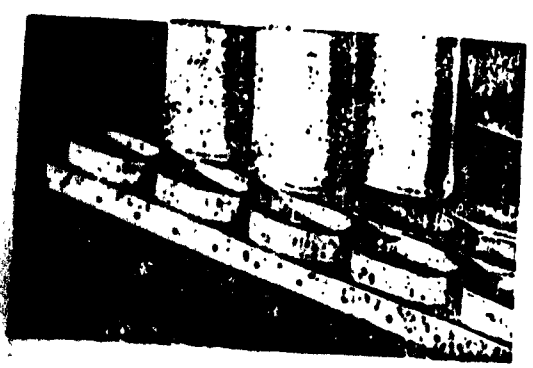


Figure 2

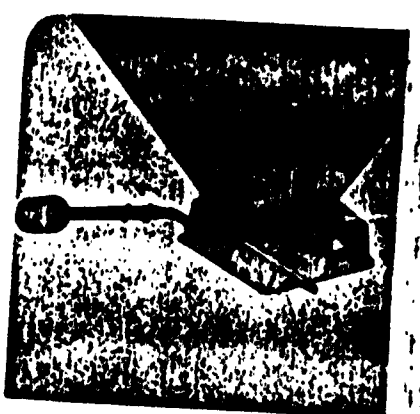


Figure 3

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Figure 4

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The collector shown in Figure 1 is a standard Schmoible unit made up of seven vane sections, one of which is used as a water eliminator. Standards units having fewer vane sections are available for less difficult applications.

The efficiency of this washer is par with others of its type. But the vane sections are less accessible than in others and, therefore, more difficult to clean.

This washer, in common with others, must have an adequate, uniform, and constant water supply.

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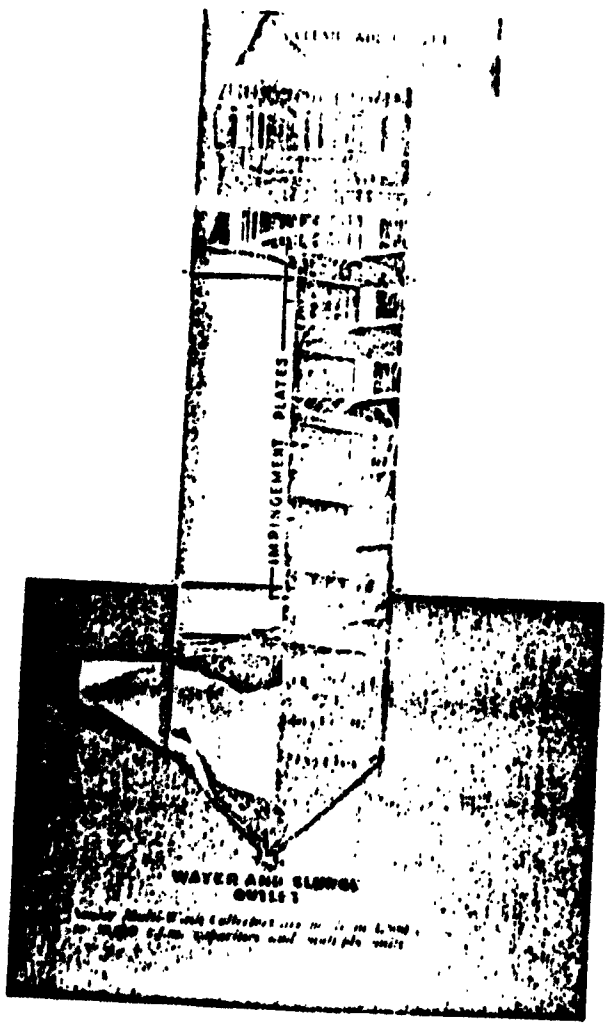


Figure 1

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The Sly flat bag or envelope arrester is available in one, two, or three tier units. The three tier unit is more commonly used because it presents greater filter area per square foot of floor area. The one and two tier units are used when head room is limited. Single tier units can be purchased assembled. The envelopes in all types are spaced 2 inches on center. (1" between envelope surfaces) but when required spacing may be increased in 1/2" increments. Heavy dust loading and excessive fiber would indicate wider than standard spacing.

The section in Figure 1 shows the ends of the envelopes from the dust side of the collector. Figure 2 is a section of a three tier unit, showing locations of clean air and dust air chamber.

A cloth bound wire insert is placed in every envelope as shown in Figure 3. The purpose of the insert is to prevent collapse of the envelope when the collector is placed under negative pressure. When operating conditions are severe as when abrasive materials are collected, bag wear first becomes evident at points of contact.

Figure 5 is a photograph of a gear motor and cam that imparts a vigorous oscillating motion to the filter bags. Figure 4 above shows the hook and tension spring being attached to a filter bag from the dust side of the collector.

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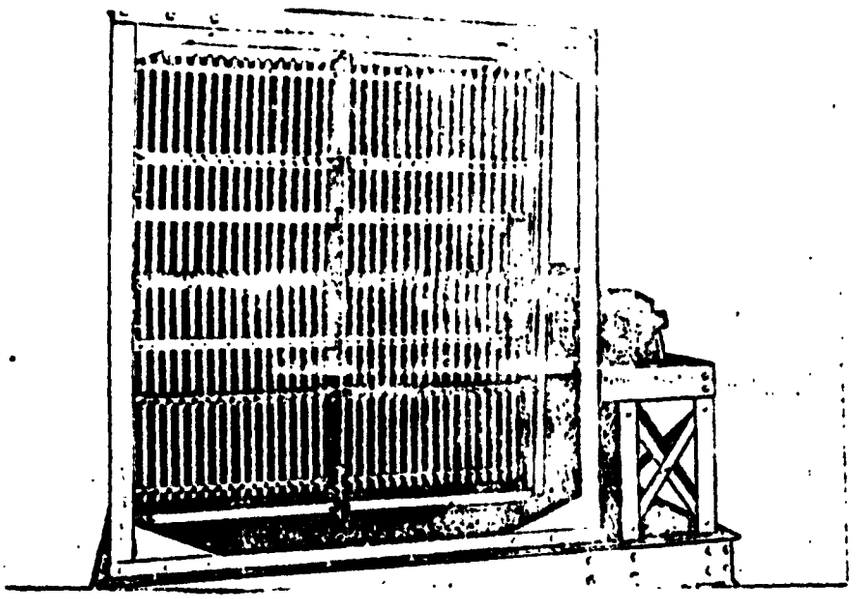


