EARLY HISTORY

of

THE SOLVAY PROCESS COMPANY.

By

EDWARD N. TRUMP.

(In Chapters)

Chapter VI. Manufacture of Pure Bicarbonate.

CHAPTER VI

Manufacture of Pure Bicarbonate

The manufacture of baking soda in 1876 was carried on by a number of small firms who bought soda ash from the English makers or from us and who established their brands and had considerable trading in package goods.

OLD PROCESS:

The process used is quite crude but very simple. The ash was spread on trays which were dried as a unit in a room full of racks or in a series of chambers where it was exposed to gases drawn from boiler flues washed as clean as possible of dust. Enough steam was added to this gas to furnish the combined water and the CO_2 and H_2O was absorbed by the ash completely converted into bicarbonate and the product taken out, dumped into mills, ground, bolted and packed. Messrs. Church & Dwight, owners of the Arm & Hammer brand and the Dwight Company, owners of the Cow brand were among our principal customers.

Some of our customers decided to buy the wet bicarbonate directly from our filters to be dried for their product. We preferred not to sell this product and decided to try drying it ourselves.

DRYING ON TRAYS:

Mr. M.T. Bacon was detailed to make some experiments.

A number of trays were made with wooden frames having a bottom of cheese cloth.

A room was fitted up in the old malt house and after some preliminary trials provided with 880 trays, about 2,400 sq. ft.

A fan delivered 2,700 cu.ft. of air per minute which was heated to 50°C, the air coming out at 35°C. One thousand pounds of bicarbonate were produced per 24 hours.

Patrick Mullen now the oldest foreman of the Bicarbonate Department was first employed on drying by means of trays.

The cost of handling the trays which only held about 1-1/4" of bicarbonate was very great; the drying was slow and heat wasted in the large amount of excess air.

A study was made in May, 1886 and a report made on a continuous method of handling and drying by heated air.

SKETCHES #71, #72, BOOK 2, JUNE, 1886

Sketches were made of a continuous drying apparatus having belts 6 ft. wide consisting of two chains on each edge driven by 12" rollers and supported by 5" rollers. The intervals between these chains being kept apart by other slats over which was driven a belt of duck 6" wide fastened to the slats by means of tacks. The first sketch #70 shows the proposed dryer with 11 belts one over the top of the other, 6 ft. wide and 150 ft. long arranged so that the air was to be circulated back and forth between alternate belts.

The depth of bicarbonate was intended to be 1-1/2" which would give 4,800 lbs. of dry bicarbonate on all belts or 100 lbs. per hour if the time required to dry was 48 hours, which was the experience with the trays.

We hoped to get more rapid drying, as the crystals would be turned over 11 times in the passage

over the belts.

ADJUSTABLE SPEED DRIVE - PLAN #1244 - SEPT. 30, 1886

The details of the dryer are all shown in the same sketch book - Rollers Adjustable Speed Feed Apron and Fan with small engine and heater between January, 1886 and January 4, 1887.

PLAN G-2175, MARCH 1891

This shows the first dryer which was a good deal modified before the second was built. The date on the plan is evidently incorrect as the details are dated September, 1886.

PLAN G-1767, MAY 20, 1891

The general arrangement of the completed plan as it was built is shown on plan 1738 and 1767.

PLAN 1738, MARCH 3, 1891

After this dryer was built and started, it was suggested that a rotary cylinder with the heating jacket be tried. This was erected but was found to have very limited capacity.

July, 1886, a general plan of building for the manufacture of pure bicarbonate was laid out which was completed on August 14, 1886. The plant was designed to make the bicarbonate from liquor of 23° Be made by dissolving soda ash in the return liquor with the addition of water. This liquor was to be first settled and then pumped through filter presses into storage tanks. These presses were intended to be erected on a second floor so that the liquor from them would run directly into the tanks. From the storage DO pumps handed the liquor to the CLs where it received lime kiln gas pumped into it from three A frame compressors. One of the CLs was

to be steamed out while the others delivered the precipitate into six centrifugals. These centrifugals were of the Weston type, which at that time were being tried in the S.A. Department to filter the bicarbonate from the precipitating columns. When the charge of crystals in the basket had been spun until they contained about 6% of water, the charge was dug out and delivered through the bottom into a screw conveyor to the elevator and to the feeders of the dryers.

Plan 1237, Plan #1767 shows the #1 and #2 dryer which were erected in a building with peaked roof and was followed by a third dryer. This plan also shows the elevators, scalpers and bolts on the floors above the bins for dried product, the roller mills which succeeded the stone mills which we first used, the finished bicarbonate bin and the packers. A storage floor for empty barrels was provided. When built this made a very satisfactory little plant. The dryers gave quite good service in spite of occasional breakages of slats and piling of belts and were worked up to a capacity of 2500 kilo tons of bicarbonate per day.

PLAN C-1284, MAY 23, 1887

This plan shows the rotary cylinder dryer which was tried with disappointing results. It was found to have such a limited capacity that it was abandoned and a third belt dryer built instead.

IMPROVEMENTS IN BELT DRYER

We made several improvements in #3 dryer. A feed apron with rollers to close off and feed the bicarbonate was used. Cone speed regulators were

tried, the temperature of air increased and better rollers with loose sprockets were provided at the takeup end of the belt which gave less breakage. The labor in attendance of repairs was considerable as the duck used on the belt was liable to tear, which allowed crystals to drop onto the inside of the belt piling up at the ends so as to finally stop the dryer and require cleaning out and careful watching.

MILLS

The bicarbonate dried in crusts and lumps and had to be first passed through a scalping reel and the coarse product through the stone mills.

DRESSERS

The elevators from these mills delivered the milled product to the dresser of the usual flour mill type with silk bolting cloth making a very fine screened product.

The product found a ready sale and increased in popularity.

Church & Dwight and the Dwight Company were rivals and competed for the bicarbonate trade with us. They had the advantage of the Arm & Hammer Brand and the Cow Brand which were the most popular baking sodas and it cost a great deal to advertise. Church & Dwight had started the manufacture of pure bicarbonate by the Ammonia process at Trenton, Mich. They had a good plant which threatened to develop into a large unit which would compete with us and Dwight & Company. A consolidation between the two companies was consummated under the name of the Church & Dwight Company and The Solvay Process Company made a contract to supply them

with all of the bicarbonate they could use at a base price to be modified from time to time in accordance with changes in prices of labor and raw material and one-third of the profit. The plant at Trenton was dismantled and the Sibley Quarry which was owned by Church & Company was purchased by The Solvay Process Company and the stone used for the Detroit Works. The Church plant was giving some trouble at the time but these undoubtedly would have been eliminated by experience and the arrangement was, therefore, quite satisfactory and has continued until the present day.

Difficulties with the Process

FILTERING

The filtering of the solution of soda through soda processes was a difficult problem.

PLAN G-9514 - FILTER PRESS

The carbonate of lime is very fine. The filter cloths were effected by the ash in the hot solution so that they rotted and wore out rapidly. The presses had to be taken apart and cleaned very often and the cost of labor was high because of the action of the liquor on the hands and clothes of the workers.

SAND FILTER, PLAN 1837

We soon abandoned the filter press and used a sand filter to take out the last impurities.

SETTLING PLANT, PLAN #5234, August 13, 1900

The sand filter shown on this plan was a simple tank with the cone filled with crushed stone having finer and finer stone from the bottom up with sand on top. As the production increased we utilized the half of the AL building and the tanks already there and put in a dissolving and measuring machine

with handling system for receiving soda in cars and elevated in bins.

PLAN 13751 - DISSOLVING PLANT

We used some of the above tanks for filters replacing the small conical filters in the other buildings.

PLAN 13765 - LARGE FILTER

This filter was filled with large stone followed by smaller and smaller crushed stone and then sand on top and was provided with special stirrers and rewashing arrangement so that they could be cleaned at frequent intervals, and a very clear pure solution was finally obtained.

KILN GAS

One of the main difficulties was with the kiln gas.

This gas had a preliminary scrubbing in the coke scrubbers at the lime kiln but still contains some dust, and some H_2S which reacted with the iron of the pipe and CL tubes making black sulphide of iron which showed in the product.

L.F.R. - PLAN 7837, August 24, 1904

We first added a three compartment L.F.R. to give the gas an additional scrubbing with water. Three more compartments were added to this later. We still had trouble with color.

SCRUBBER - PLAN 13626 - OCTOBER 14, 1908

We finally added a coke scrubber through which we pumped the return liquor coming from the centrifugals. The remaining soda ash absorbed the H_2S and some of the other impurities in the gas giving a clean white product.

COMPRESSORS

Having abandoned the Weiss compressors of the balance slide valve type in the S.A. Department and replacing them by Riedler compressors, we transferred them to the B.C. Department. This type of valve required lubrication with oil which still gives us more or less trouble.

The old type of compressor used by the Solvays' in Europe which has water in the compression cylinder would give a much cleaner gas and would make a white product. We have, however, never been able to change to this type of compressor. A single compressor was used for each of the CL's and although not very efficient and costing a good deal for repairs have been in use ever since. The large amount of steam used having been employed for vacuum pans, which made their efficiency less important. Undoubtedly at times a great deal of steam was wasted when the pans were not in use.

C.L.'s - PLAN 5731, SEPTEMBER 5, 1901

The C.L.'s first designed for the precipitation of the bicarbonate were made up from the discarded rings from the modified C.L.'s of the S.A. Department and the special passettes which had been designed and used for the manufacture of alumina. (See Plan #5731). These passettes were intended to prevent obstruction from the settling of the alumina which could not be dissolved out. There is no reason why the ordinary C.L. passette as is used in the upper part of the C.L. as shown on the above plan would not be entirely satisfactory as they have been used in the European works, but we had these alumina passettes on hand and the first C.L.'s were erected with them so that we have followed this type ever since because of the good work done by them.

PLAN 29173 - MAY 2, 1919

Various modifications of the cooling tube arrangement were made as new C.L.'s were erected to increase capacity and efficiency and these are shown on Plan #29173.

The baffle plate shown in #1 and #5 of this plan in the top rings were omitted when #2 and #3 were rebuilt and were not used in #6 as the ordinary type of C.L. passette was found to be better.

PLAN 5749 - SEPTEMBER 23, 1901

The general arrangement of the first four C.L.'s is shown in Plan 5749, also the 2 D.O.'s with the small round sand filters above them, the apparatus pumps used to handle the liquor and the general arrangement of the building. Two horizontal tanks 7' diameter by 37' long were located in the cellar to receive the return soda liquor from the centrifugals.

CENTRIFUGALS - PLAN 3626 - OCTOBER 23, 1896

To reduce the cost of drying we wished to keep the percentage of moisture in the crystals as low as possible. It was, therefore, decided to use centrifugals like those used in the sugar manufacture. These had been tried in the S.A. Department for the filtering of bicarbonate in the soda manufacture but the ammonium chloride liquor caused serious corrosion and the repairs were so expensive they were abandoned in favor of rotary filters. In the B.C. manufacture as the soda liquor protected the steel they could be used for the bicarbonate manufacture and the abandoned S.A. Department machines were utilized with modified frames and located as shown in the above general plan. They received the liquor with the precipitated crystals from the C.L.'s. As the baskets were charged

running at a low speed the excess of liquor carried considerable quantities of the fine crystals through the oil cloth into the return liquor tanks filling them up frequently and these had to be dissolved out thus reducing the production and efficiency of the process. The loss was found to be about 20%. We at first erected four centrifugals followed by two more and later erected on the top of the framework one of the old long filter tanks provided with inclined baffles to give a preliminary settling of the crystals. Part of the liquor overflowed clear to the tanks thus reducing the amount of liquor passing through the centrifugal baskets which reduced the amount of crystals passing through.

PLAN #6043 - JANUARY 11, 1902

We finally entirely eliminated this trouble when we put in a set of rotary filters shown in the plan separating all of the liquor and delivering the crystals to the centrifugals through large spouts and bags. These crystals coming from the filters had about 16% of moisture and we dried it to 6 or 7%.

When the production increased to 60 tons per day, it was necessary to increase the number of these centrifugals and to increase the number of the dryers.

NORTH EXTENSION - PLAN 3591 - OCTOBER 5,1891
- PLAN 3626 - OCTOBER 23,1891

In October, 1891 we made designs of the north extension to the building. This accommodated #4 and #5 horizontal belt dryer and #6 additional centrifugal and a vacuum pan which we used to produce monohydrate and sesqui-carbonate,which we called Snow-Flake, these being produced as by-products from the return liquors. By this time we had improved the system of milling by substituting

roller mills and as the silk boats were slow and the increased production required a great increase in number we put in a Raymond air separator and only used the silk boats for special products.

RAYMOND SEPARATOR, PLAN 3992, JULY 19, 1897

The extension of the building enabled us to entirely remodel the milling, separating, and packing plant as is shown in Plan #3992 and we had room for the Raymond separator, larger bins and better elevator and conveying system.

The north extension shown in Plan #3991 was added to the old peaked roof building using the mill construction pipe of wooden building and the old building was afterwards extended up, the roof modified to a flat type to correspond with the new part.

Plan 3626 showed the new centrifugal and the location of #1 vacuum pan with the arrangement of elevator to feed the dryers.

VACUUM PAN - PLAN #3690 - DECEMBER 30, 1896

The process of dissolving ash and using return liquors with the washing of the filters and C.L.'s increased the return liquors and made a surplus that had to be evaporated to save the soda. This was especially the case when we changed to the process of making M.C. liquor from the bicarbonate of the S.A. filters. As this surplus was increased by the 13% of water in the bicarbonate, it became necessary to put in an evaporator. Plan #3690 shows #1 pan in the north extension.

SNOW-FLAKE

Two by-products were developed from the return liquor - sesqui-carbonate of soda, which had a long needle like crystal which we named Snow-Flake and a mono-carbonate of soda which we named mono-carbonate.

These products were similar to some English sodas which were being imported and were made to compete with them. The present large business of washing powders had not been developed. These products found a ready sale. If we had put these products up in packages as suggested and established a brand for them, we would now have a very large business but we only sold in carload lots so that our customers reaped the larger part of the extra profit which always comes with packed goods.

#1 VACUUM PAN - PLAN #3672, MARCH 25, 1897

This plan shows the detail of the vacuum pan and the arrangement of pipes, and pumps and condensers are shown in Plan #3690. A patent was taken out for the method of extracting the crystals from the pan while in operation.

In making mono-hydrate, a heavy scale was formed on tubes of the pan which falling off would clog the valve in the bottom of the pan so that when we used a salt catchall, such as we used in the C.S. work, we had difficulty in having the salts drop into it. We, therefore, designed a combined mill and horizontal centrifugal pump which circulated the mixture of salts and liquor continuously, grinding up the scale and elevating the mixture into a vertical loop of pipe which allowed the crystals to be drawn off into the centrifugal under pressure while the pan was under vacuum.

Plan #3690 shows the arrangement of piping, pump and centrifugal. This process was used for many years and was very successful. When the manufacture of mono-hydrate was abandoned, the mill was not needed for Snow Flake and a horizontal pump has been substituted and the same principle has been used in extracting other crystals such as salt, potash and fished salts. Two special centrifugals and one of dryers were used for the crystals and special conveyors and bins erected

as the trading increased.

#2 VACUUM PAN - PLAN #4306 - MAY 21, 1898

The second pan was erected with vertical tubes as shown on Plan #4306. This was thought to be a better design then the horizontal tubes, because of the experience in salt manufacture which was studied in Michigan, where the short vertical tube had been very successful. The surface was much larger than the horizontal tube and the circulation more violent, construction cheaper and simpler. This pan, however, was not successful for monohydrate because the scale formed and plugged up the inside of the tubes so rapidly and the pan had to be boiled out so often and the tubes bored out, that we found the horizontal tube much better even for Snow-Flake.

To increase the heating surface over that used in #1 pan, a new ring with a round tube header was designed as shown in Plan #7551.

ROUND HEADER VACUUM PAN - PLAN 7551 - MAY 6, 1894

This pan was erected as shown in Plan #7602 alongside of the #1 pan and connected up as a double effect, but they have usually been used as single effects, a second condenser having been provided. The exhaust steam was, therefore, not very well utilized, because the Snow-Flake required is more then can be produced with a double effect with low pressure. The pumping system for the discharge of crystals was the same for both pans, the continuous circulation allowing the crystals to accumulate until they had formed a thick liquid which could be drawn into the centrifugal without further settling and the pipes were kept clean because of the continuous circulation.

VERTICAL DRYER

The plant grew very rapidly as the sale of pure bicarbonate increased. A second Raymond separator was added and special belts for Royal Baking Powder,

a special brand which required bolting through #11 silk cloth and over #16 silk cloth. The screenings which were taken out by the Raymond separator and scalper were sold for making soda water and the trade increased so that we were soon up to the full capacity of the plant, which was limited by the drying in spite of the fact that we had in five of the large belt dryers which had a capacity of 25 kilo tons each. Running under such pressure the repairs were high, cost for duck covering on account of breakage of slats and tears in the cloth, stops for inspection or to replace broken chains reduced the working time so that one dryer was out nearly all the time and 100 tons per day was all we could get out of the plant. The four G.L.'s had a capacity of 50 tons each and the 12 centrifugals would dry over 200 tons per day. We, therefore, gave careful study to other systems of dryers and having tried the rotary with and without jackets, the tray system and studied the system of vertical dryer in use abroad, consisting of steam heated plates, we finally thought of the suspension of crystals in a current of hot air. Our first idea was to drop the crystals down a tube falling through an upward current of air, but as the fine dust had to be separated from the outgoing air, it was seen that if the velocity was enough to hold the wet bicarbonate suspended as it dried, the specific gravity would be less and it would require less velocity to make it rise with the air. The system of suspending the crystals in a current of air diminishing in velocity so that the wet particles would take a new position as the water was evaporated and pass out of the apparatus when dried was new and strong patents were obtained for the method and the apparatus. The first dryer designed

was a vertical conical tube enlarging at the top to a cone and provided with an internal cone which was proportioned to give a greater area than the tube below thus decreasing the velocity and allowing the bicarbonate to settle and vibrate in the tube. Baffles were arranged at the top to divert the air and a central feed hopper fed the wet B.C. taken into the tube by means of an agitating shaft and a feed propeller such as was then in use on the S.H.T.'s.

PLAN #5019 - MARCH 1, 1900

March 1, 1900 was the date of the first design. A snail shell shape at the bottom whirled the air from the fan into a spiral cyclone and it was, therefore, called a cyclone dryer.

The #1 dryer was built, erected and tested using a fan driven by a Straight Line Engine so that the speed could be varied to find the correct velocity of the air.