Figure 1



Figure 2

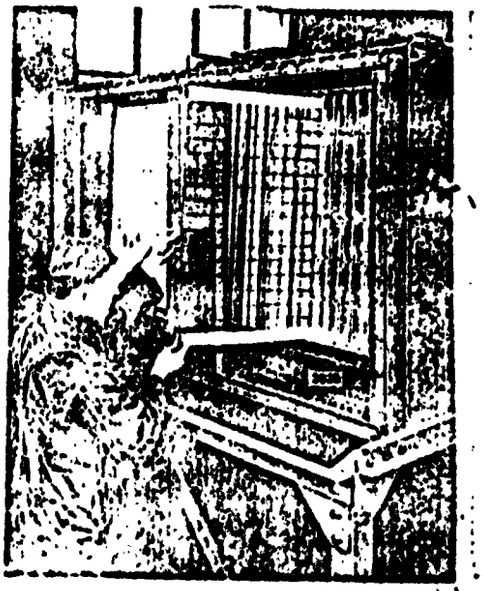


Figure 3

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Figure 4

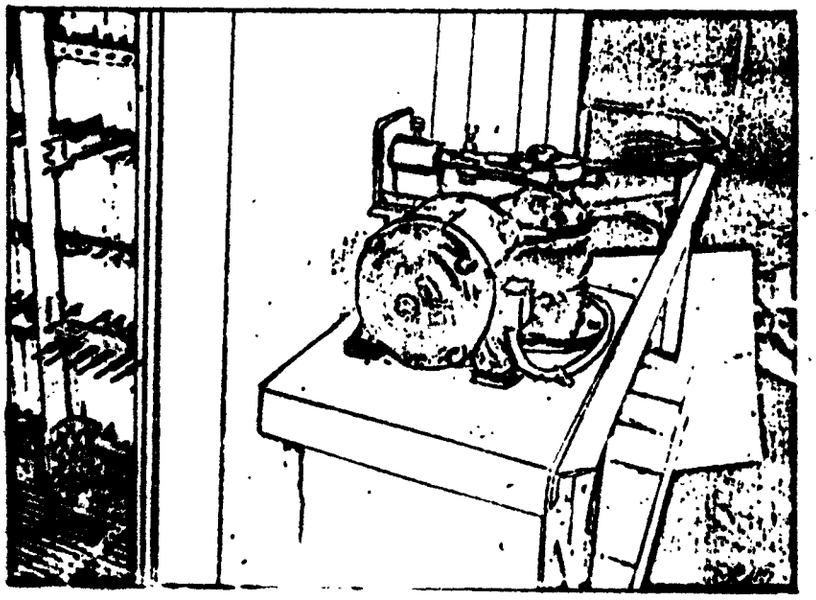


Figure 5

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Dynaclone

The Sly Dynaclone is the best development of automatic continuous dust collection made in the past several years. The collector is little changed over the present 260 and 360, the same size bags are used and their arrangement and spacing remain the same. Changed is the method of cleaning the dust from the filter surface. One bag in each size is isolated and suddenly air is reversed through it. The snap imparted to the bag dislodges the filter cake and air flowing through the filter cloth in the reverse direction inhibits penetration. The nozzle through which the reverse air is blown travels back and forth over a given number of filter bags. The frequency of the trip is predetermined and controlled by a program timer.

The advantages of this collector are, uniform resistance pressure, wear due to filter bag rubbing entirely eliminated and common with all automatic continuous collectors the collector need never to be shut down for cleaning the filter bags. In some sizes there may be cost advantages over conventional automatic continuous collectors.

The one known disadvantage is that the collector does not work well with fibrous materials or materials that tend to stick to the filter cloth.

The Dynaclone Collector has been in use in limited sizes for only five years but is [illegible] appears to be reasonably durable.

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OPERATING PROCEDURE

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OPERATION PROCEDURE
WET COLLECTORS

There are two general types of wet collectors used in Johns-Manville plants, the centrifugal air washer and the wet dynamic collector. Although the two types are quite different in design, their primary requirements for good performance are the same. Each require an adequate and uniform supply of water. Momentary operation without water can cause considerable difficulty. It is important, therefore, that an uninterrupted flow of water is available at all times. Proper drainage is another very necessary requirement. Sludge should not be permitted to build up in the hopper because the performance will be affected and because stoppage may cause unsafe loading of the supporting structure.

OPERATION PROCEDURE
DRY FILTER COLLECTORS

Dry dust collectors are simple devices being, simply, the arrangement of dust and clean air chambers separated by filter media. The form, arrangement and type of filter media will vary with the manufacturer, but the principle of removing the dust particles from the air stream is the same.

There are no moving parts except for the shaking mechanism which operates only a few minutes each day. All that is required to put the collector in service is to start the fan motor.

To maintain maximum efficiency and cleanliness, collectors must be equipped with automatic timers. The type of timer installed would depend upon the nature and size of the job and the availability of the collector for servicing during operating time.

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MAINTENANCE

DRY TYPE DUST COLLECTORS

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Dry type collectors operated under normal conditions are not difficult to maintain in good condition. Once the collector is properly installed little more is needed than occasional adjustment. Collector parts that give the most trouble are commented on in the following paragraphs.

1. Collector Casing

a. Leakage

Omission of gaskets and failure to apply sufficient caulking between joined surfaces at the time of assembly of the collector is the most frequent cause of leakage.

Leakage, when dust collectors are operated under positive pressure is sometimes indicated by dust streaks on the casing. But usually leakage is very difficult to detect. The only reliable method of determining whether or not leakage exists and the amount of leakage is to measure the air in the ducts entering and leaving the collector with a pitot tube. See "Maintenance, General - 1".

b. Condensation

Condensation frequently occurs in collectors serving systems in buildings where wet processes are used. When humidity is moderate condensation is in evidence only after a weekend shut down. At the other extreme, humidity may be high enough to cause wet sludge to form on the cloth and render it useless. When condensation is moderate insulation of the collector casing and hoppers is a satisfactory remedy. Where extreme humidity occurs it may be necessary to raise the temperature of the collector above the dew point by steam heating the casing.

c. Corrosion

The exterior of the collector should be kept painted to protect surfaces from corrosion. If the corrosion occurs on the inside of the collector, all interior surfaces should be thoroughly cleaned and painted.

d. Insulation

Once the installation has been made corrosion and other effects of condensation will indicate when insulation is needed.

e. Paint

Dust collectors should be painted regularly in accordance with "Painting Specifications for J-M Plants" specification 700, item #701.

2. Hoppers

a. Bridging

Hoppers handling materials having a large angle of repose should be equipped with a screw conveyor to continuously remove the material. If such materials are permitted to stand in the hopper bridging may occur. An alternate where the quantity of material is small is to provide an oversize discharge opening (12" sq. or more) with a self-clearing blast gate.

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2. Hopper (cont.)

b. Mutilation

Mutilation occurs when the hopper sides are beaten to make the material flow.

Failure to flow usually occurs because of too flat a pitch to the hopper sides or to condensation. The remedy is replacement of the hoppers with ones having steeper sides. If condensation is the cause, insulation should be applied.

c. Rappers

Rappers are sometimes employed to help keep the material flowing freely. The rapper basically is a spring-return device that hammers against the hopper sides. A rapper should be used with discretion since it may do more harm than good. Some materials pack more tightly when vibrated by rappers.

If a rapper fails, it might be advisable to replace the hoppers with ones having steeper sides.

3. Hopper Blast Gate

a. Operating Condition

Collectors not having conveyer equipment for continuous removal of waste should be equipped with blast gates of the self-cleaning type. Gates should be kept in repair and made to slide easily otherwise waste removal from the hoppers will be neglected.

4. Rotary Valve

a. Seals

Rotary Valve seals must be maintained in air tight condition for reliable performance. Leakage can be detected by manometer readings on both sides of the valves. When the rotary valve discharges into screw conveyor, or other tight enclosure, a reading should be taken in between rotary valve discharge and screw conveyor at the time of installation and recorded. If the periodic check shows a reading .02" wg. higher (as measured on the inclined "U-tube") than the original reading, the rotary valve seals should be thoroughly checked and tightened.

When the rotary valve discharges freely or through a short canvas or sheet metal spout, the best way to check the valve is to disconnect the spout and to physically inspect the rotary valve blades.

The renewable blade seals should be inspected regularly and replaced when necessary.

b. Speed

Valve speed should not exceed design speed. If capacity is inadequate, the valve should be replaced with a larger size.

5. Screw Conveyor

a. Dust Cover

Dust covers should be made of at least #10 gage metal in order to seat well and should be air tight to prevent leakage.

Soft gaskets, such as 60# roofing felt cemented on both sides with black plastic cement, should be used between the flanges of the screw conveyor trough and the dust cover to insure a dust tight condition.

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5. Screw Conveyor (cont.)

b. Casing

Screw conveyor casings should be checked regularly for wear and repaired or replaced as needed.

c. Bearings

Worn bearings cause excessive trough wear.

Bearings should be kept properly lubricated according to bearing manufacturer's instructions.

6. Filter Cloth

a. Wear - Filter Tubes

Wear is usually first evidenced at the bottom of the tube at the cell plate and at the top near the point of suspension. If wear occurs a foot or so above the base of the tube, it is probably due to high velocity blasts of abrasive dust. Intermediate holes in the tube usually are due to burns or tears.

Wear - Flat Bags or Envelopes

Wear of W. W. Sly Co. envelopes usually occurs first where the wire separators come in contact with the cloth.

The Pangborn Corp. cleaner shakes less vigorous and the bag wear is proportionately less.

b. Penetration

Very fine materials sometimes are carried through the filter cloth. The fine dust clings to the outside of the cloth and gets into the clean air stream when the bag is disturbed. Penetration is usually accompanied by "blinding" or rapid increase in the resistance. A pressure increase of approximately 3" wg or more in one hour across the dust collector cloth indicates penetration on the average dust collector installation. Penetration in existing installations can be retarded by reducing the air volume passed through the collector. Penetration in a new installation can be minimized by allowing more filter cloth per given volume of air at time of design.

c. Bag Suspension

Tubes should hang limp with about 1" to 1-1/2" droop when tube is not inflated. Tube tension is easily corrected by adjusting the take-up spring at the top of the bag. Envelopes are supported on wire frames attached by means of a spring to the filter frame and no adjustment of bag tension is required. Proper bag tension or adjustment is important because adequate shaking and good filter cleaning depend upon it.

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6. Filter Cloth (Cont.)

c. Filter Cake

When a filter cake remains on the cloth after the tube has been shaken, it is an indication of condensation, inadequate shaking, poor adjustment of shaking mechanism or tube tension.

Methods of correcting condensation have been mentioned under 1b.

If difficulties are due to poor adjustment of the collector parts the manufacturer's maintenance manual should be consulted for a remedy.

e. Spacers

If the spacers or wire frames in an envelope type filter become damaged or collapsed, it will be necessary to replace them with new ones.

7. Shakers

a. Drive

The duty of all shaker drives is very light and little maintenance can be anticipated. Occasional take-up where V-Belts are used and routine lubrication of motors is the only requirement.

b. Bearings, Linkages

The shaking motion is imparted through linkages, connecting rods, eccentrics and cams. It is essential that all of these parts be lubricated at regular intervals and kept in adjustment.

8. Manometer

a. Dirty or Broken Glass

Every dust collector should be provided with a manometer arranged to indicate differential pressure and the pressure on each side of the filter cloth. These readings should be made regularly every time the dust collector is inspected, the results marked down on a permanent record and any discrepancies marked on the "Dust Collector Inspection Check List" and the "Inspection Report". When the differential manometer readings show 3"-4" wg. a thorough check should be made to determine why. Also, if a certain reading has been obtained at several previous inspections and this time the reading is higher, the reason should be investigated also. The manometer glass should be kept clean and in good condition.

b. Tubing

Tubing should be kept clear from obstructions and in good repair.

9. Motors

a. Lubrication

Motors should be lubricated in accordance with motor manufacturer's instructions.

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10. Fan

a. Bearings - Lubrication

Preventive instructions by the bearing manufacturer should be followed closely. Do not over-lubricate. Too much grease forced in by a grease gun can ruin the seals of the bearing.

b. Drive

Belt drives should be checked for proper belt tension to avoid loss of fan capacity and excess belt wear.