#1 DRYER - PLAN #5018 - JANUARY 1⅛, 1900

This dryer was erected alongside of #5 dryer. A special elevator delivered the bicarbonate from the centrifugal conveyor elevator to the feed hopper at the top and a cyclone separator was provided alongside of the vertical cone to separate the dry bicarbonate from the air. A small amount of dust was settled in a temporary dust chamber built on the upper floor. A pipe from the bottom of the cyclone separator delivered the dried product to the dryer conveyor. This dryer was successful from the start and delivered a dry product automatically. The capacity seemed almost unlimited as compared with the belts and it took very little ground area.

The air was heated by means of a Sturtevant

heater supplied with exhaust steam, the fan drawing the air through the heater and delivering it into the small shell at the bottom of the dryer. It was found to have several faults, the feed screw being in the hot air would not give a regular feed, because the heat crusted the bicarbonate on the inside of the tube and the elevator also gave trouble.

FEED TABLE - PLAN #5529 - MARCH 25, 1901

We, therefore, decided to try a feed at the bottom and designed a feed table (See Plan #5529) which was built and tried. This feed table revolves under a stationery cylindrical hopper and a vertical shaft was provided with blades which were expected to keep the wet bicarbonate agitated.

PLAN 5541 - APRIL 5, 1901

The feed table was located on the side of the dryer near the bottom of the straight part of the 2½" tube as shown in the plan. The fan and heater were in the basement, the engine and the feeder on the second floor and the B.C. was fed down from the floor above. The engine could be run at different speeds and the feed regulated to give different quantities. The main difficulty which developed was the power required to run the feed table and the sticking of the wet bicarbonate to the sides of the stationery cylinder. It was suggested by Mr. Bellinger that it would be better if the whole mass revolved and a method of doing this was revised by the writer which consisted of a cone supported on the central shaft through the table which gave much better results. This feed table was designed by the writer as shown in sketch book and in plan #5670.

56434

FEED TABLE FOR VERTICAL DRYER - PLAN #5870 - JUNE 25,1901

The high conical cylinders were supported by a set of wings at the top of the revolving shaft which also supported the table and had a step bearing below. This cylinder was eight feet high, a height sufficient to allow the feed to be forced into the dryer against a pressure of 20" of water, the weight of the bicarbonate prevented the mass in the cylinder from blowing out.

The cylinder was provided with a water seal as shown which kept the pressure and prevented leakage of air around the cylinder.

An adjustable knife peeled out the bicarbonate between the table and the lower edge of the conical cylinder into the vertical tube continuously and the revolving spiral current of air whirled the bicarbonate up to the conical part of the dryer and kept it dancing there a few seconds until it dried and passed out to the cyclone dryer separator. 99% of the crystals were separated and the balance were nearly all caught in the dust chamber.

Plan #5870 shows the detail and the arrangement of the dryer and the shoot for the bicarbonate from the floor above.

Plan #5541 shows the second and third dryer location.

DRYER #2 & #3 - PLAN #5538 - APRIL 3, 1901

#1 dryer was so successful that two additional dryers were built. These were provided with steam heaters and special fans driven by motors on each side of the fan, and had conical baffles as shown in plan #5538.

The inside cone was not needed the baffles being arranged to reduce the velocity of the air in the same form and consisting of a turbulence of the air

which caused the crystals to be in contact with it.

PLAN 6672

This plan shows a modification of the inside cone to cause a separation of the coarse crystals from the fine to help the Raymond separator. Four dryers of this type were put in one after the other as the old belt dryers were removed. They were supposed to have a capacity, with 65° C. temperature of air, to dry 125 K.T. of bicarbonate per day. They were also used for Snow-Flake and mono-carbonate as well as bicarbonate. The Snow-Flake was, however, considerably broken up and another type of belt dryer was finally erected to preserve the shape of the crystals for special customers. With wet bicarbonate a crust formed on the inside of the vertical tube close to the feed table and a door was cut in the side opposite the feed to remove this at intervals but a chain suspended on a swivel from the baffle above which revolved with the air, kept the cylinder clean. It became a very satisfactory apparatus.

The power needed, 90 H.P., seemed excessive but the power per ton of product was not too high. The simplicity of the apparatus compared with other forms of dryers has kept it in use.

A modification in the heater and the change in the snail shell at the bottom to a straight elbow with a spiral vane in the tube reduced the friction and increased the quantity of air from 15,000 cu.ft. to 21,000 cu.ft. per minute. Additional heating surface in the heater increased the temperature to 105° C. and we have several tests showing the capacity of 210 tons of bicarbonate per day for one dryer.

PLAN #7552 - BEERIGEN HORIZONTAL CENTRIFUGAL

A continuous centrifugal which was tried for the B.C. without success.

PLAN #6695 - DUST FILTER (FLEUTER) - Tried for catching last traces of dust from distillers without success.

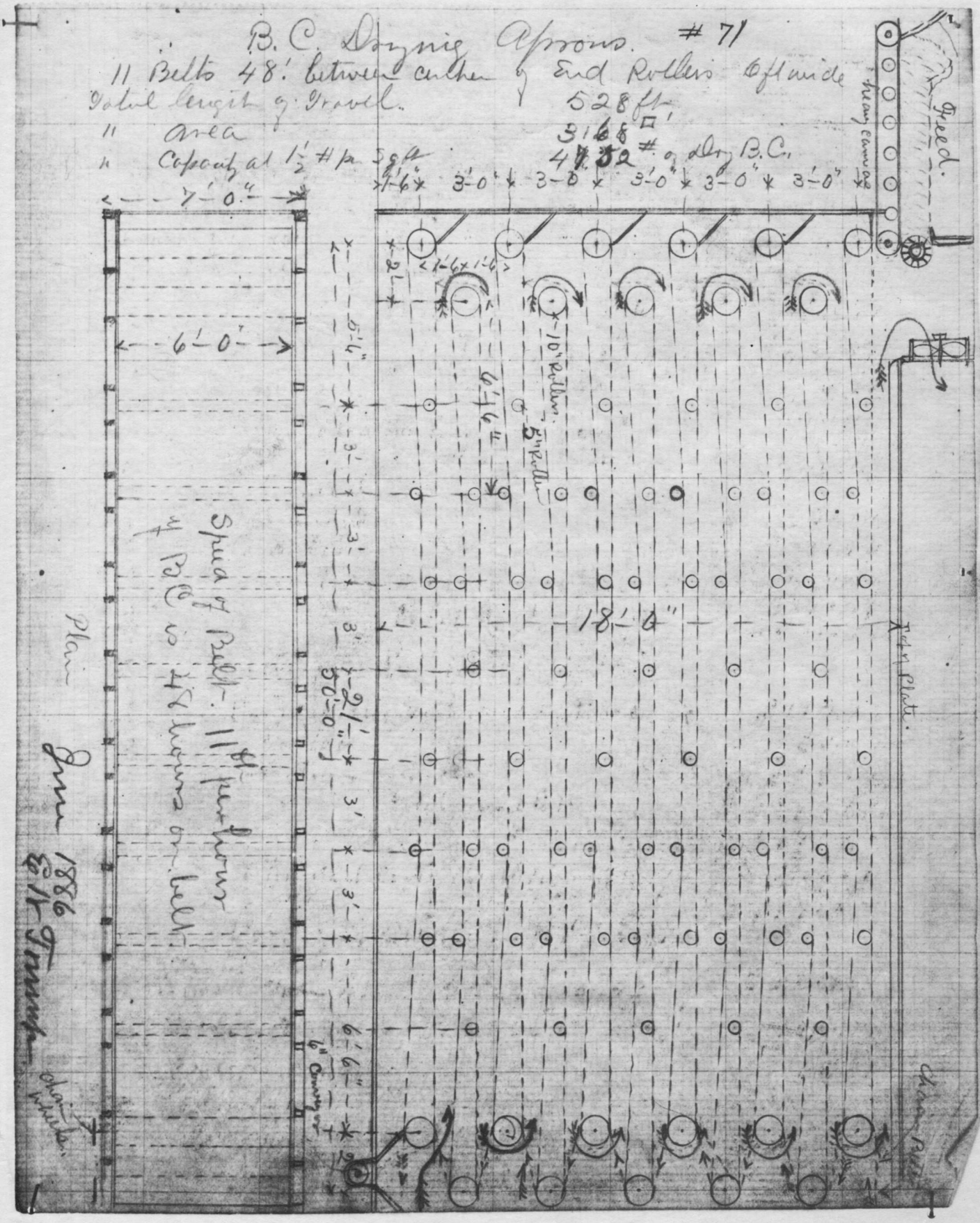
B. C. Drying Aprons. #71

11 Belts 48' between centers & End Rollers Off inside

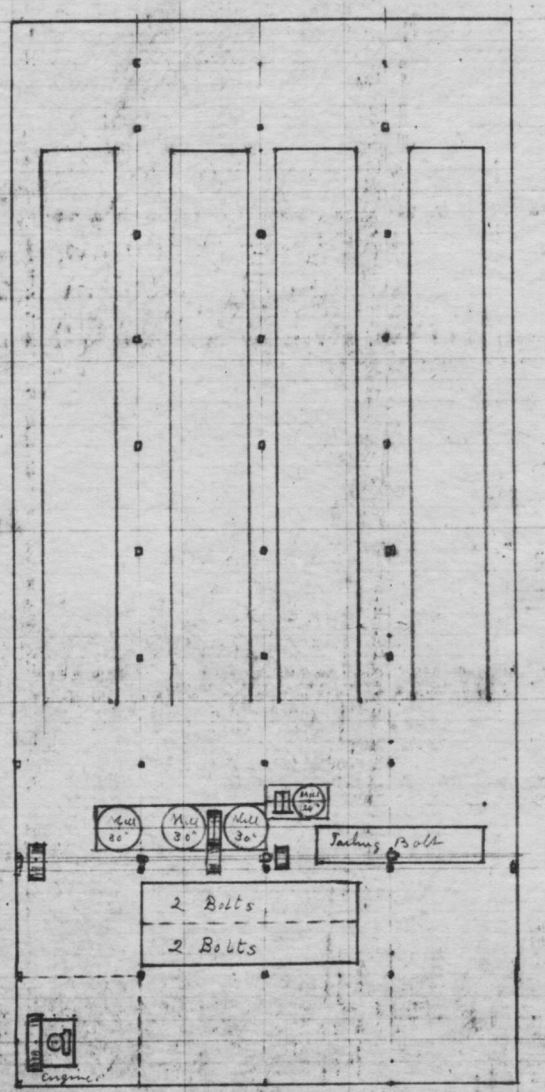
Total length of Travel. 528 ft.

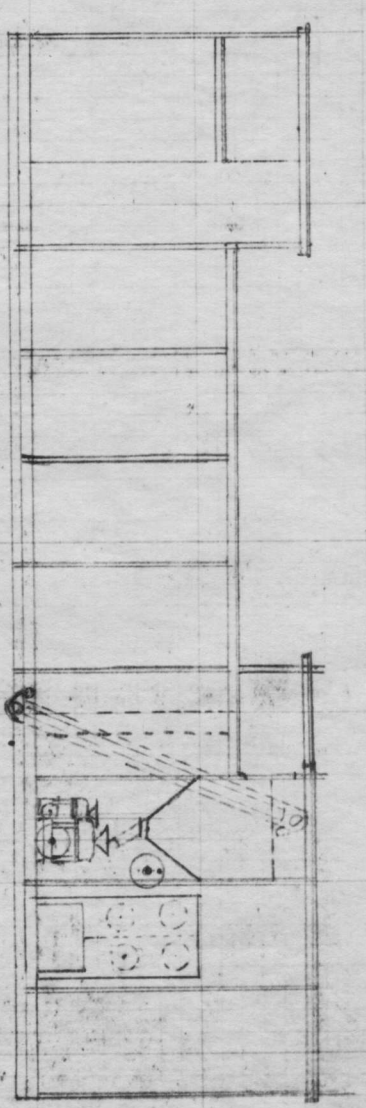
" Area 3168 □'

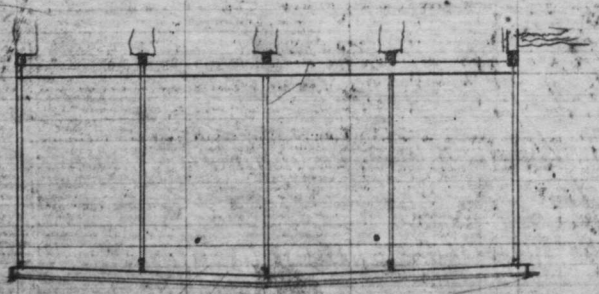
" Capacity at 1½ #pr sq ft 4752 #. per hr. B.C.



#72





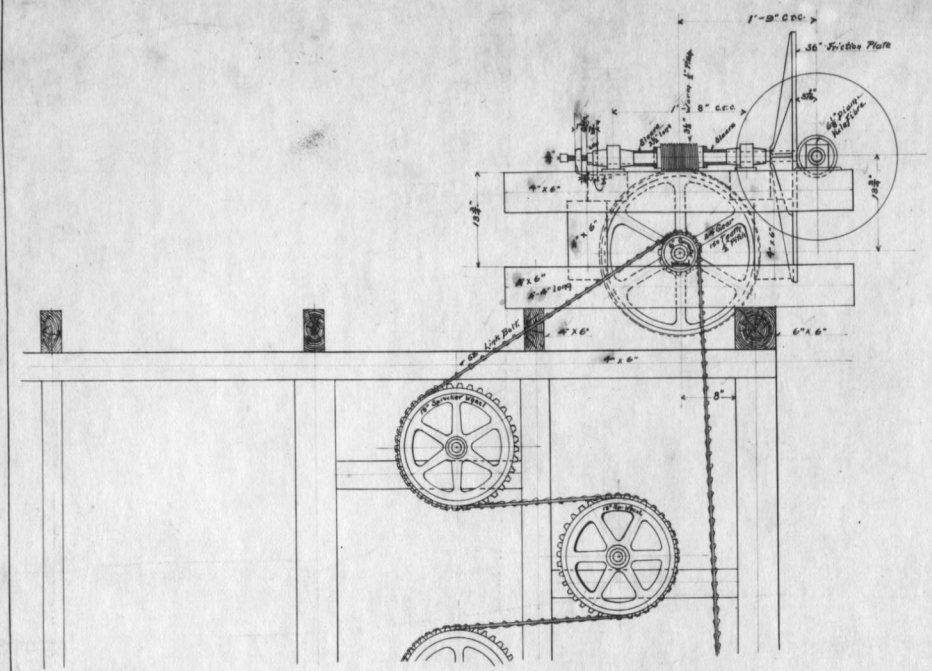


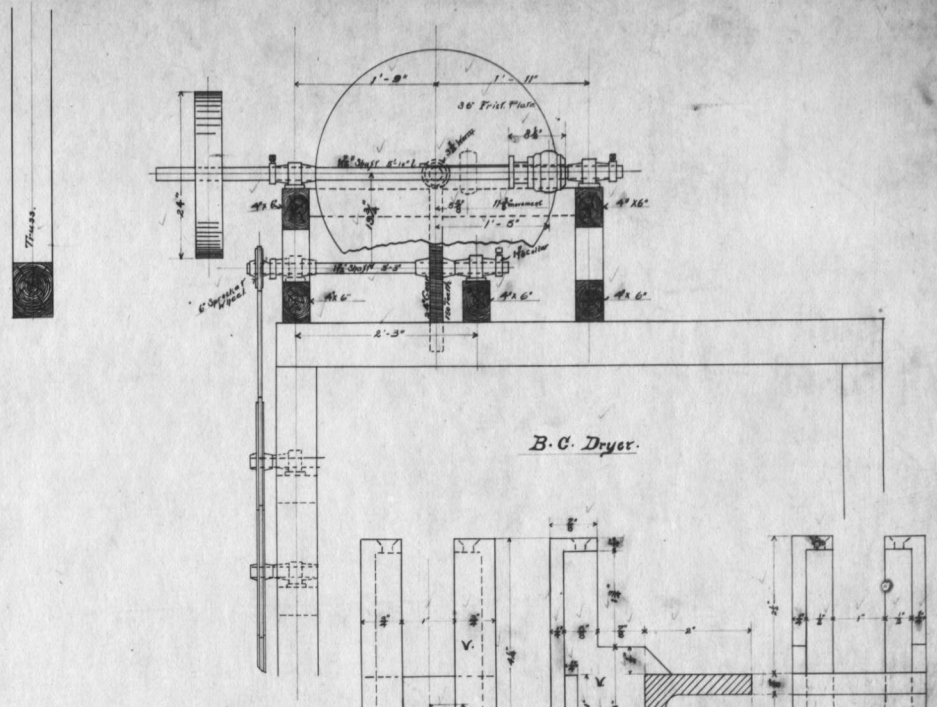
July 1886

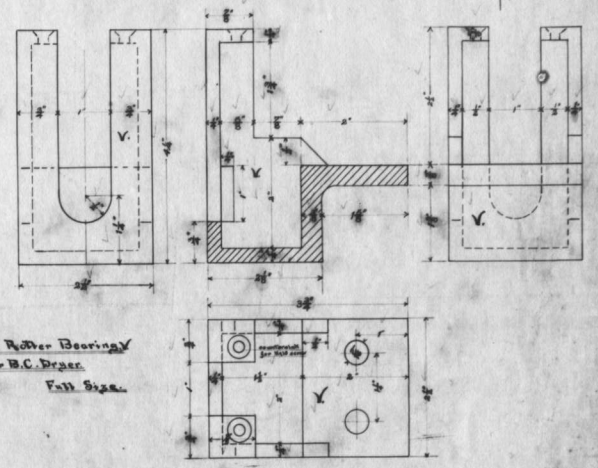
Sketch #72

Bicarbonate Drying Building & Tramp

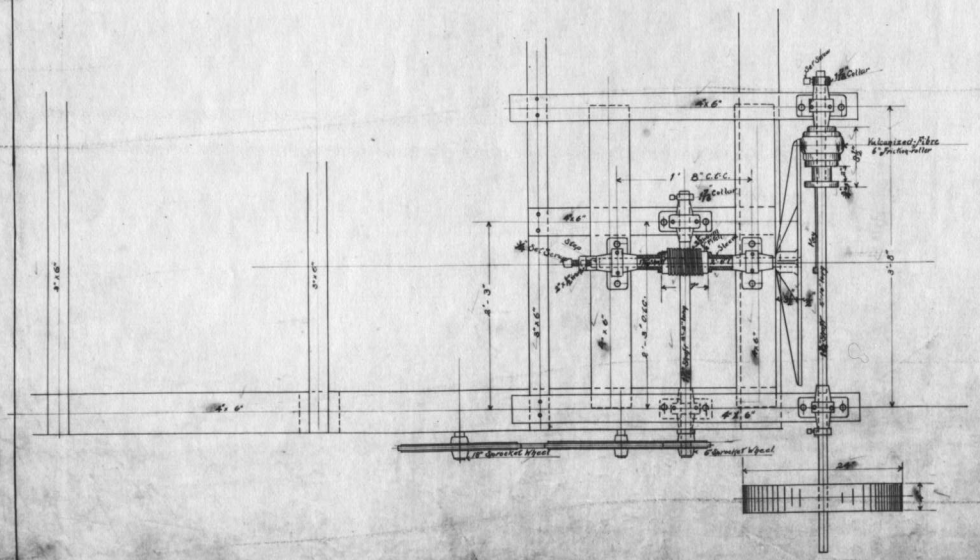
Sk. 72 - p75







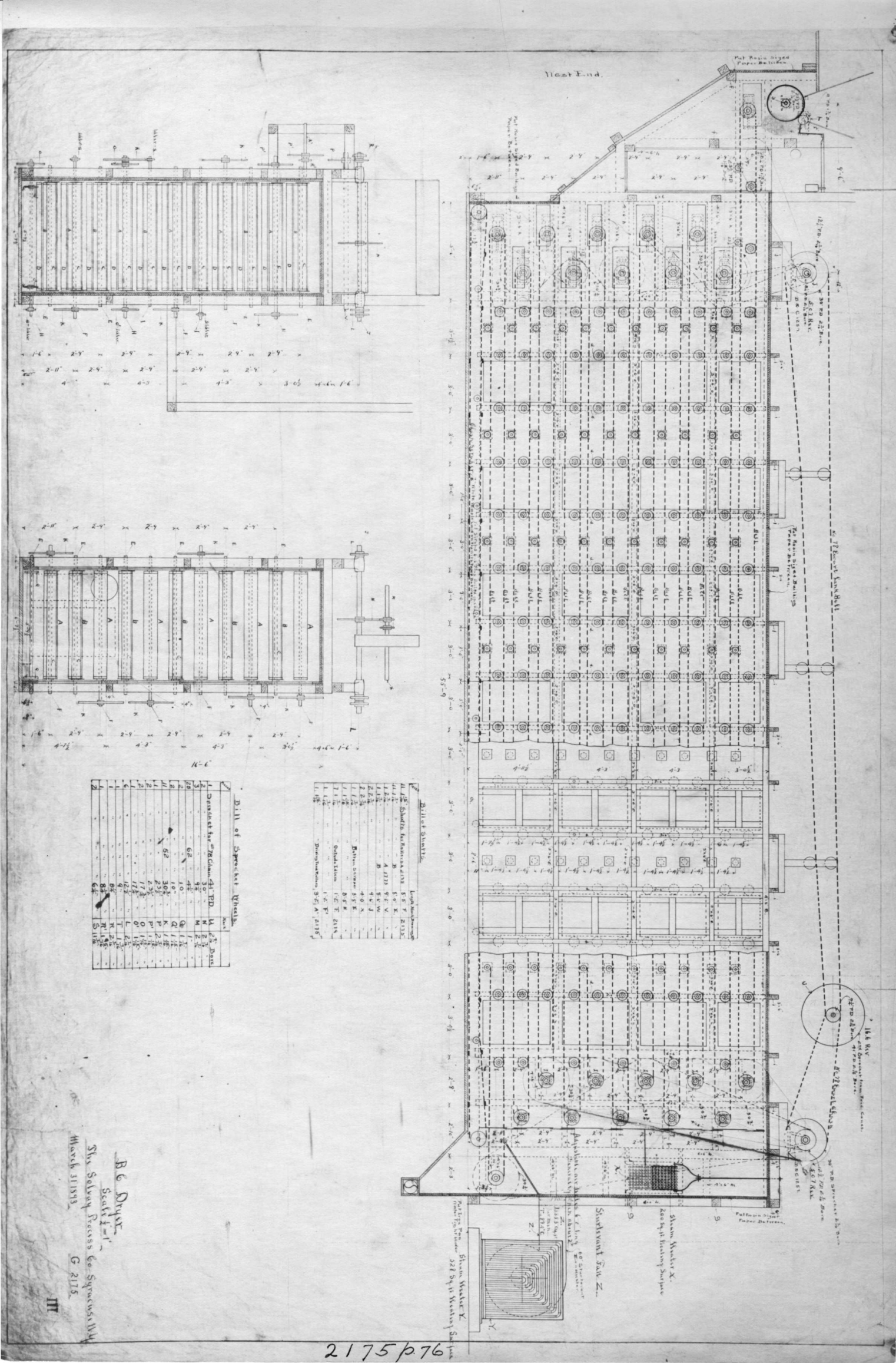
Detail of Roller Bearings for B.C. Dryer.
Full Size.

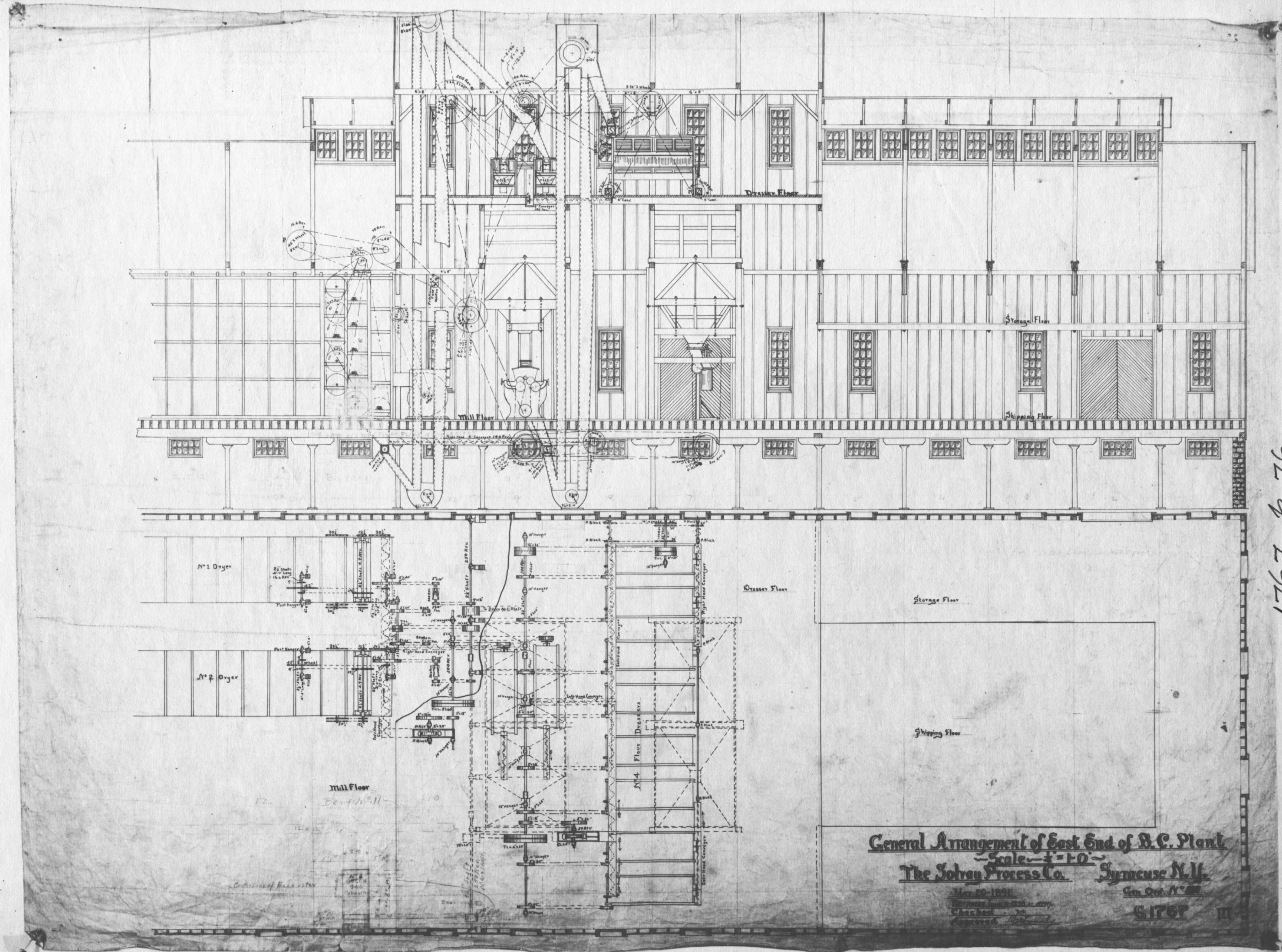


		Revolutions per min.	per hour
If	Friction Roller	Zero	1800
	Plate's Worm	Max. 150	9000
		Min. 50	3000
	Gear 6" Sprocket Wheel	Max. 1	60
		Min. ⅓	20
	4" Roller in Dryer	Max. 1	60
		Min. ⅓	20
	Maxim. Speed of Belt 5,760 feet per hour.		
	Min. " " " 1920 " "		

Adjustable Driving Device
for B.C. Plant
Kan. - Minneapolis
The Colvay Process Co. Syracuse, N.Y.
Sept. 20, 1886.
C-1244.
RETRACED-BY- A. Ch. Jr.
CHECKED-BY- H.W.G.
APPROVED-BY- P.C.

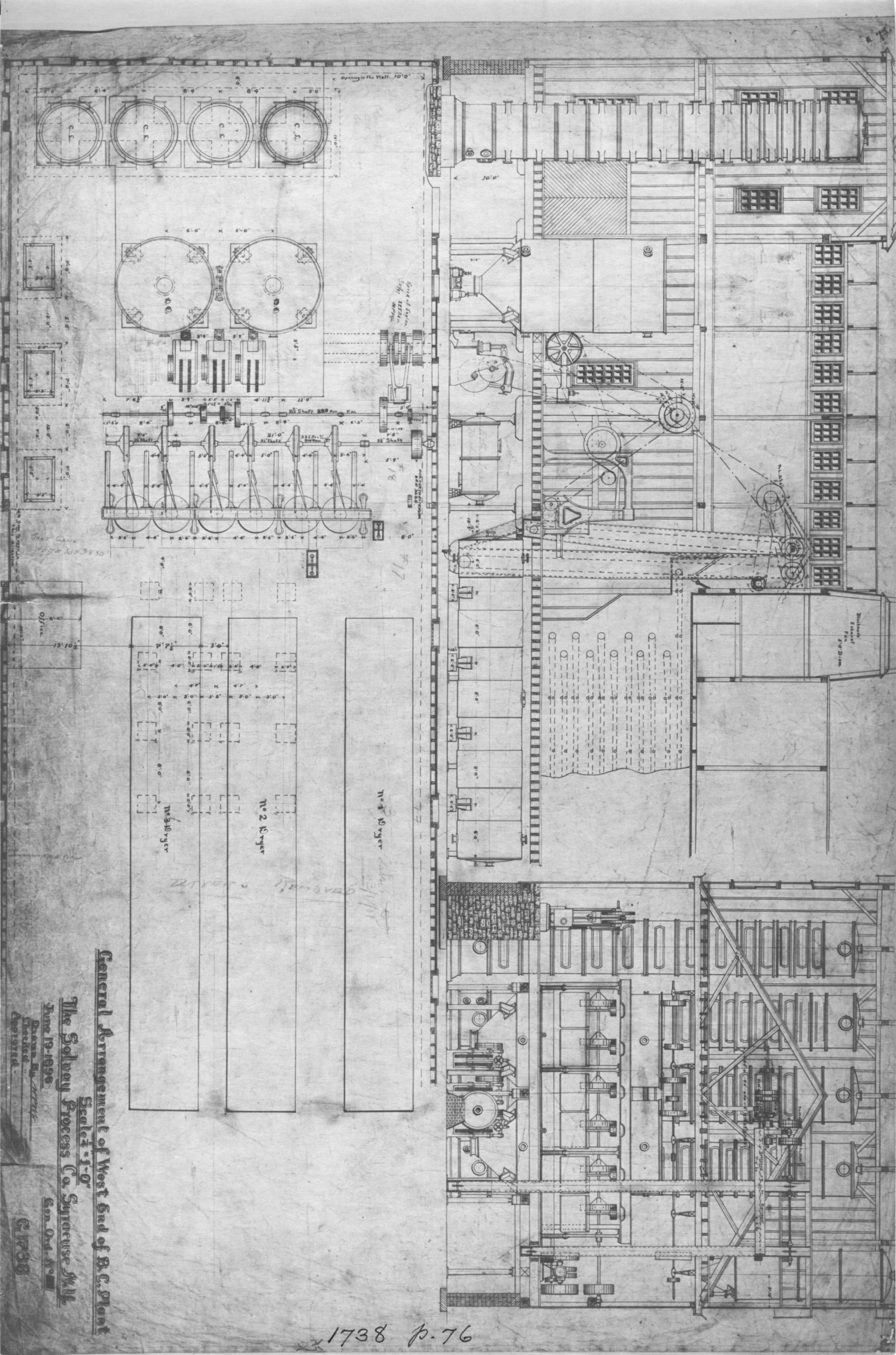
9.cl 14421


West End.
Bill of Sprocket Wheels.
Bill of Shafts.
Sturtevant Fan Z.
Sturtevant Fan Y.
Sturtevant Fan X.
B.G. Drum
Scale 1/4"=1'
The Solvay Process Co. Syracuse N.Y.
March 31 1919.
G 2175
III
2175 p 76



1767 p. 76

BC 5-1767



General Arrangement of West End of B.C. Plant

The Solvay Process Co. Syracuse N.Y.

June 19-1899

Drawn By

Checked

Approved

Con. Ord. No.

C.F.38

1738 p. 76

West End View

Section through West End Looking East

Section through East End Looking East

Transverse Section through Paint

Sections End view of B.C. Building

Scale 1/4"

The Solvay Process Co. Syracuse, NY

Drawn by

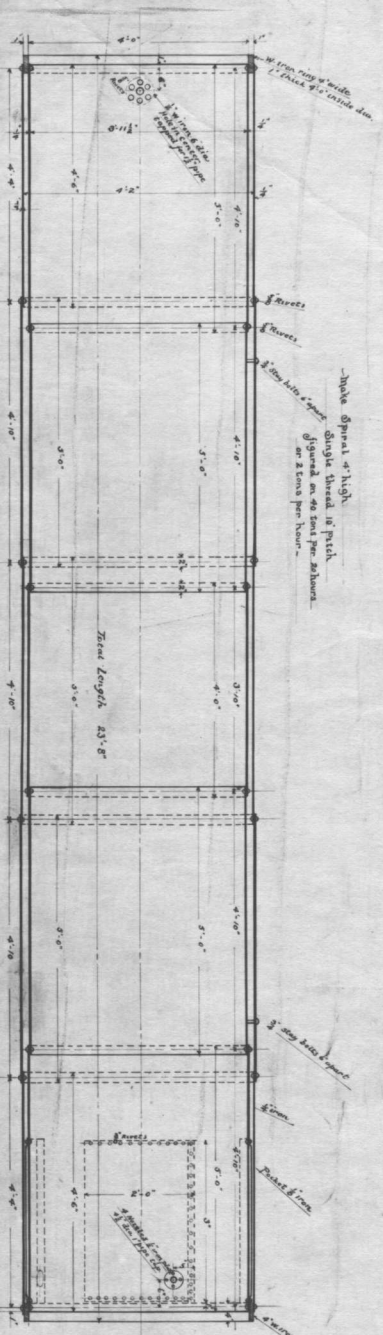
Traced by

Checked by

Date

1237

1237 p. 77



Details of B.C. Revolver

Scale 1" = one foot

The Solvay Process Co. Syracuse N.Y.

Drawn [illegible] May 23 1887

Retraced by GT May 13 1904

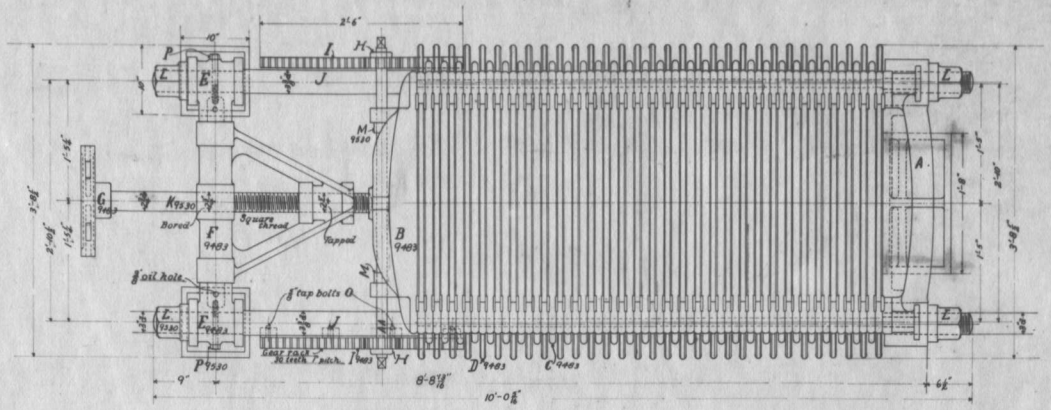
Checked [illegible]

Approved [illegible]

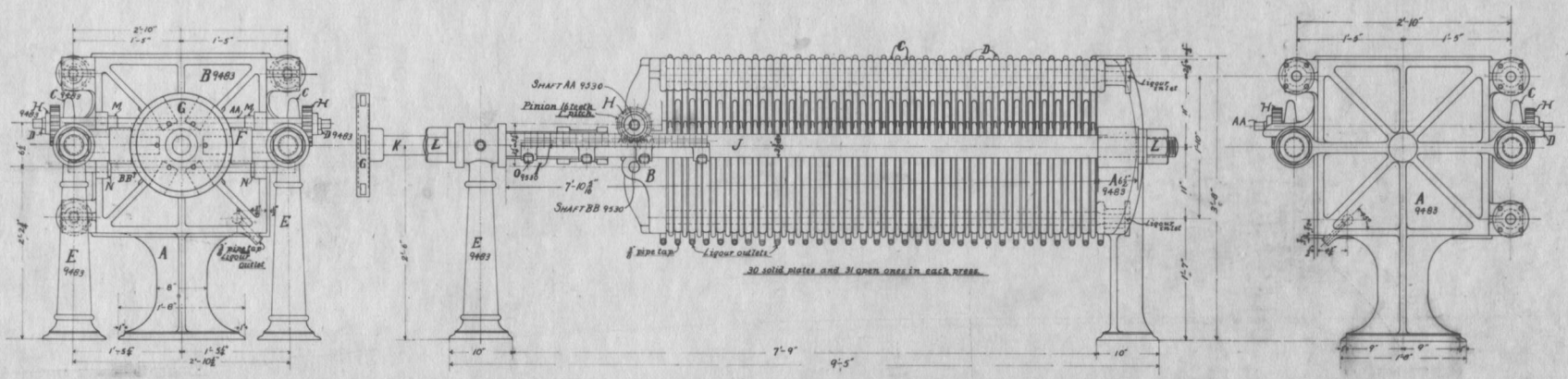
G-1284

Note: for furnace dec 1880

1284 p. 77



PLAN



FRONT ELEVATION

SIDE ELEVATION

30 solid plates and 31 open ones in each press.