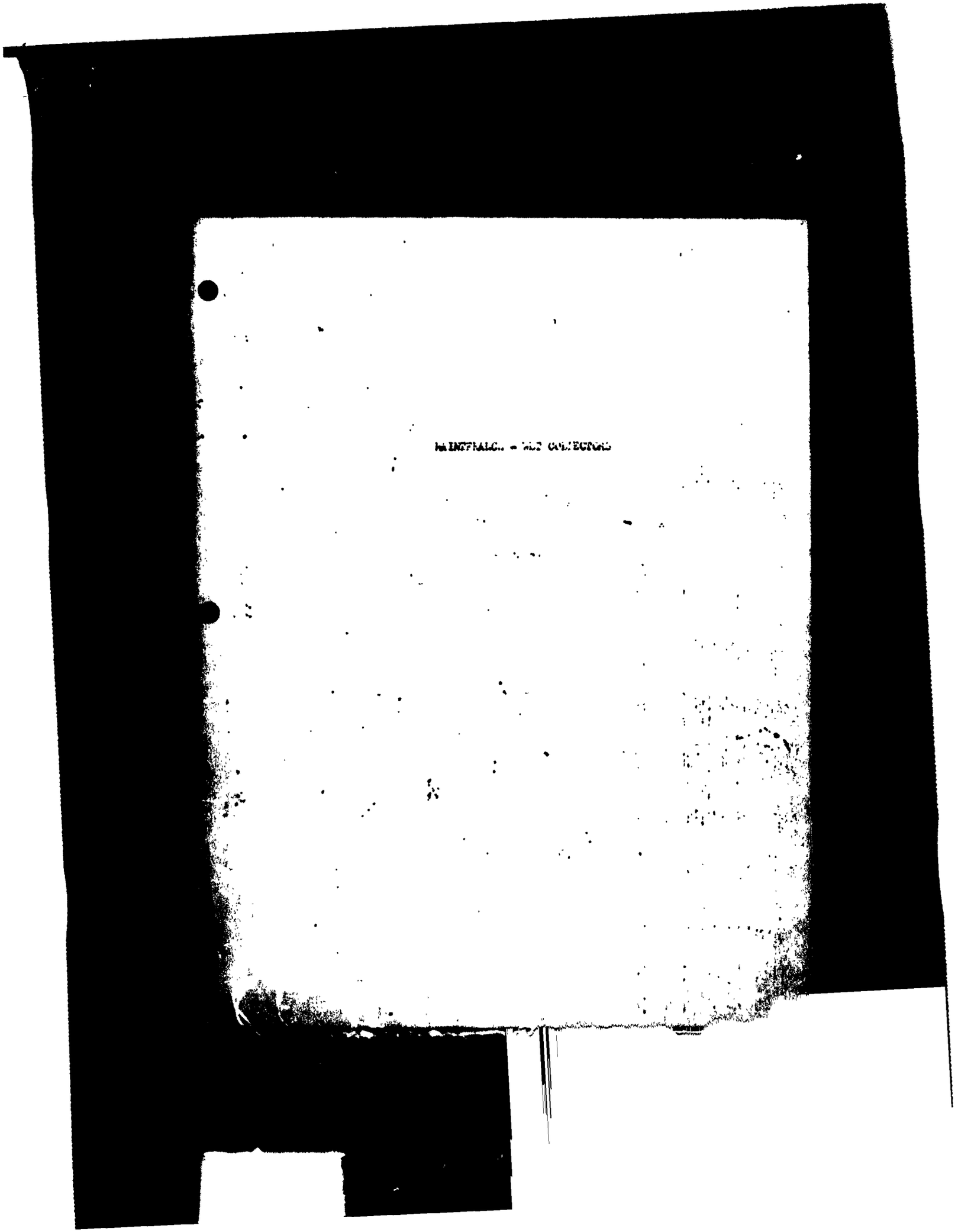
c. Balance

Unbalance due to unequal build up of dirt on the wheel frequently causes excessive vibration and loss of bearings. Fan wheels should be inspected regularly for dirt build-up and cleaned as required.

d. Wheel

Condition of wheel should be checked occasionally. Excessive wear or distortion due to temperature should be corrected.

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Wet collectors are useful tools and at times, when moisture is concerned, almost indispensible. However, they are less efficient than dry, cloth type filter collectors and more expensive to maintain. Depreciation due to corrosion and cleaning costs frequently tend to cancel out the advantage of initial low cost.

11. Wet Collector Shell

a. Corrosion

Wet collectors should be inspected regularly for evidence of corrosion. Where possible economically acid spray water should be neutralized or corrosion resisting shell substituted.

b. Inspection Doors

Inspection ports should be maintained leak-tight. On large diameter washers provide cleanout doors on opposite sides of the collector in order to give access to all parts for cleaning. Inspection doors should be arranged to provide access to parts most likely to need cleaning, such as the eliminator baffles and the spray header.

c. Seals

Careful inspection of washer should be made after installation to insure water tight seals between sections. Imperfect seals should be corrected by use of J-M Duraseal.

d. Stack

Washers installed adjacent to building should be provided with a stack high enough to extend 10'-0" above roof.

12. Vanes

a. Corrosion

Corrosion occurs first at the line separating the wet and dry areas. Replacement of corroded parts should be made before complete failure causes damage to the entire unit.

b. Cleaning

Accumulation of sludge should be removed from vanes at regular intervals to maintain collector efficiency.

13. Nozzles

a. Wear

Worn nozzles should be replaced for best performance.

b. Plugging

Plugged nozzles should be cleaned as soon as condition is detected. Adequate filters should be placed in the water supply line if plugging persists.