REAR ELEVATION

for Johnson Filter press no 9597.

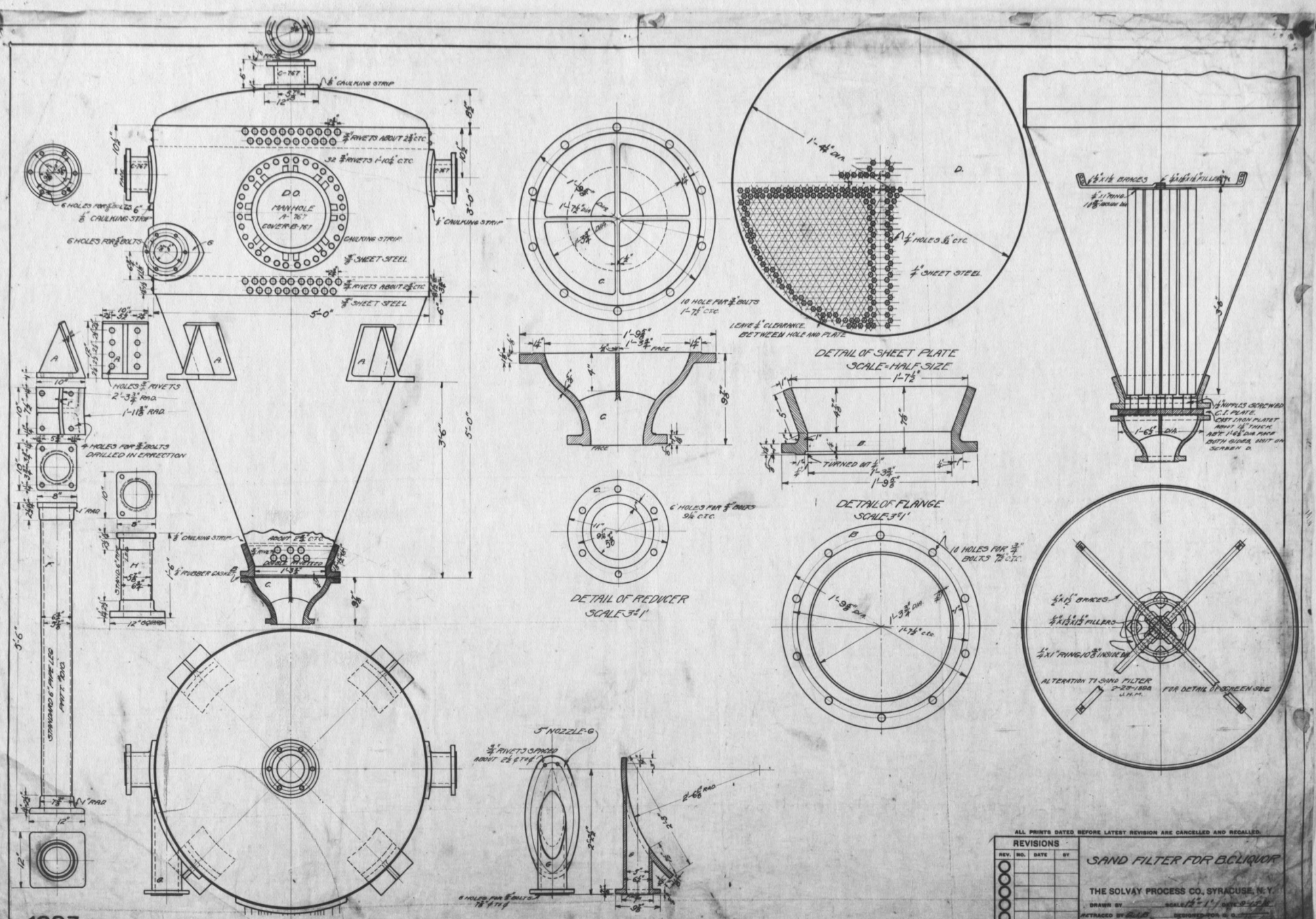
Drawn and dimensioned from measurements
For cast iron details of pinion see 9530
For wrought iron details see 9530

BC DEPT.
GENERAL DRAWING OF 24"50
PUSEY & JONES FILTER PRESS
THE SOLVAY PROCESS CO. SYRACUSE, N.Y.
DRAWN BY M.J.R. SCALE 1"=1'-0" DATE OCT 21-1904
TRACED BY M.J.R.
CHECKED BY
APPROVED BY

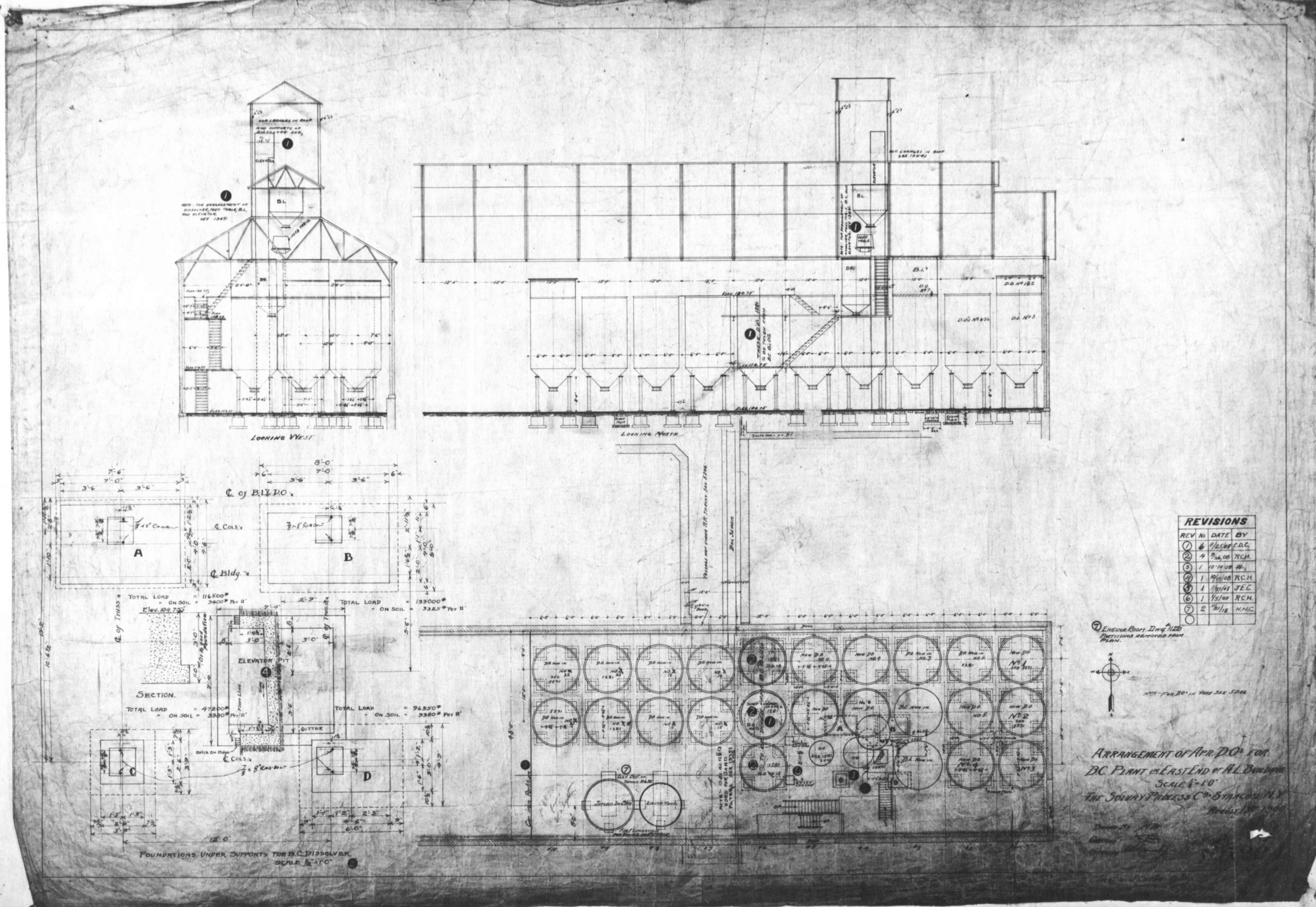
G-9514.

BC cf. 9514

9514 cf. 79


DETAIL OF SHEET PLATE
SCALE = HALF SIZE
DETAIL OF REDUCER
SCALE 3"=1'
DETAIL OF FLANGE
SCALE 3"=1'
SAND FILTER FOR B.C. LIQUOR
THE SOLVAY PROCESS CO., SYRACUSE, N.Y.
G-1837
ALL PRINTS DATED BEFORE LATEST REVISION ARE CANCELLED AND RECALLED.
REVISIONS
REV. NO. DATE BY

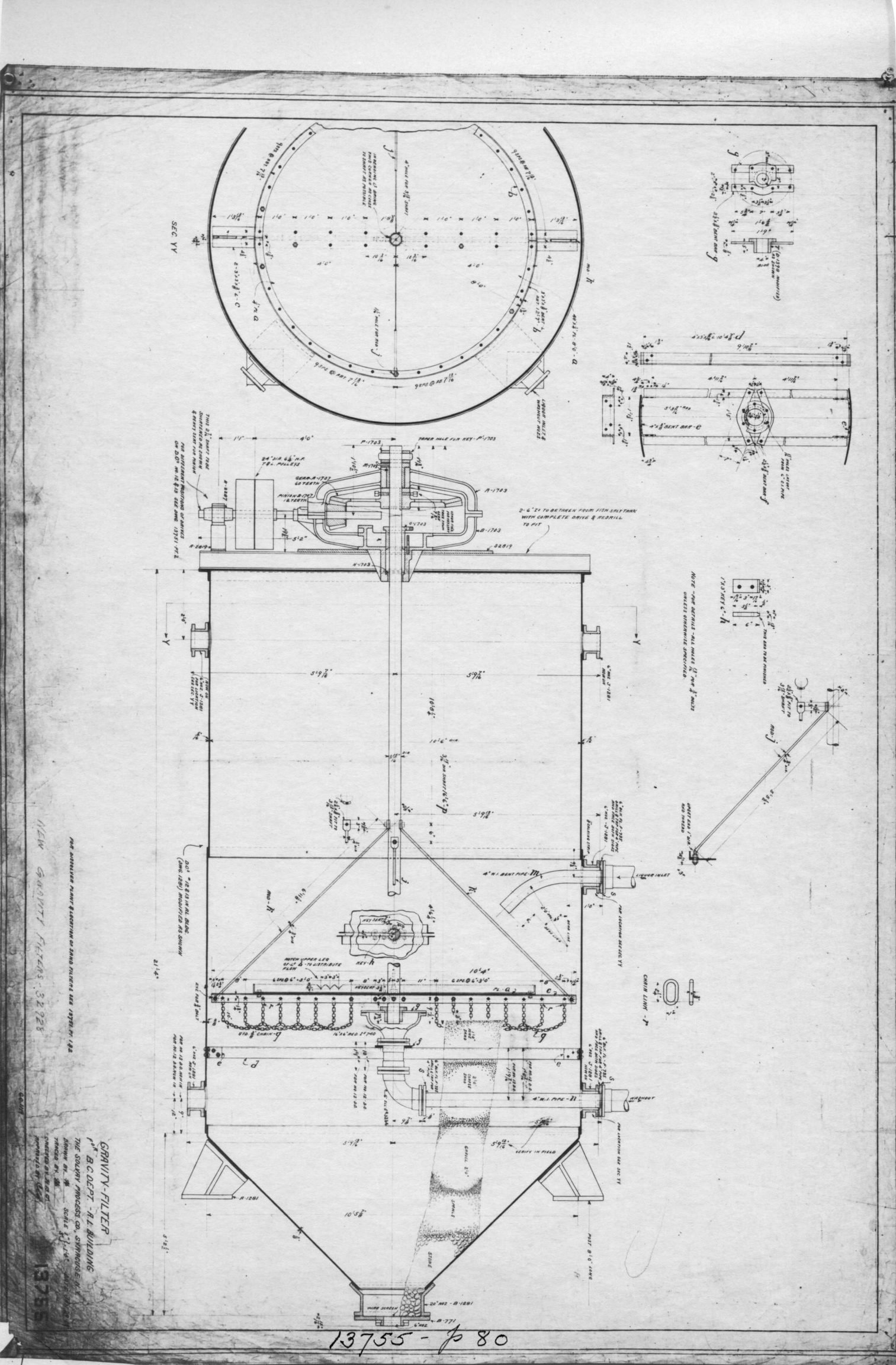
1837 p.79

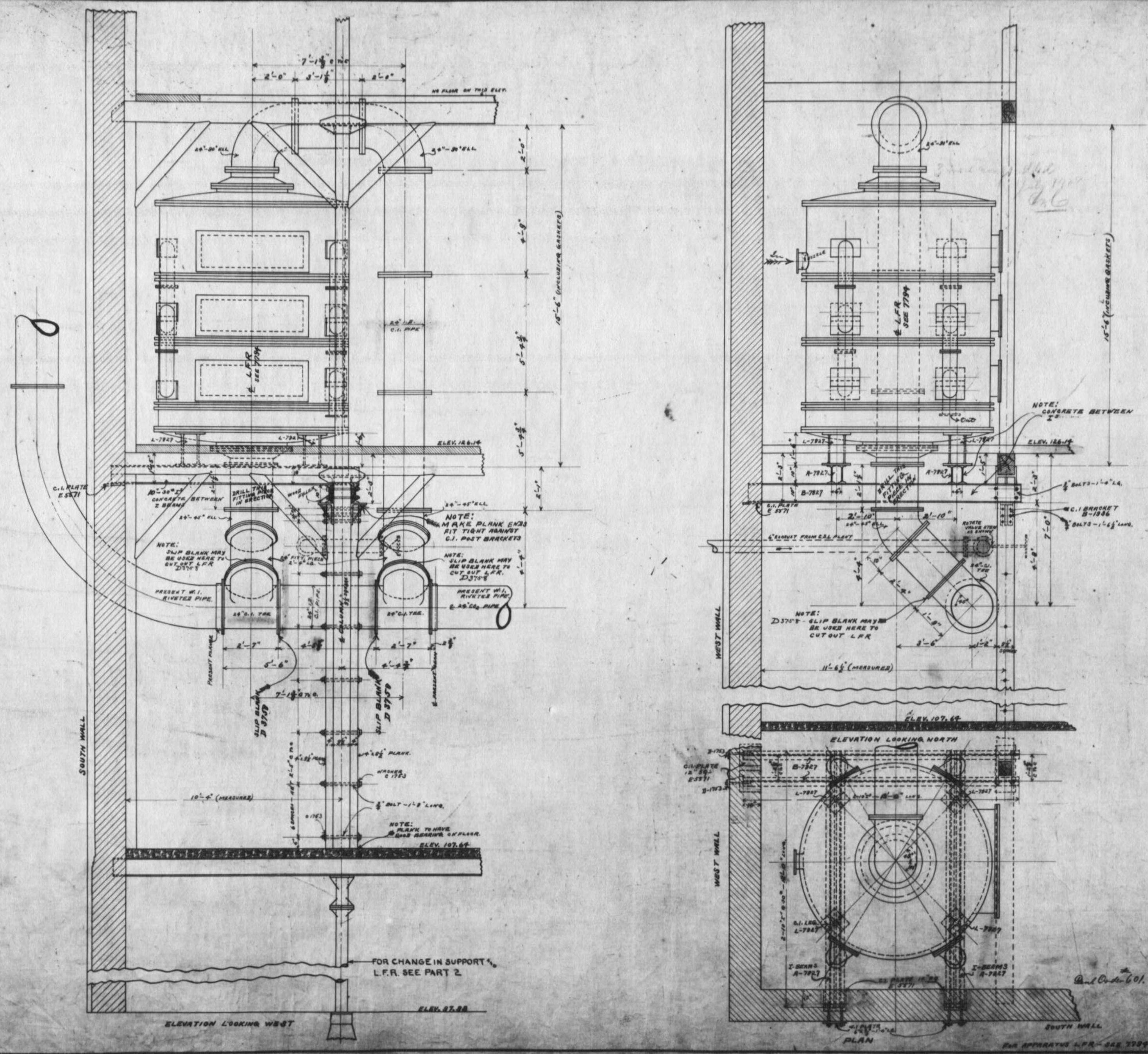


LOOKING WEST
LOOKING NORTH
C of BLDG. D.O.
A
B
C
D
SECTION.
ELEVATOR PIT
TOTAL LOAD = 116500#
" ON SOIL = 3400# Per □'
TOTAL LOAD = 133000#
" ON SOIL = 3325# Per □'
TOTAL LOAD = 47200#
" ON SOIL = 3380# Per □'
TOTAL LOAD = 96350#
" ON SOIL = 3380# Per □'
FOUNDATIONS UNDER SUPPORTS FOR B.C. DISSOLVER
SCALE ½"=1'-0"
REVISIONS
REV | No | DATE | BY
1 | 6 | 8/25/08 | C.D.C.
2 | 4 | 9/26,08 | R.C.H.
3 | 1 | 10-14-08 |
4 | 1 | 10/15/08 | R.C.H.
5 | 1 | 11/27/08 | J.E.C.
6 | 1 | 1/5/09 | R.C.H.
7 | 2 | 11/21/18 | H.N.C.
7 ENGINE ROOM DWG. # 11220
PARTITIONS REMOVED FROM PLAN.
NOTE - FOR D.O.s IN YARD SEE 5206.
ARRANGEMENT OF APR. D.O.s FOR
B.C. PLANT IN EAST END OF A.L. BUILDING
SCALE ⅛"=1'-0"
THE SOLVAY PROCESS C°. SYRACUSE N.Y.
AUGUST 13th 190

5224 p. 79

D.O. Nº 12-13-14
D.O. Nº 12 & 13 TO BE USED FOR GRAVITY FILTERS 13755
D.O. Nº 10
NO. 2 DISSOLVER 13561
NO. 1 DISSOLVER 13560
BAY Nº 7
BAY Nº 6
BAY Nº 5
BAY Nº 4
BAY Nº 3
ELEVATOR 13537
ELEVATION LOOKING NORTH
D.O. Nº 12 NOW IN TO BE USED FOR GRAVITY FILTERS
ELEVATOR 13571
D.O. Nº 13 NOW IN TO BE USED FOR GRAVITY FILTERS
D.O. Nº 14
45 TOOTH SPROCKET
ELEVATION LOOKING WEST
REVISIONS


SEC YY
SEC XX
GRAVITY-FILTER
B.C. DEPT. - A.L. BUILDINGS
THE SOLVAY PROCESS CO., SYRACUSE, N.Y.
NEW GRAVITY FILTERS - 32228
13755
13755 - P 80



CHANGED SEE PART 2

ARRANGEMENT OF APPARATUS
LFR
FOR BC PLANT

THE SOLVAY PROCESS CO. SYRACUSE N.Y.

DRAWN BY F.B.K. SCALE $\frac{1}{2}$" = 1'-0" DATE

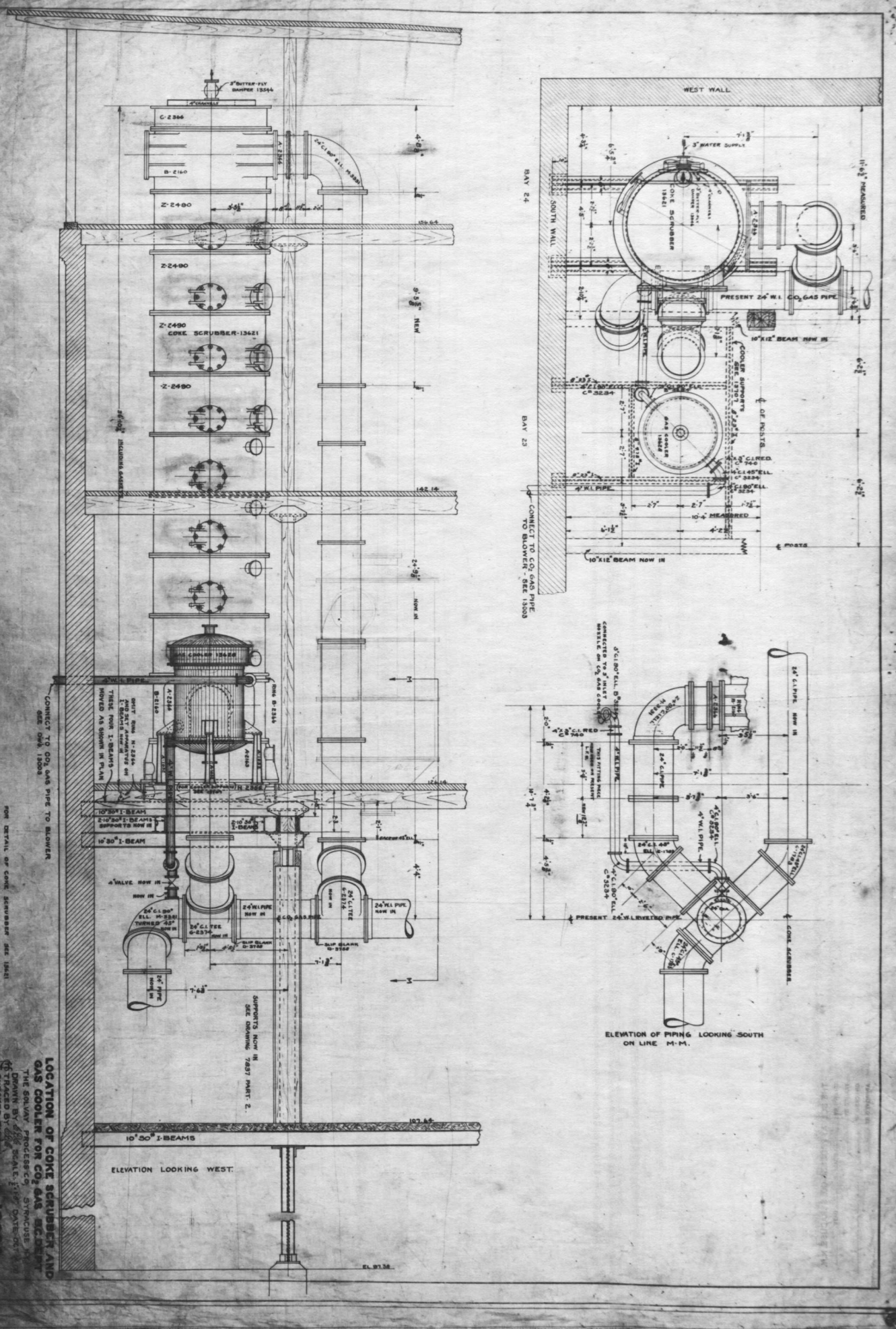
TRACED BY F.B.K.

CHECKED BY

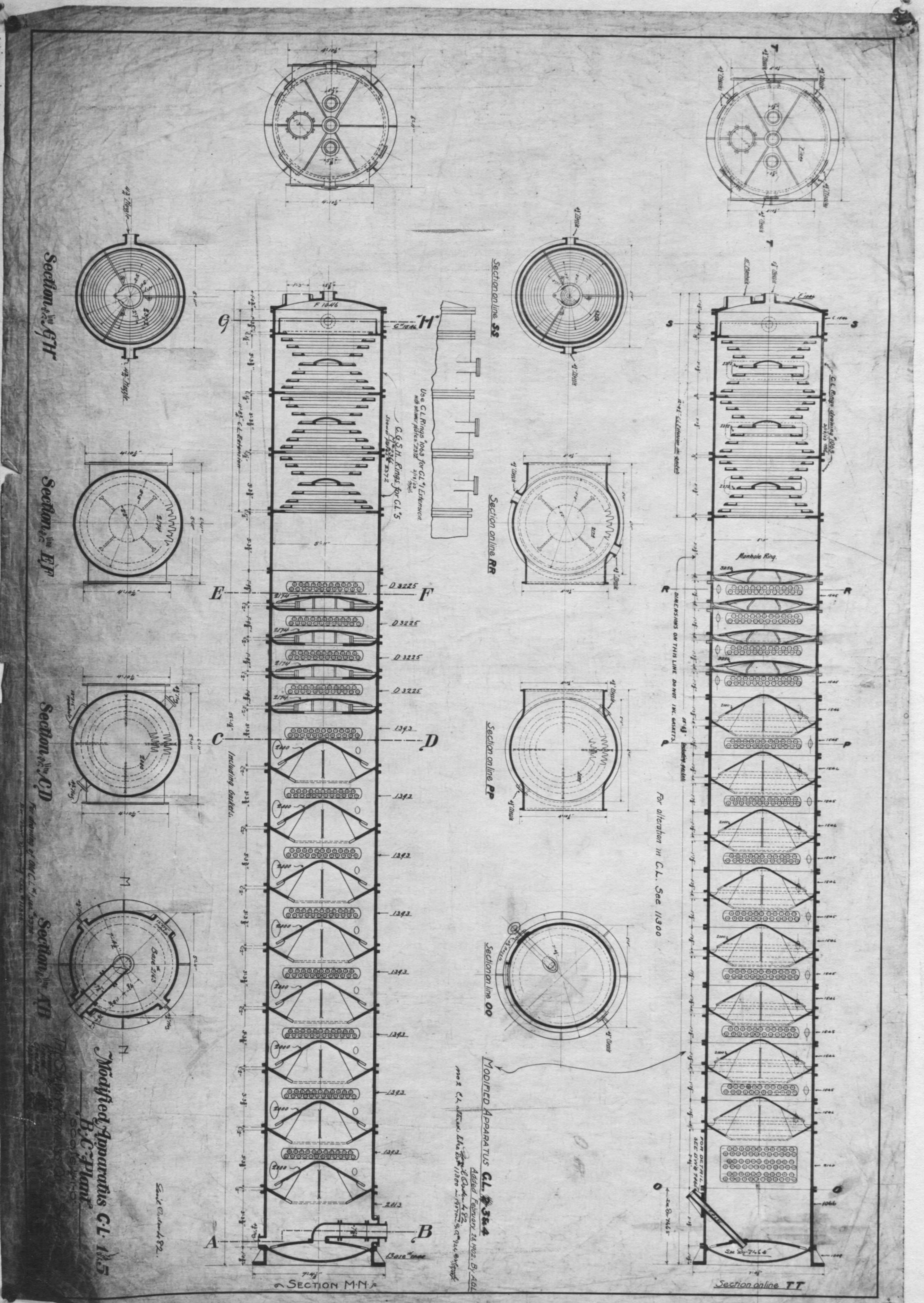
APPROVED BY

G-7837

7837 p. 80

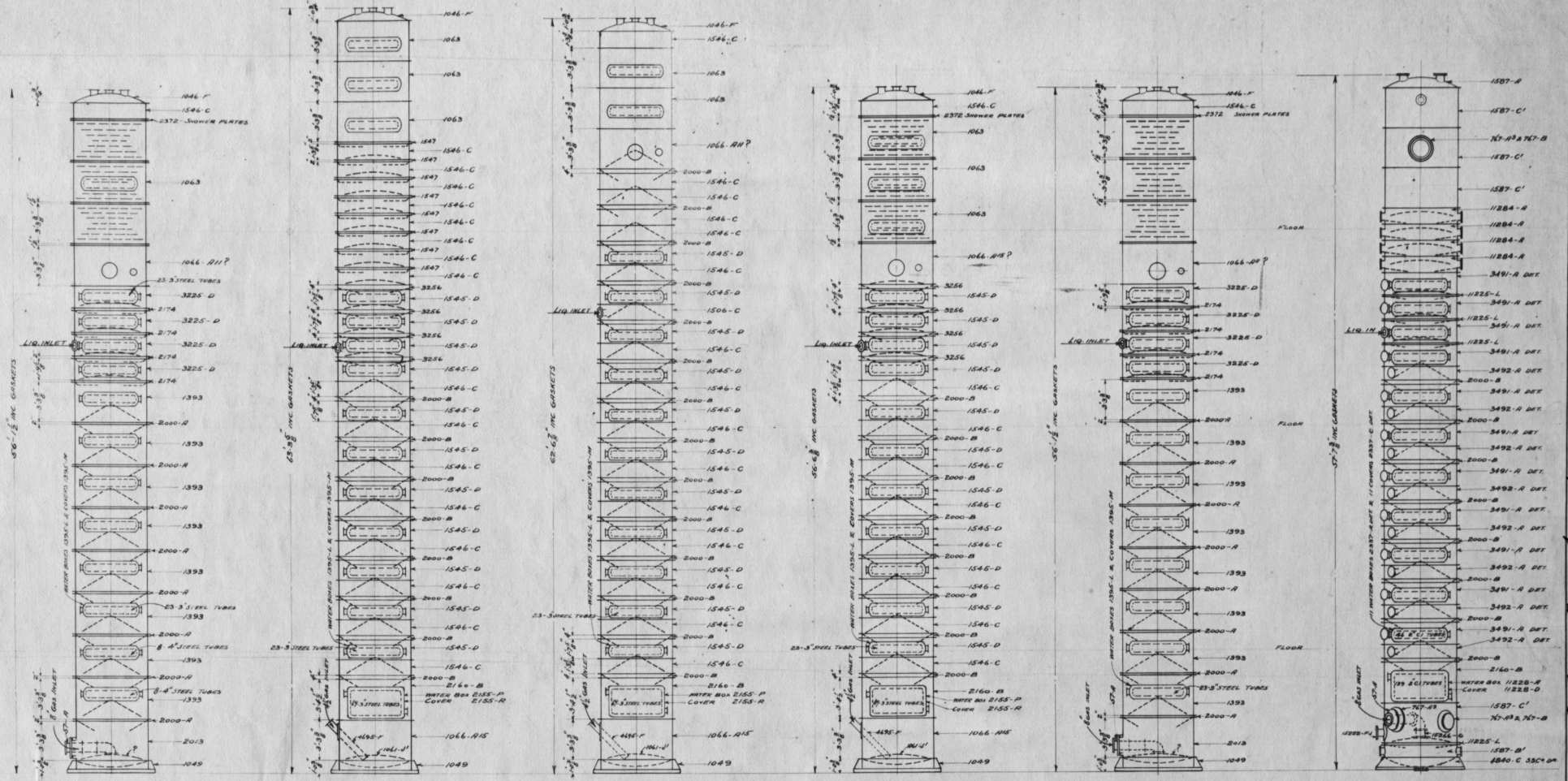

WEST WALL
SOUTH WALL
BAY 24
BAY 23
COKE SCRUBBER 13621
GAS COOLER 13624
PRESENT 24" W.I. CO2 GAS PIPE
10"X12" BEAM NOW IN
CONNECT TO CO2 GAS PIPE TO BLOWER SEE DWG. 13003
10"X12" BEAM NOW IN
ELEVATION OF PIPING LOOKING SOUTH ON LINE M-M.
10"30" I-BEAMS
ELEVATION LOOKING WEST.
LOCATION OF COKE SCRUBBER AND GAS COOLER FOR CO2 GAS SCRUBBER
THE SOLVAY PROCESS CO. SYRACUSE, N.Y.
13626

13626 p. 80



Modified Apparatus C.L. 1&5
"B.C. Plant"
Section on line GH
Section on line EF
Section on line CD
Section on line AB
Section M-N
Including Gaskets
Section on line SS
Section on line RR
Section on line PP
Section on line OO
Modified Apparatus C.L. #3&4
For alteration in C.L. See 11300
Manhole Ring
Section on line TT

5731 p.81



29173 p. 82

ALL PRINTS DATED BEFORE LATEST REVISION ARE CANCELLED AND RECALLED.

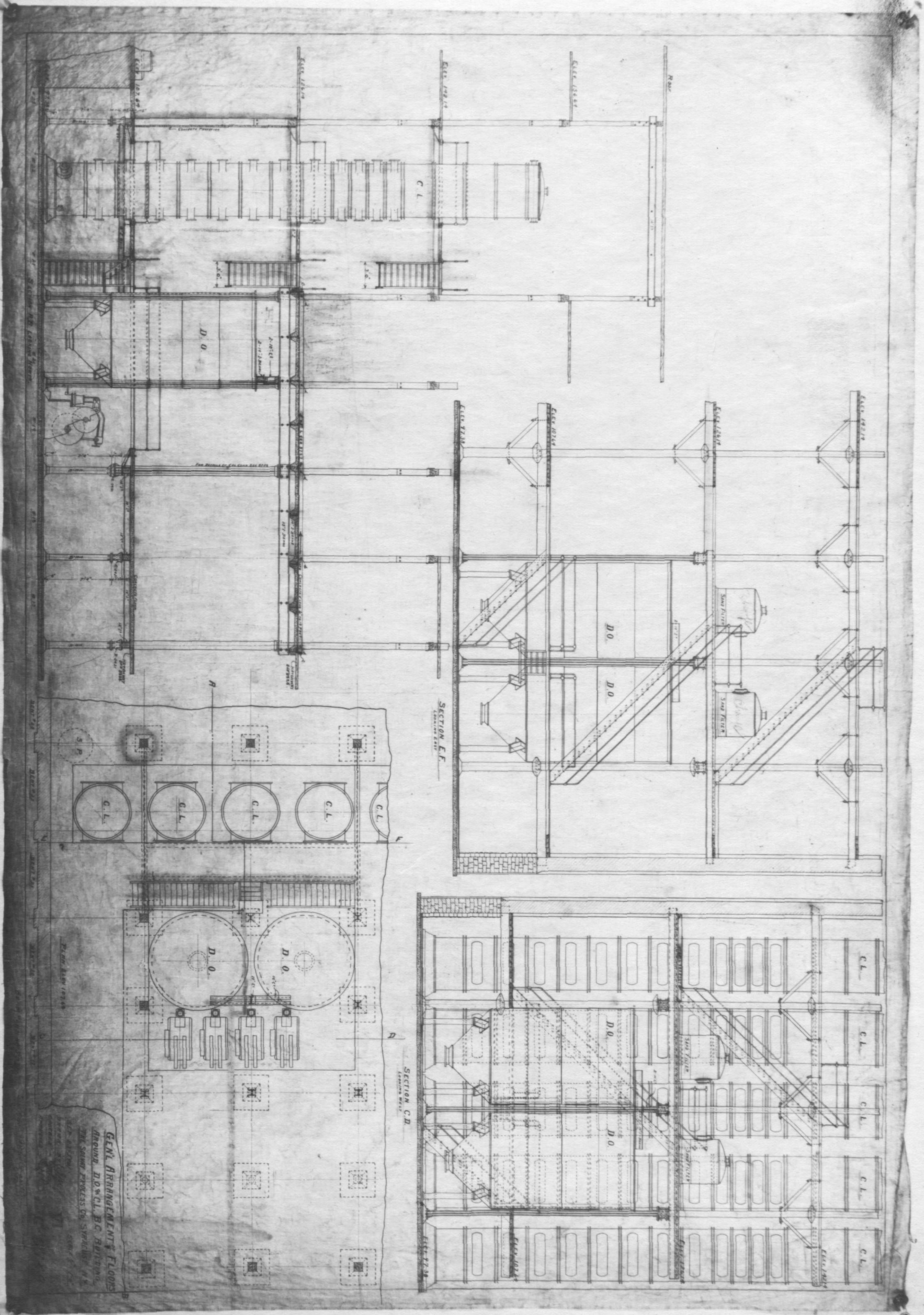
REVISIONS			
REV.	No.	DATE	BY

COMPARISON OF BC-CL's 1 TO 6 INCLUSIVE
AS ERECTED IN BC BLD'G - BC DEPT.
THE SOLVAY PROCESS CO., SYRACUSE, N.Y.