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14. Sludge Outlet

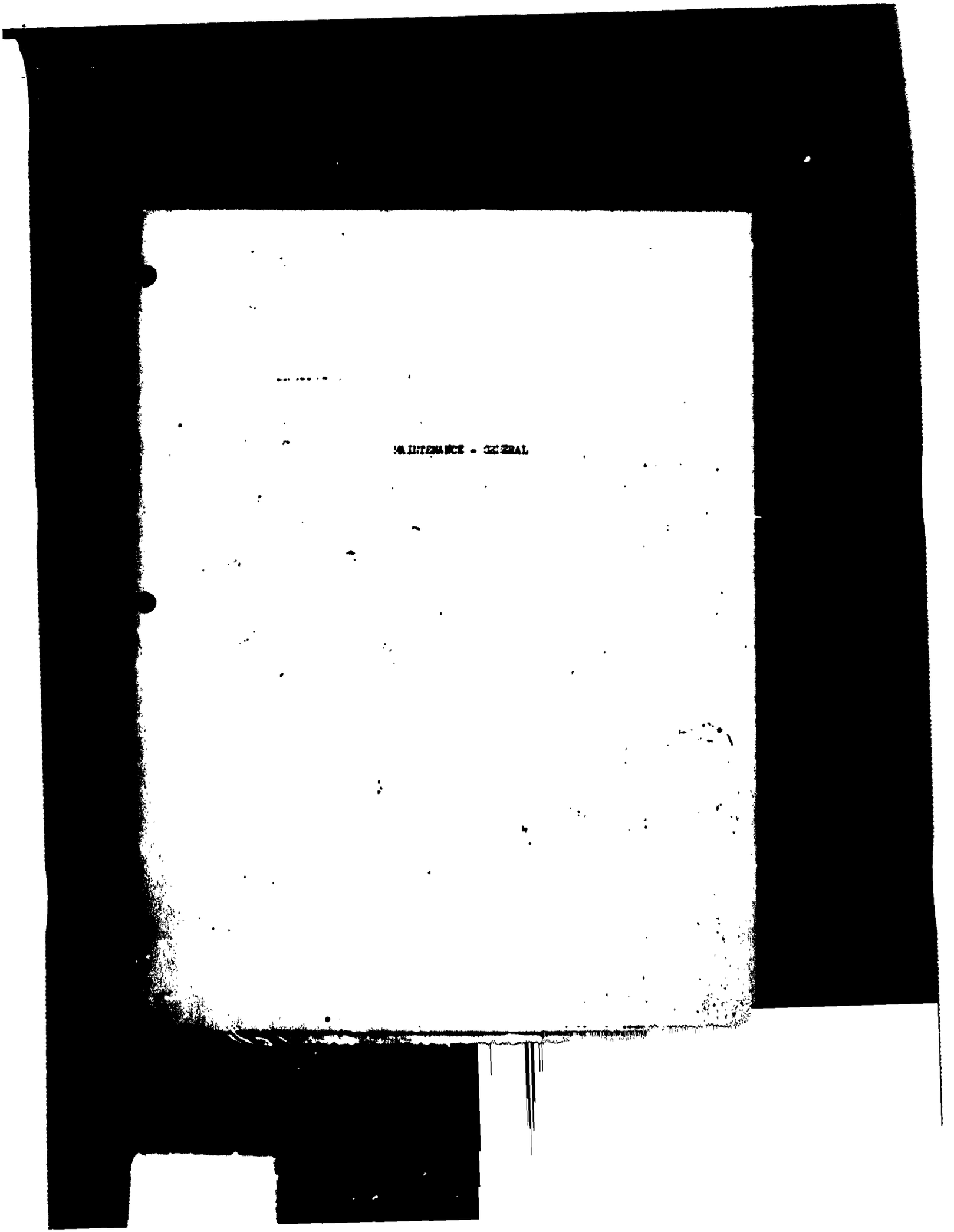
a. Clean

Sludge should not be permitted to build up in the sludge hopper, otherwise stoppage will occur and cause the collector to flood. If recurring trouble in getting rid of the collected sludge is experienced, provide a large sludge outlet.

15. Water Supply

Valves and piping should be kept in good repair and free from obstructions. Strainers or filter in water supply line should be inspected and cleaned frequently and regularly. A pressure gauge should be installed on the supply line to the wet collector. Adequate water is needed for good collector efficiency.

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1. Pitot Tube or Volometer Readings

Static pressure readings should be taken in the suction and discharge ducts respectively. A velocity pressure reading in the center of the duct should be taken in about the middle of the longest straight run of duct, either on the suction or the discharge side of the fan. These readings should be taken at the time of installation of the dust collecting system.

Subsequent periodic checks will then indicate deviations from the "basic" values recorded at the time of installation of the system. If the static pressure reading is higher than the original values, some kind of obstruction has since been introduced, such as a partial dust blockage. If the static pressure is lower, it may indicate sizable leakage in the system or belt slippage.

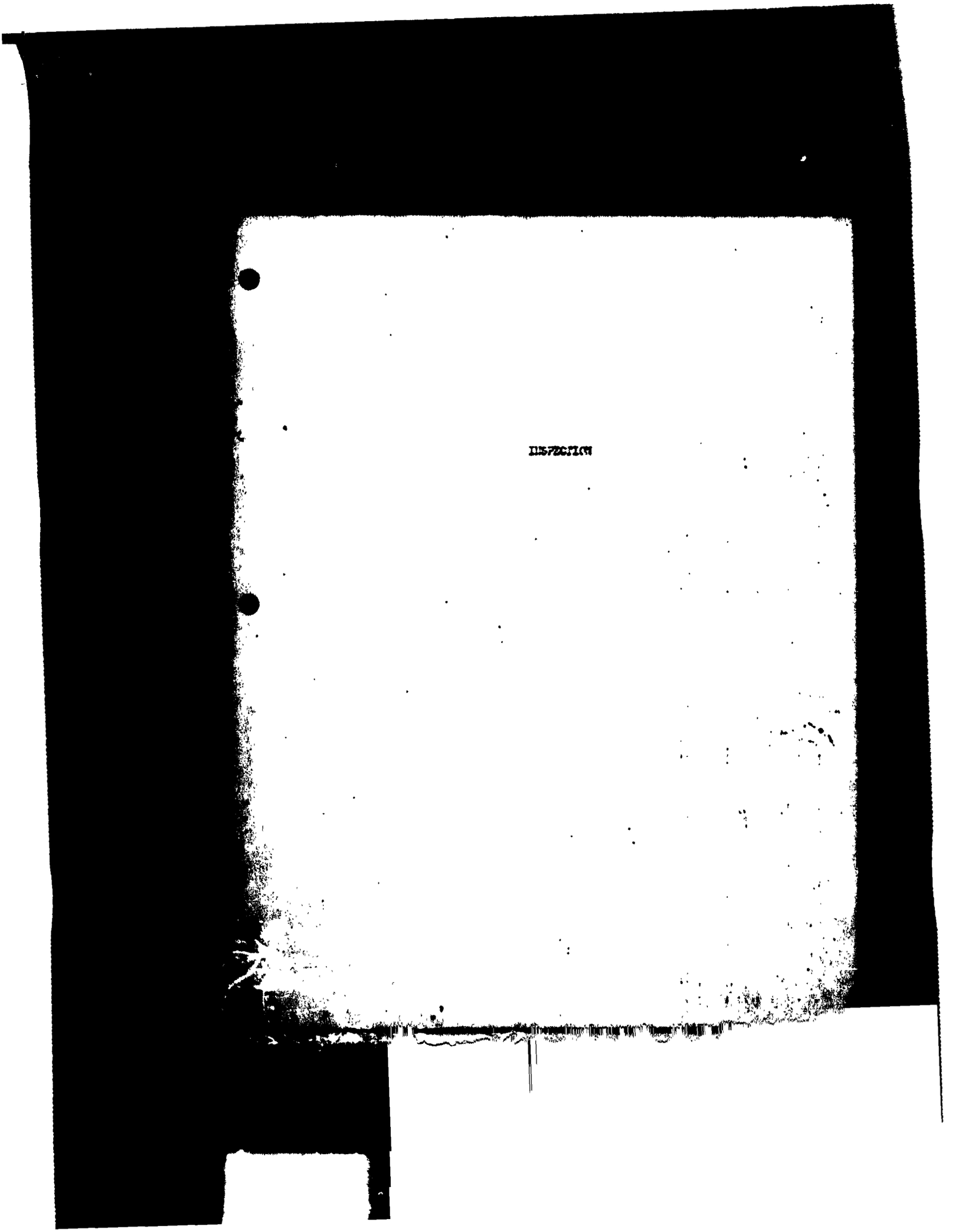
If the velocity pressure is higher than the "basic" value, it again would indicate leakage in the system; if the reading is lower, check for belt slippage, dirty ducts or dust collector.