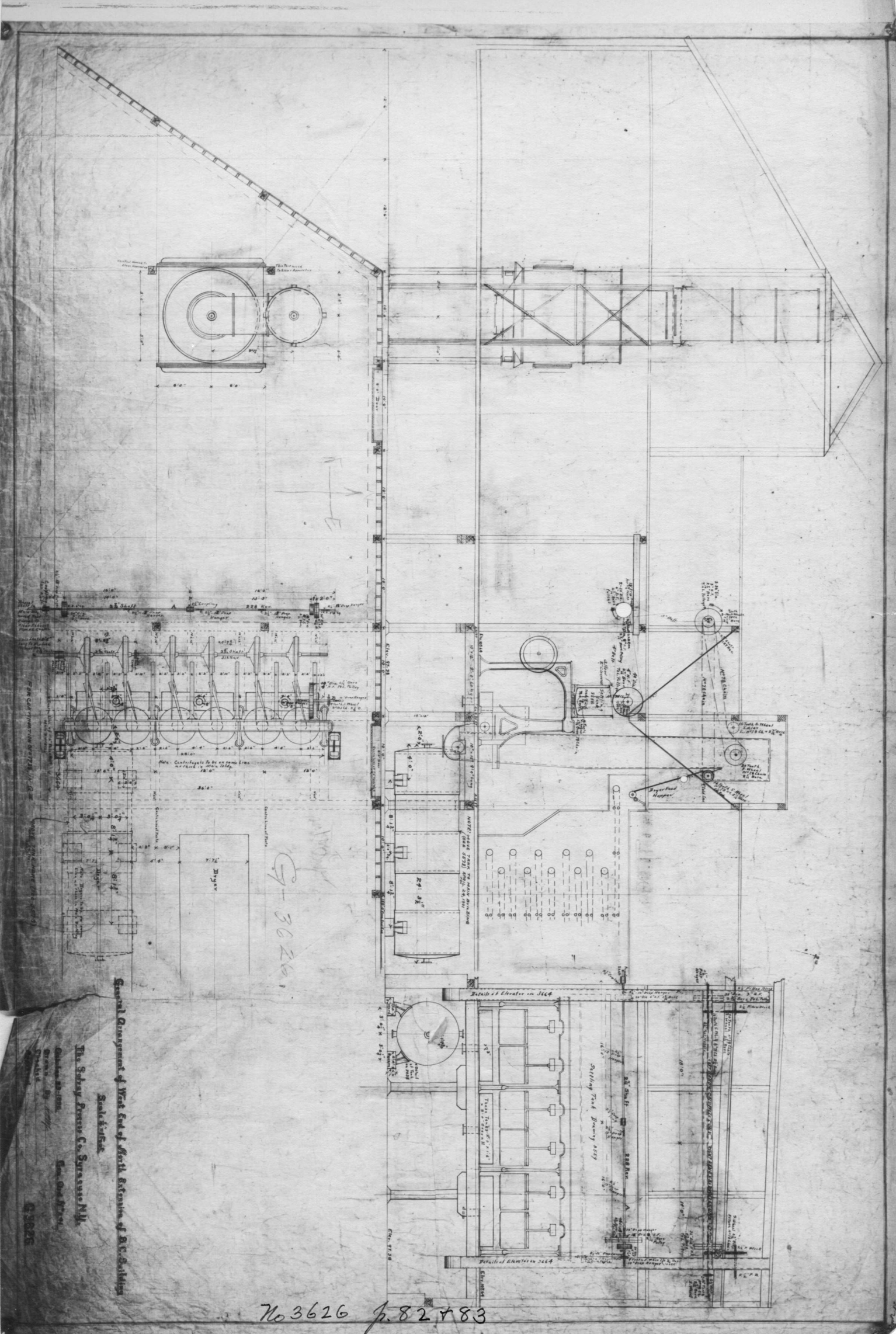
DRAWN BY GCL SCALE 1/4"-1'-0" DATE 5-2-1919
TRACED BY GCL DESIGNED FOR G.O. A191
CHECKED BY GCL
APPROVED BY CLG

29173

29173


GEN'L ARRANGEMENT OF FLOORS
AROUND D.O. & C.L. BC. BUILDING
THE SOLVAY PROCESS CO. SYRACUSE N.Y.
SECTION E.F.
LOOKING EAST
SECTION C.D.
LOOKING WEST
D.O.
C.L.
SAND FILTER
ROOF

5749 p. 82



General Arrangement of West End of North Extension of B.C. Building

Scale 1/8 Inch.

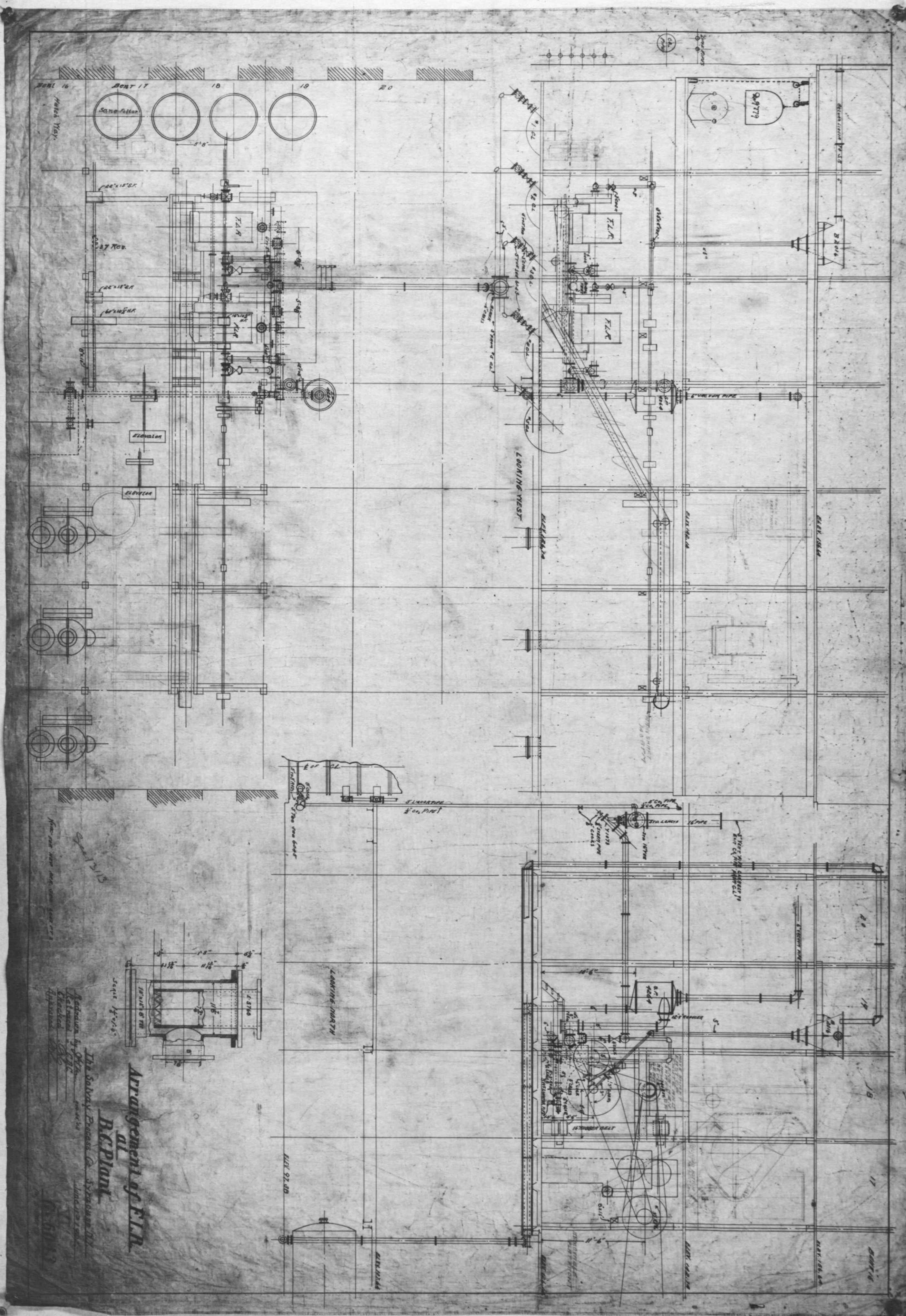
The Sebrey Process Co. Syracuse N.Y.

Checked By

Scale

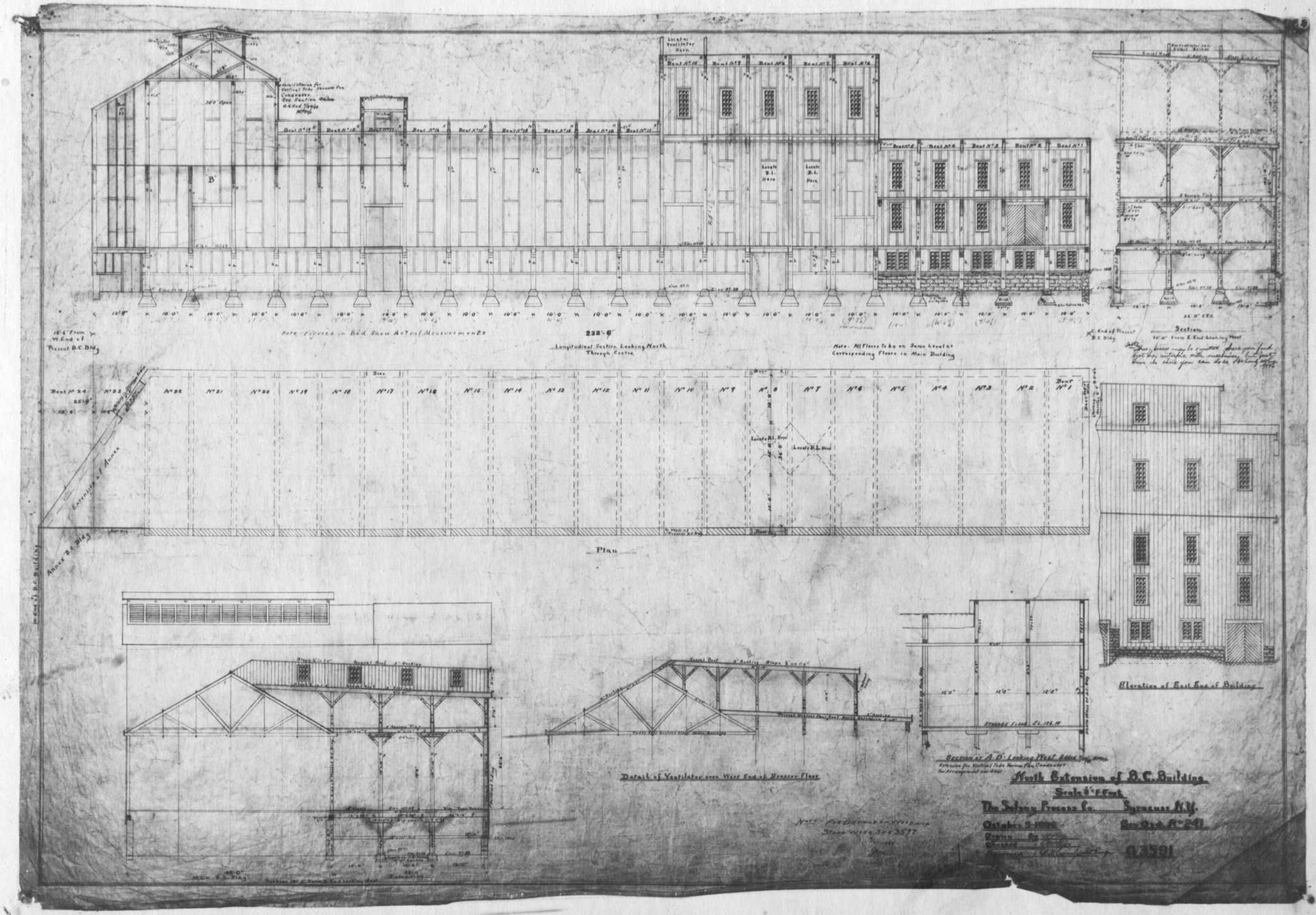
G 3626

No 3626 p. 82 & 83

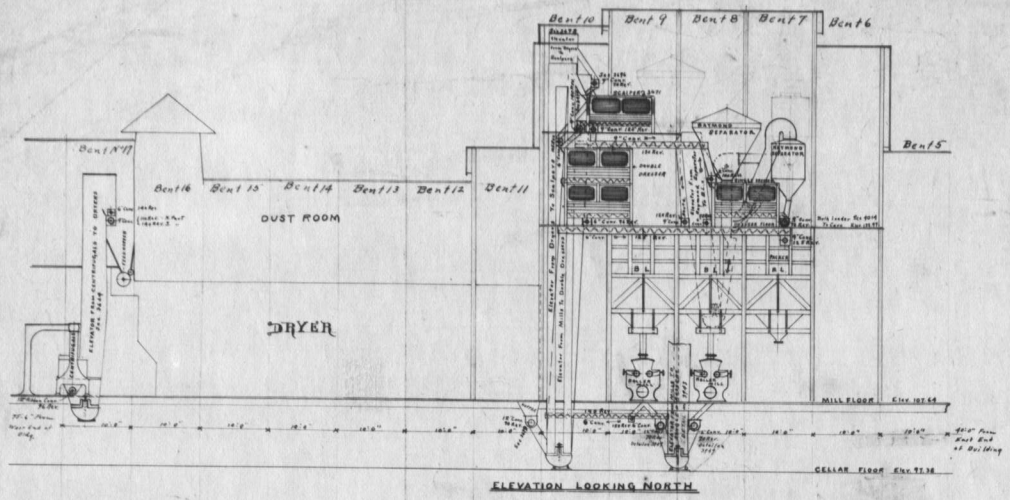


Arrangement of F.L.R.
at
B.C. Plant
The Solvay Process Co. Syracuse N.Y.
Redrawn by
Retraced
Checked
Approved
Scale
LOOKING WEST
LOOKING NORTH
Elevator
Sand Filter
F.L.R.

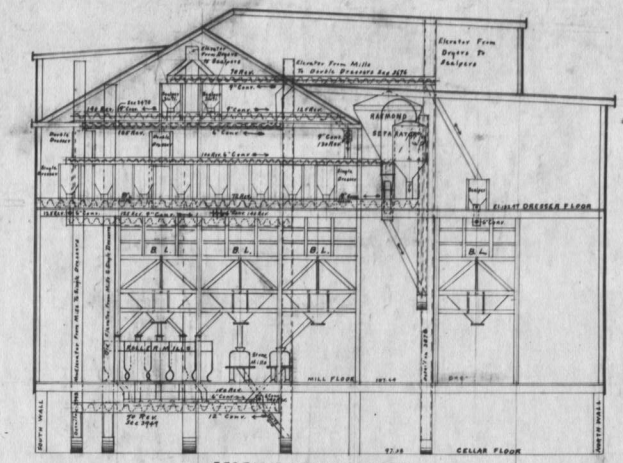
6043-p 83


Note—Figures in Red Show Actual Measurements
222'-9"
Longitudinal Section Looking North Through Centre
Note—All Floors To be on Same Level as Corresponding Floors in Main Building
Section
Plan
Elevation of East End of Building
Detail of Ventilator over West End of Brewery Floor
North Extension of B.C. Building
Scale 8' = 1 Inch
The Solvay Process Co. Syracuse N.Y.
October 5 1898
Dwg No A-241
3591

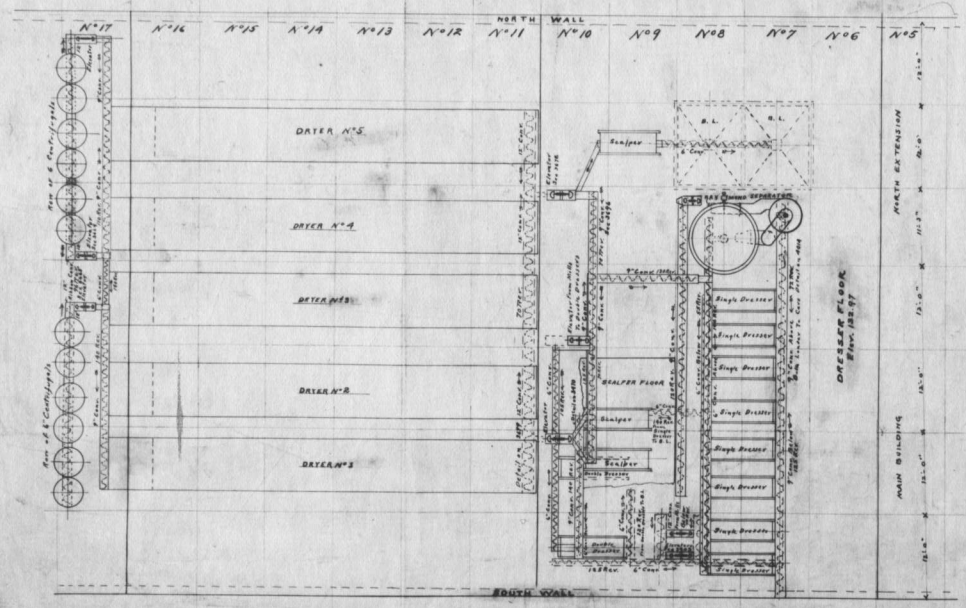
3591 - p. 83.



ELEVATION LOOKING NORTH



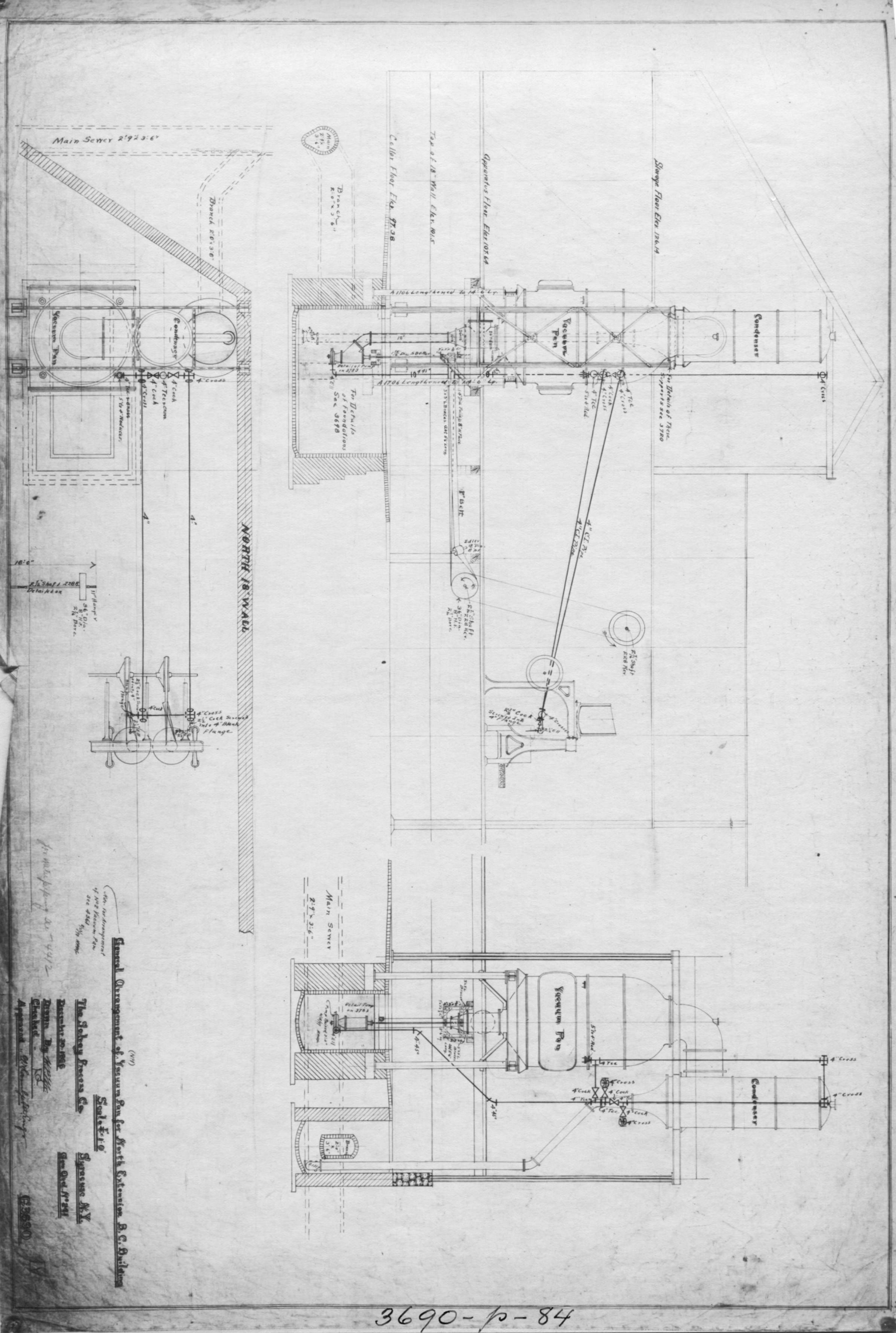
SECTION LOOKING WEST



PLAN

General Plan of Conveyor System B.C. Plant
Scale 1" = 10'
The Solvay Process Co. Syracuse N.Y.
July 12. 1927
Drawn By H.P.W.
Checked
Approved

3992 - sh. 48



General Arrangement of Vacuum Pan for North Extension B.C.A. Building

Scale 1/2" = 1'-0"

The Sharp Process Co. Syracuse, N.Y.

December 20, 1916

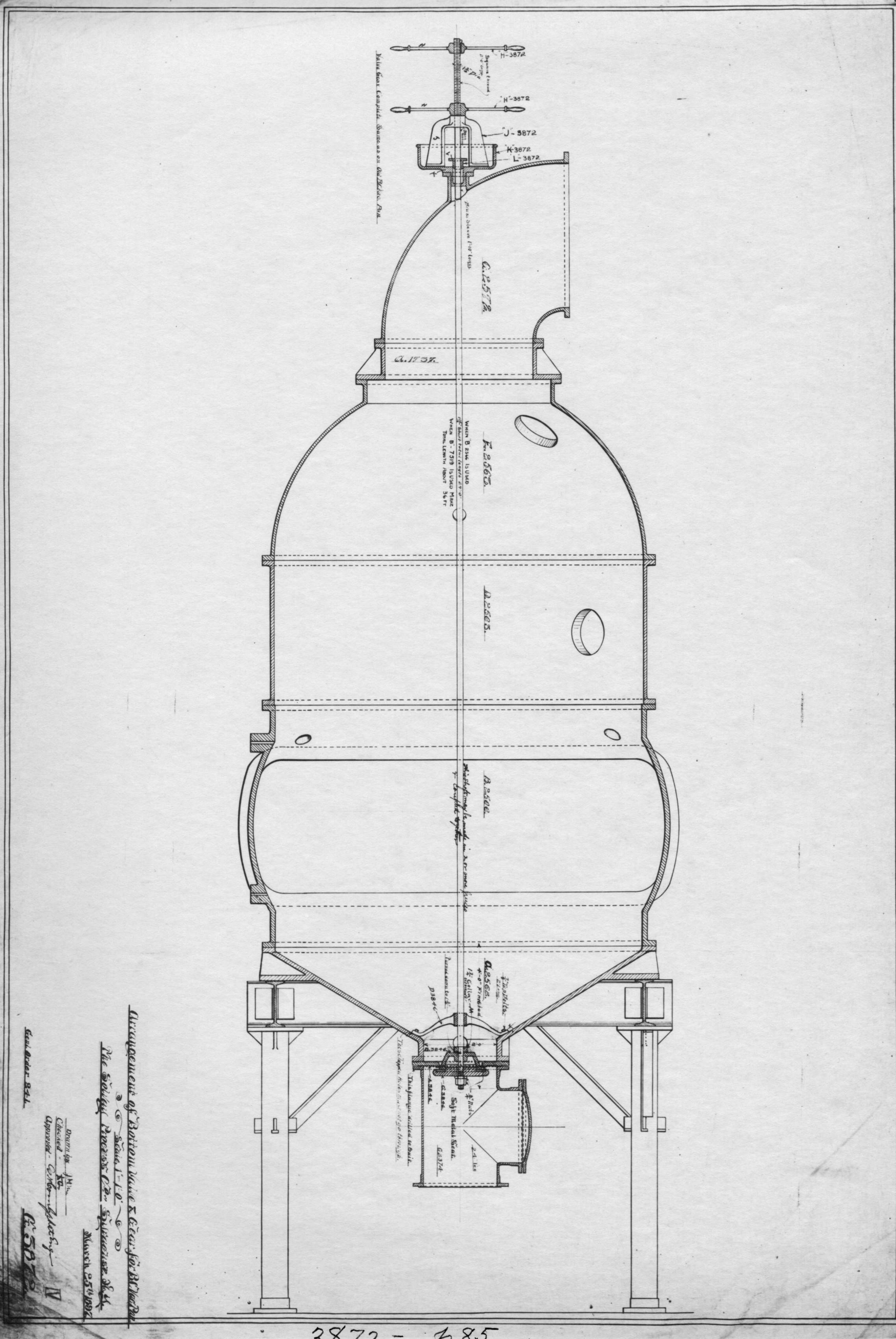
Drawn By [illegible]

Checked [illegible]

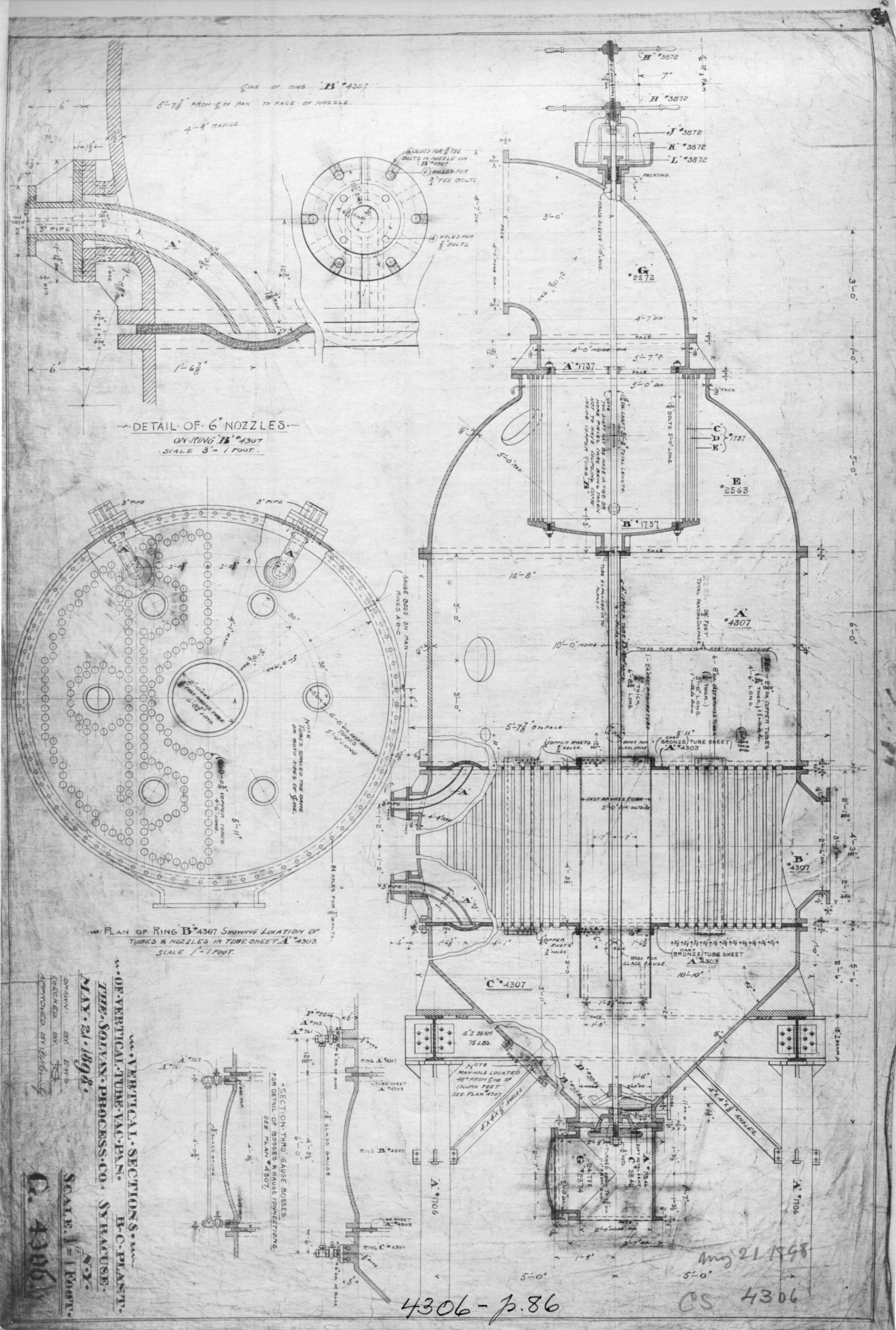
Approved [illegible]

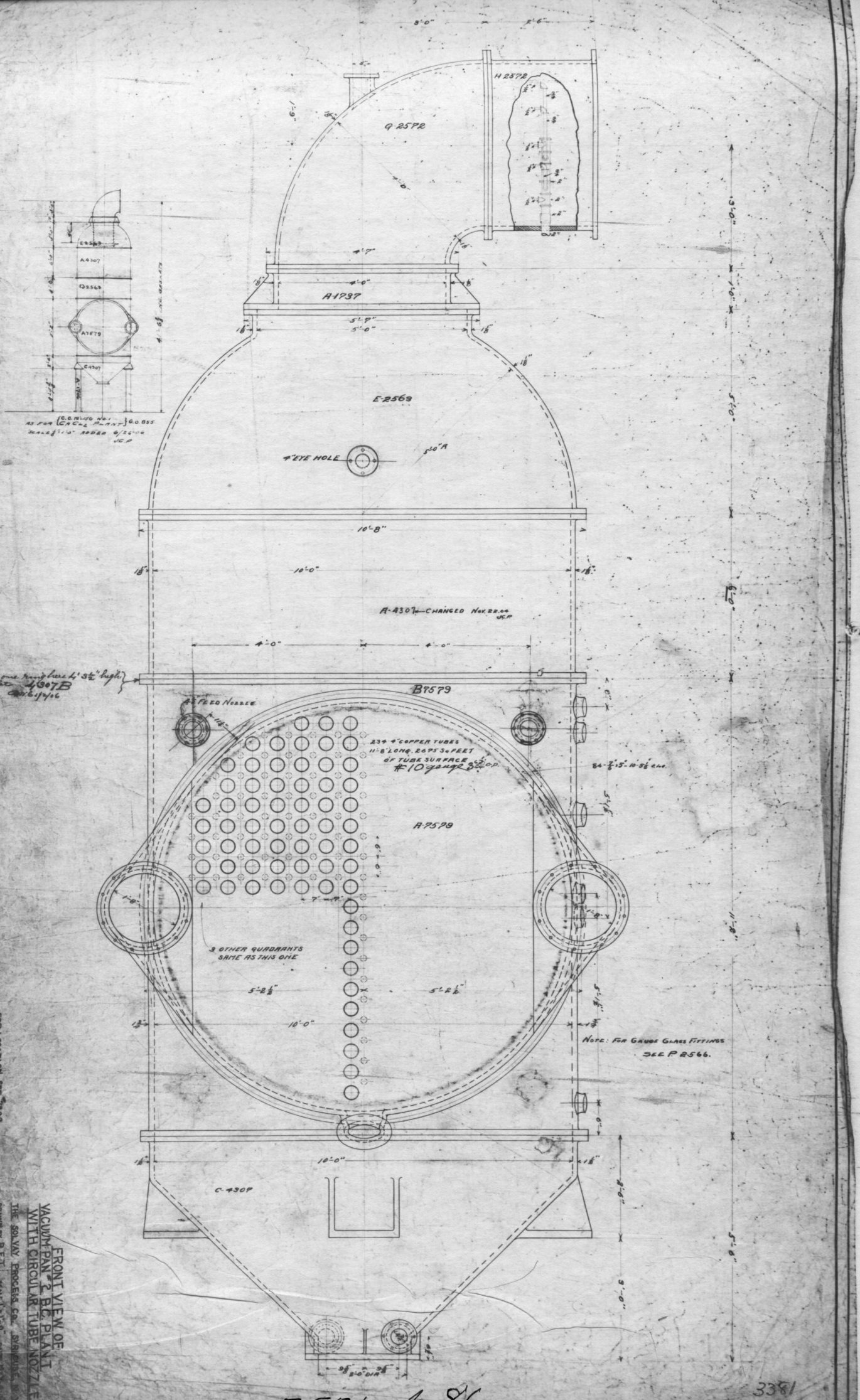
C5800

3690-p-84


H-3872
H-3872
J-3872
K-3872
L-3872
A.1737.
F.2567.
D.2563.
B.2566
Arrangement of Bottom Valve & Gear for B.C. Vac. Pan
Scale 1" = 1'-0"
The Solvay Process Co. Syracuse N.Y.
Drawn by
Checked
Approved
Genl Order 841.
C.3872
IV