2. Inspection

Dust systems constructed of black iron should be repainted at least once a year, in accordance with the "Painting Specifications for J-M Plants" specification #700, item #701. Galvanized iron ducts should normally not require any maintenance, except for isolated spots obviously needing touching up. Ducts should be cleaned as experience dictates and frequency of cleaning necessarily depends on quantities and nature of material handled or unless pressure readings indicate that ducts are plugged up.

It is essential that all ductwork be maintained in proper operating condition. Any leaks should be repaired immediately.

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INSPECTION OF COLLECTORS

Inspection of dust collectors at regular intervals is necessary for continuous and satisfactory collector operation. Periodic inspection will reveal wear or need for adjustment and follow up and repair will prevent major breakdown. Frequency of inspection and the time required for each tour will vary with the size and location of the installation. Forty five minutes is a reasonable estimate.

The Check list and report form Pages 53 to 55 for reporting and recording inspection data are recommended. Arranged numerically on the check list are the principle components of a dust collectory and under each major item are sub-headings lettered for identification. The inspector will check the item needing attention by placing a check in the column bearing the date of the inspection. Turning to the report form Page --- the inspector will note, in as much detail as needed, the repair to be made. A check list and report form have been filled out to demonstrate how to use them. The inspection tours are reported, the needed serving as a follow-up of the first.

It is recommended that all replacements be noted in the inspection report with the date and extent of the replacement.

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DUST COLLECTOR INSPECTION CHECK LIST

EQUIPMENT	INSPECTION DATE													
	Mar. 1,53	Mar.15,53												
7. Shaker														
a. Drive														
b. Bearings - Linkage	X													
c. Lubrication														
8. Manometer														
a. Dirty or Broken Glass														
b. Tubing														
9. Motors														
a. Lubrication														
10. Fan														
a. Bearings - Lubrication														
b. Drive														
c. Balance														
d. Wheel														
11. Wet Collector Shell														
a. Corroded														
b. Inspection Ports														
c. Gaskets between sections														
d. Stack														
12. Vanes														
a. Corrosion														
b. Wash Cleaning														
13. Piping														
a. Worn														
b. Plugged														

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DUST COLLECTOR INSPECTION CHECK LIST

EQUIPMENT	INSPECTION DATE													
	Aug. 1,53	Aug.15, 53												
7. Shaker														
a. Drive														
b. Bearings - Linkage	X													
c. Lubrication	--													
8. Manometer														
a. Dirty or Broken Glass	--	--	--	--	--	--	--	--	--	--	--	--	--	--
b. Tubing	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9. Motors														
a. Lubrication	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10. Fan														
a. Bearings - Lubrication	--	--	--	--	--	--	--	--	--	--	--	--	--	--
b. Drive	--	--	--	--	--	--	--	--	--	--	--	--	--	--
c. Balance	--	--	--	--	--	--	--	--	--	--	--	--	--	--
d. Wheel	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11. Wet Collector Shell	--	--	--	--	--	--	--	--	--	--	--	--	--	--
a. Corroded	--	--	--	--	--	--	--	--	--	--	--	--	--	--
b. Inspection Ports	--	--	--	--	--	--	--	--	--	--	--	--	--	--
c. Gaskets between sections	--	--	--	--	--	--	--	--	--	--	--	--	--	--
d. Sludge	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12. Water	--	--	--	--	--	--	--	--	--	--	--	--	--	--
a. Pressure	--	--	--	--	--	--	--	--	--	--	--	--	--	--
b. Rate of Flow	--	--	--	--	--	--	--	--	--	--	--	--	--	--
a. Dirty	--	--	--	--	--	--	--	--	--	--	--	--	--	--
b. Sludge	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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DUST COLLECTOR INSPECTION CHECK LIST

EQUIPMENT	INSPECTION DATE												
	Aug. 1, 53	Aug. 15, 53											
14. Sludge Outlet													
a. Clean													
15. Water Supply													
16. Test Readings													
a. Differential manometer readings													
b. Manometer reading at dirty air side of dust collector													
c. Manometer reading at clean air side of dust collector													
d. Static pressure reading near fan inlet													
e. Static pressure reading near fan discharge													
f. Velocity pressure reading in either suction or discharge duct													
17. Footnote													

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INSPECTION REPORT

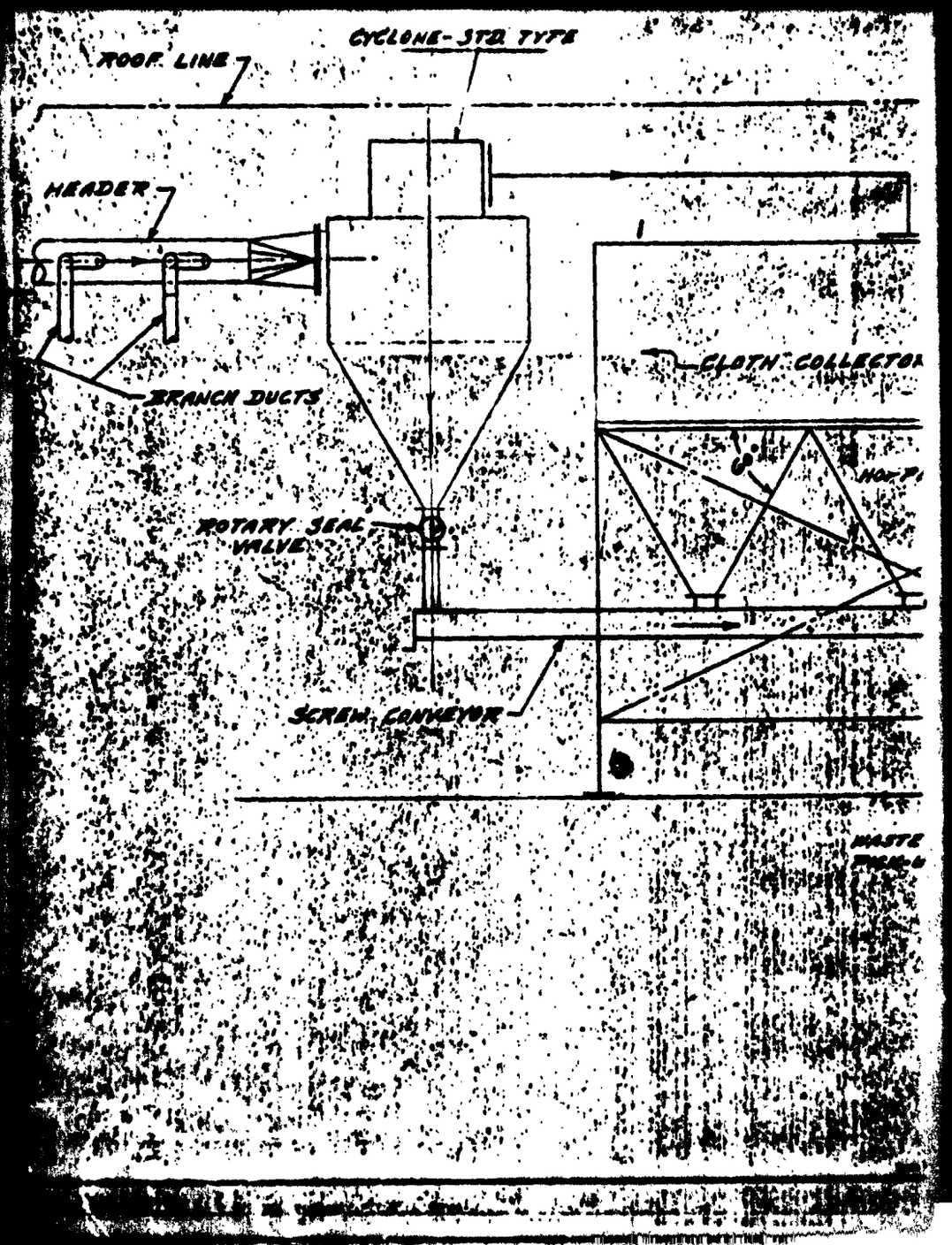
SYMBOL	
1b	Condensation on end and roof panels, interior north end of collector.
1c	Corrosion in spots throughout interior.
1e	Paint flaking off in spots.
2a	Hopper in north end completely filled with waste. Does not empty into screw conveyor.
6d	Heavy filter cake in most tubes after shaking. Material dense.
7b	Vibration excessive when bags are shaken. Bearings worn. Linkage is worn also.
10a	Fan drive belts slipping.

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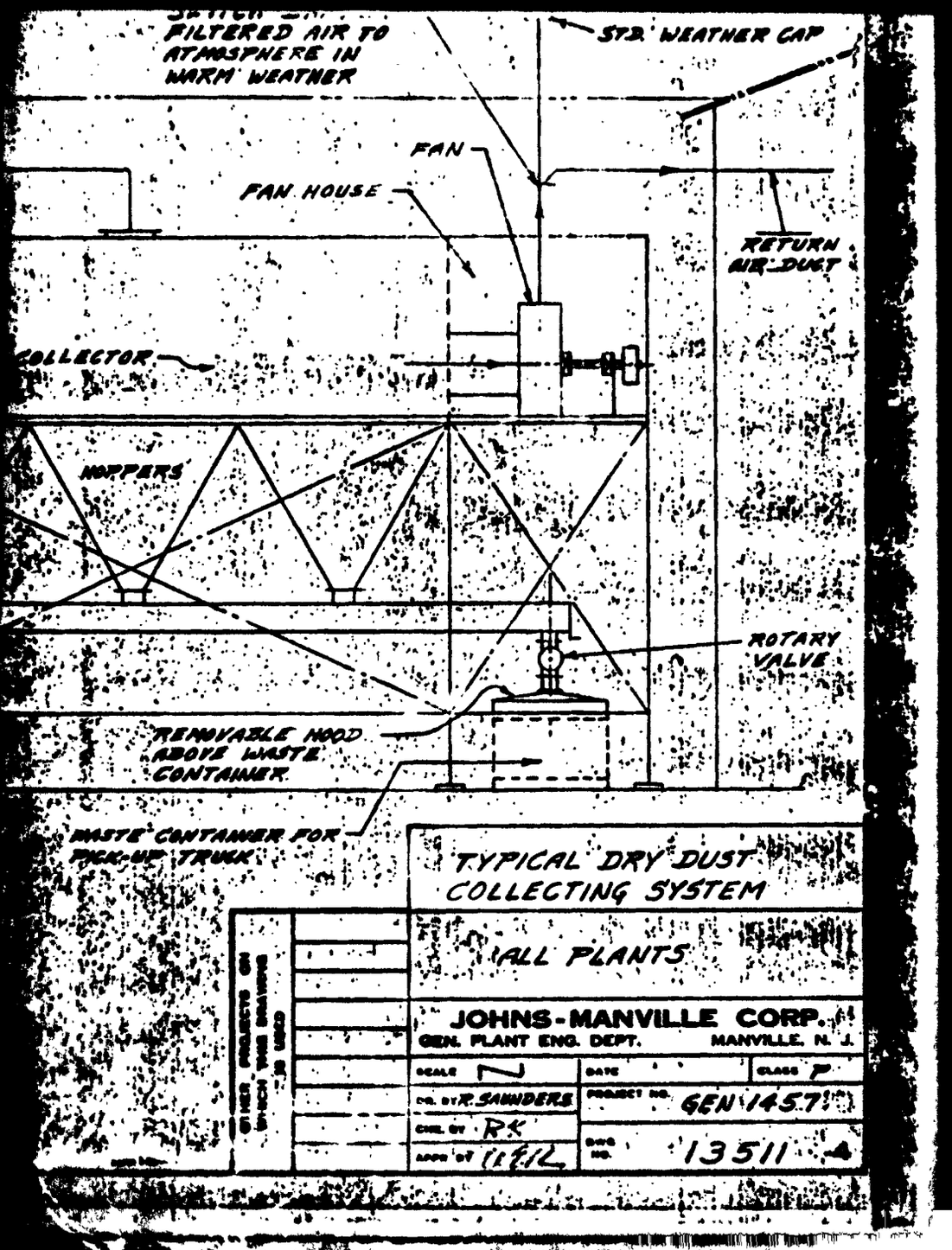
INSPECTION REPORT

SYMBOL	
1s	No work done - Deferred until after collector is insulated.
1s	No work done - Deferred until after collector is insulated.

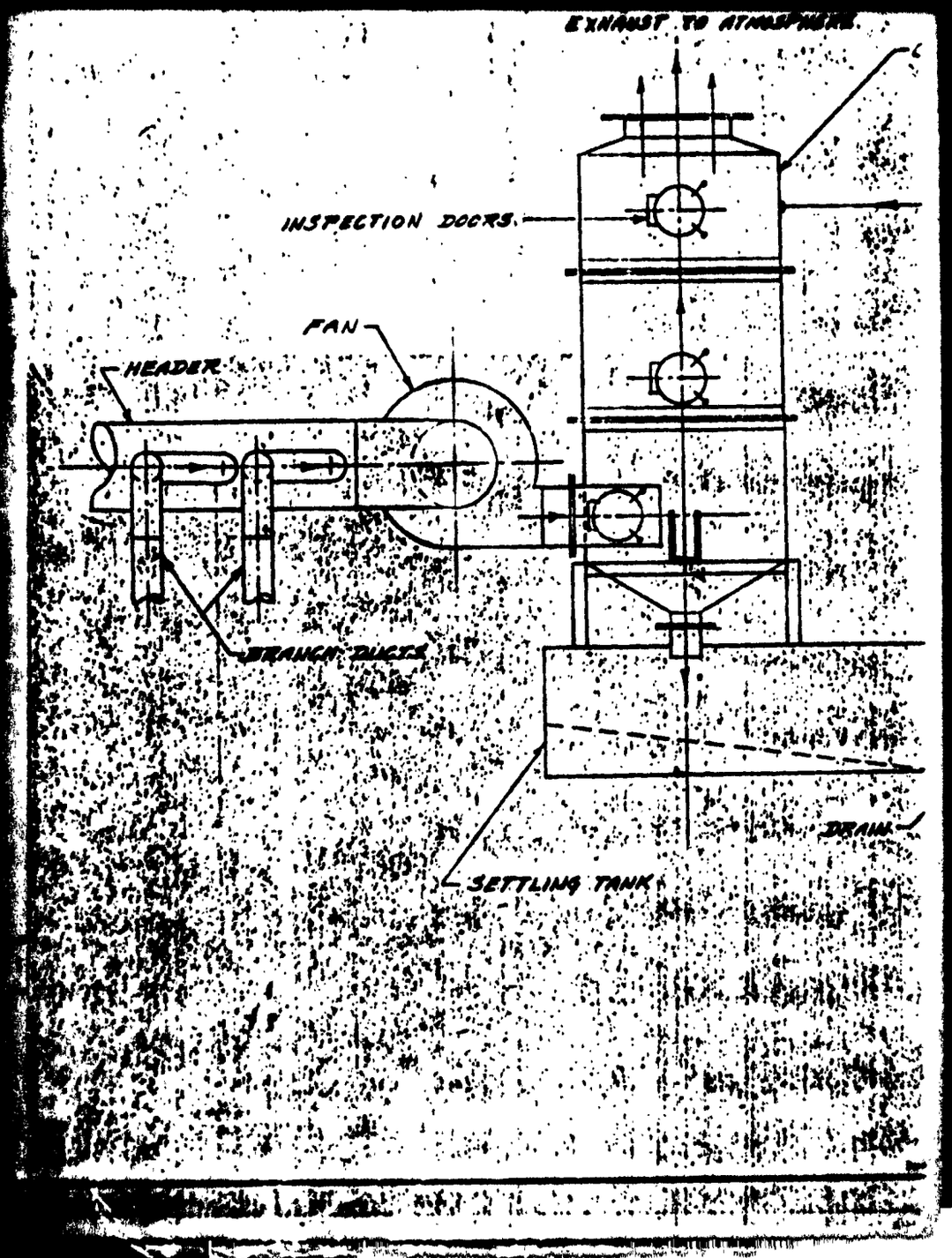
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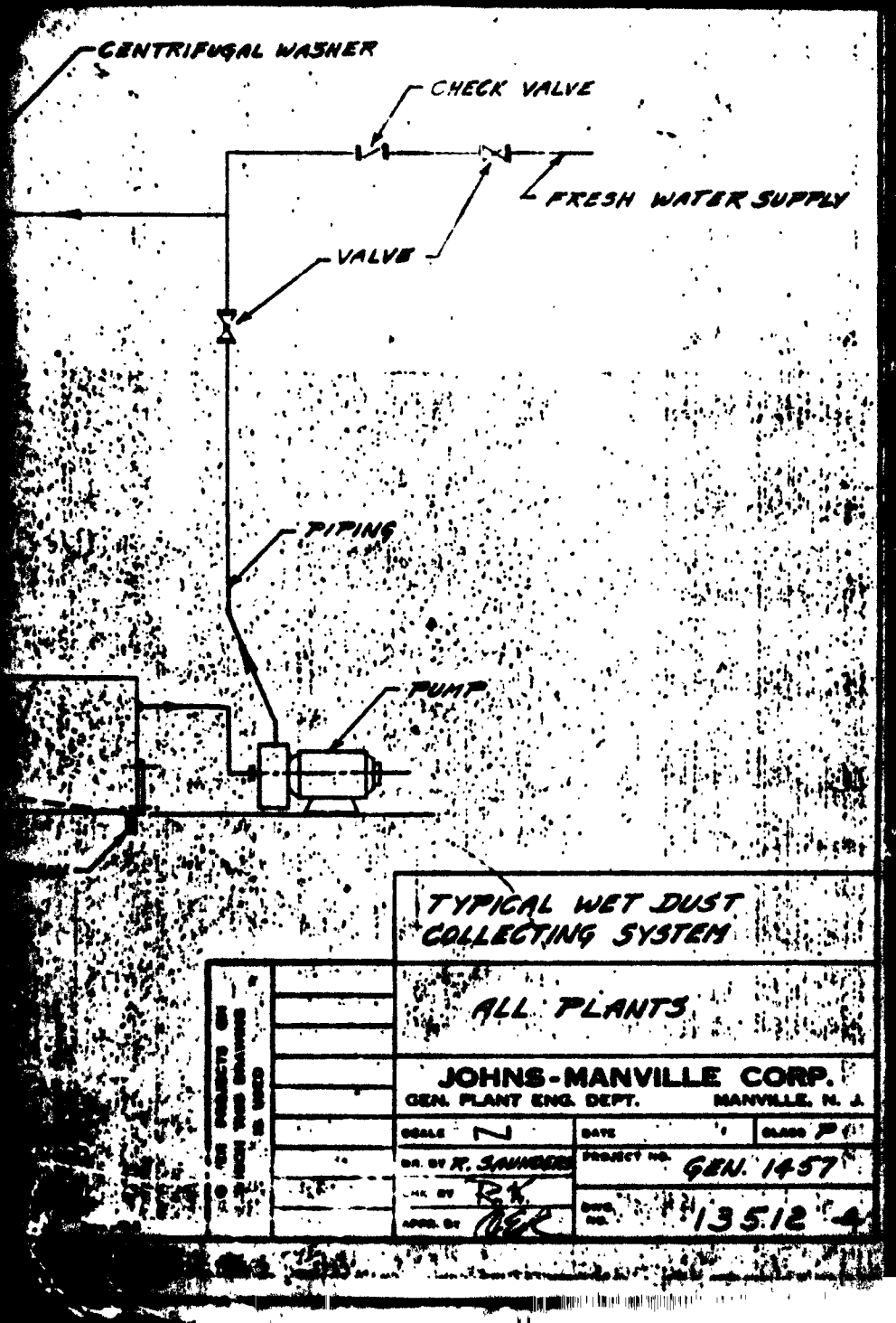
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