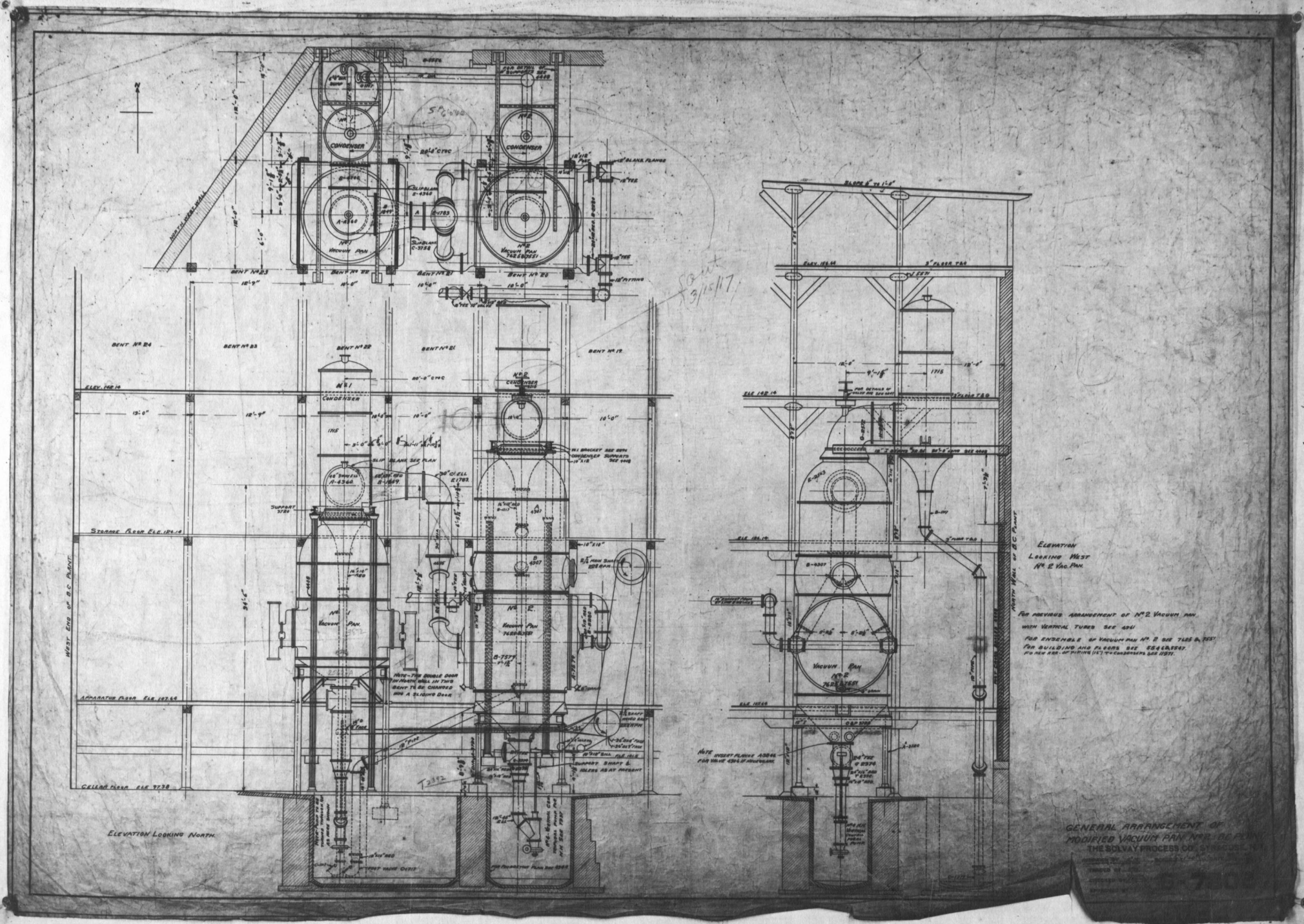
3872- p85

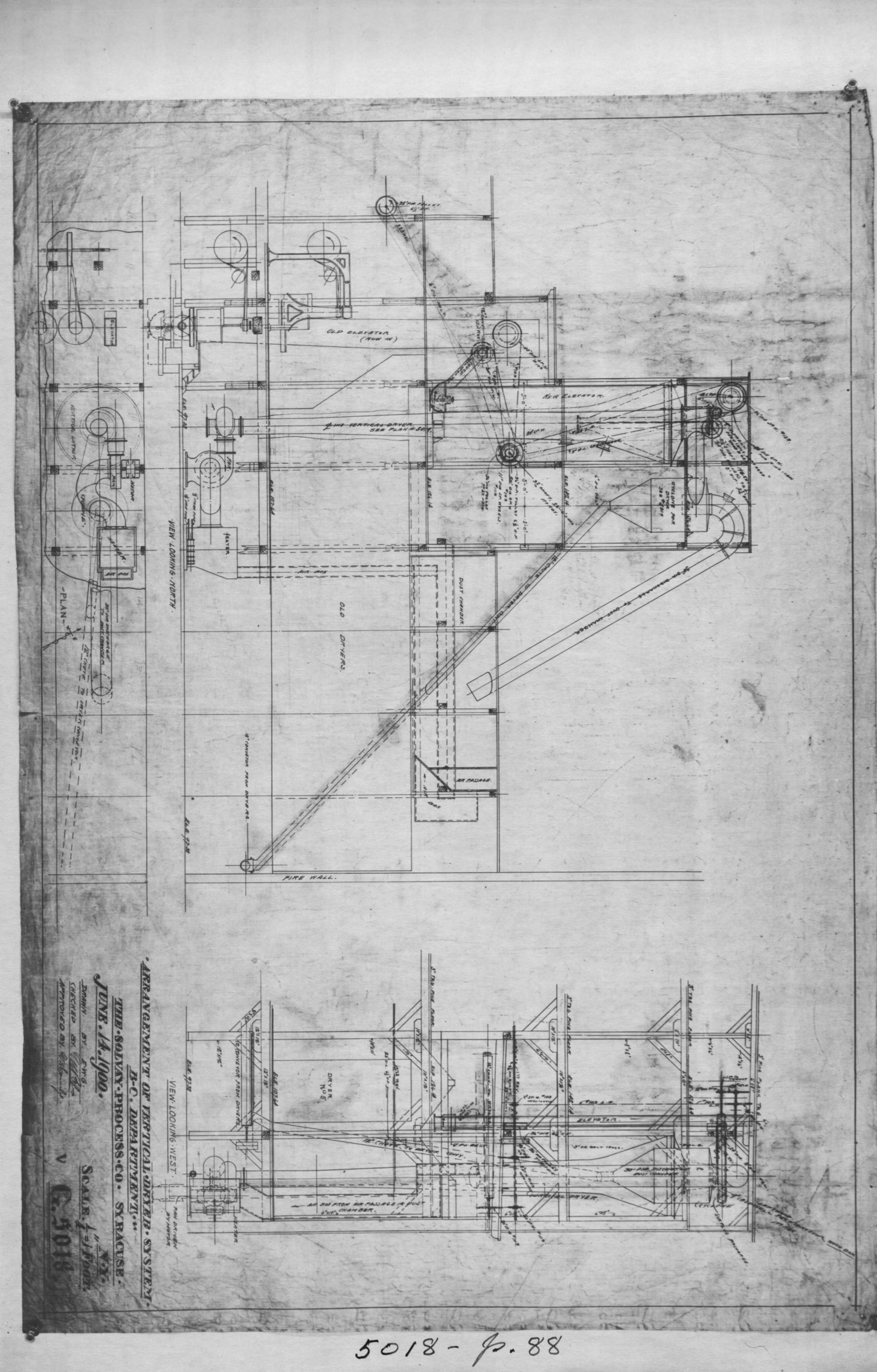

DETAIL OF 6" NOZZLES
ON RING "B" #4307
SCALE 3" = 1 FOOT.
PLAN OF RING "B" #4307 SHOWING LOCATION OF TUBES & NOZZLES IN TUBE SHEET "A" #4303
SCALE 1" = 1 FOOT.
SECTION THRO' GAUGE BOSSES
FOR DETAIL OF BOSSES & GAUGE CONNECTIONS SEE PLAN #4307
VERTICAL SECTIONS
OF VERTICAL TUBE VAC. PAN
THE SOLVAY PROCESS CO. SYRACUSE N.Y.
MAY 21 1898
DRAWN BY
TRACED BY
APPROVED BY
SCALE 1" = 1 FOOT
C. 4306
4306-p.86
May 21 1898
CS 4306



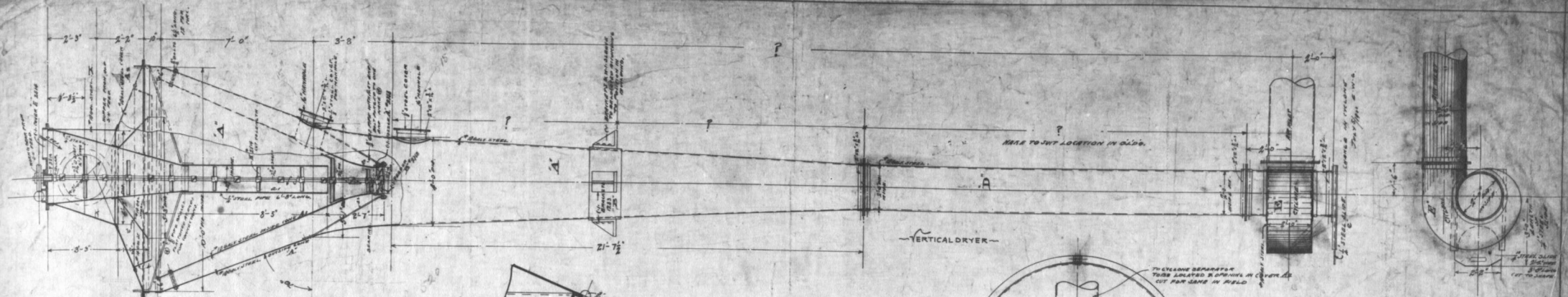
7.551 p. 86

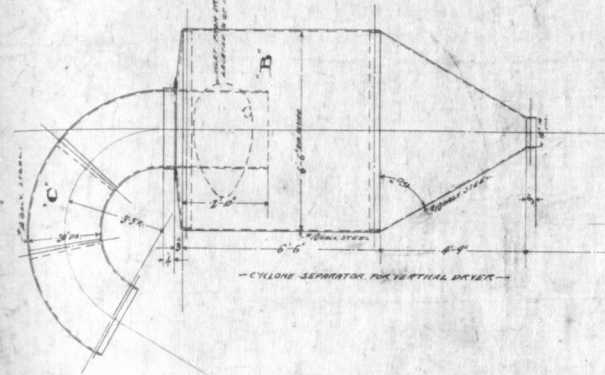
3381

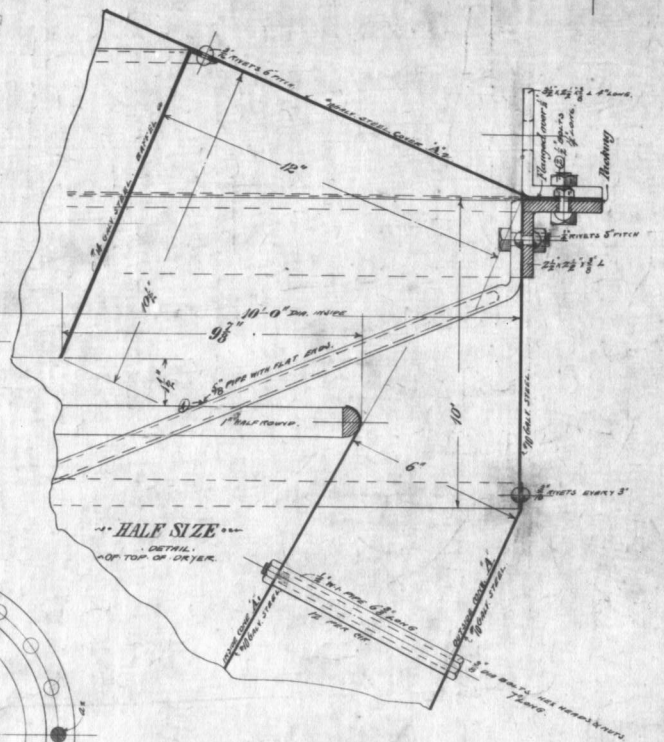

ELEVATION LOOKING NORTH.
ELEVATION LOOKING WEST NO. 2 VAC. PAN.
GENERAL ARRANGEMENT OF MODIFIED VACUUM PAN NO. 2 AT
THE SOLVAY PROCESS CO. SYRACUSE, N.Y.
No. 7802 f. 86

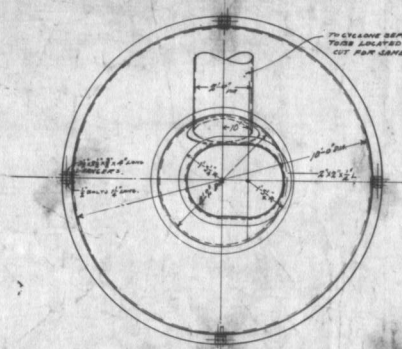

OLD ELEVATOR (NOW IN)
NEW ELEVATOR.
2 LINE VERTICAL DRYER. SEE PLAN & SECT.
OLD DRYERS.
DUST CHAMBER.
AIR PASSAGE.
FIRE WALL.
VIEW LOOKING NORTH.
PLAN
DRYER Nos 5
ELEVATOR.
VIEW LOOKING WEST.
"ARRANGEMENT OF VERTICAL DRYER SYSTEM"
B-C. DEPARTMENT.
THE SOLVAY PROCESS CO. SYRACUSE.
JUNE 14, 1900.
SCALE 1/4" = 1 FOOT.
C. 5018

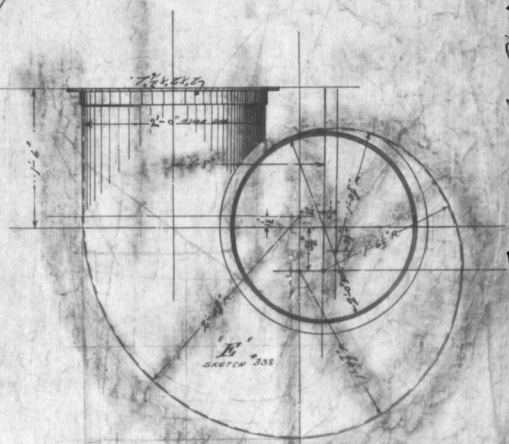
5018 - p. 88

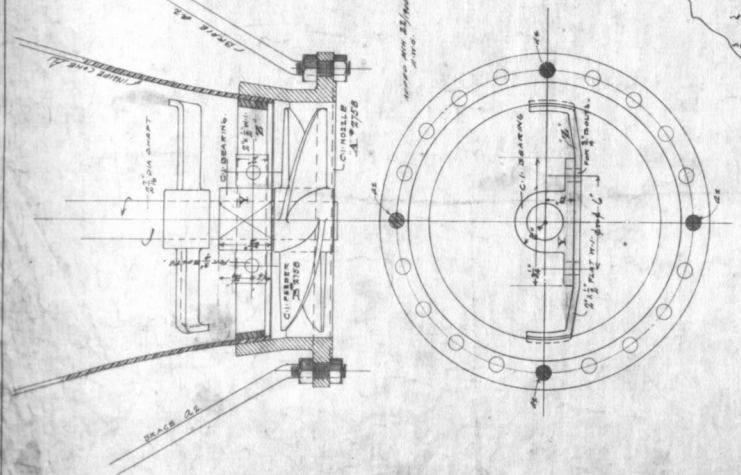










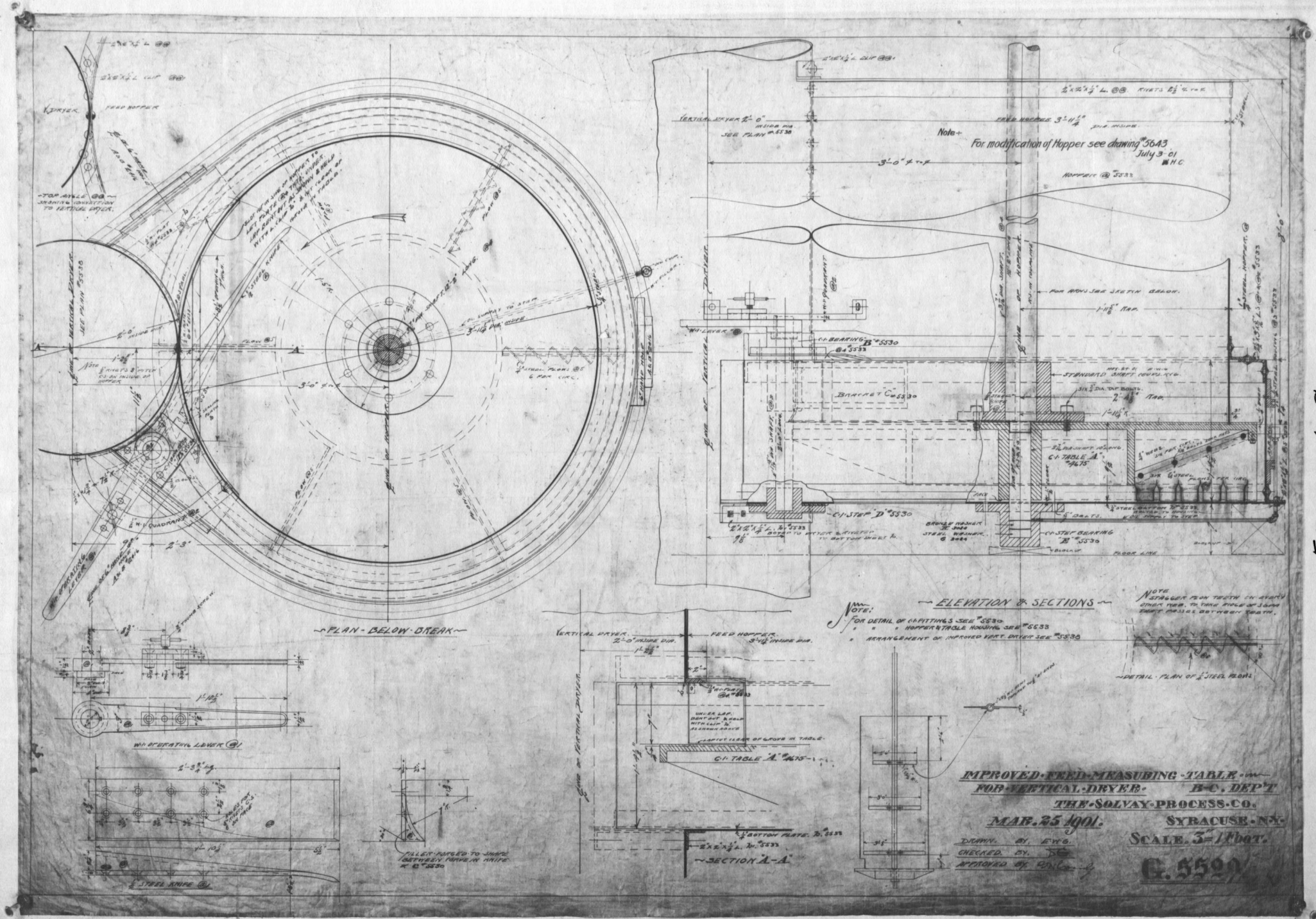


5019 - 1.88

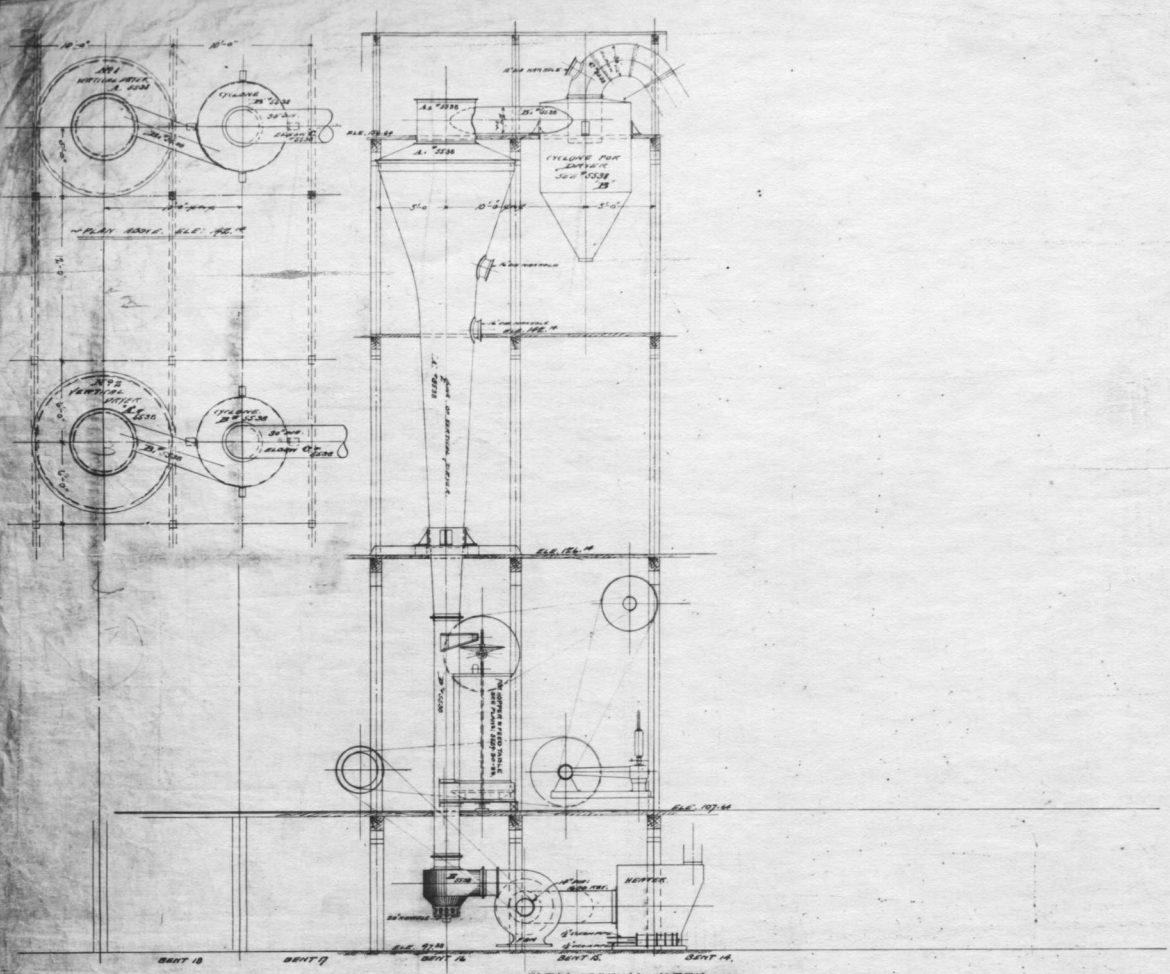
DETAIL OF VERTICAL DRYER NO 1
B-C. DEPARTMENT
THE SOLVAY PROCESS CO. SYRACUSE. N.Y.
MCH. 1. 1900.
SCALE 1" & 6" = 1 FOOT.
DRAWN BY EW.G.
CHECKED BY
APPROVED BY

G. 5019

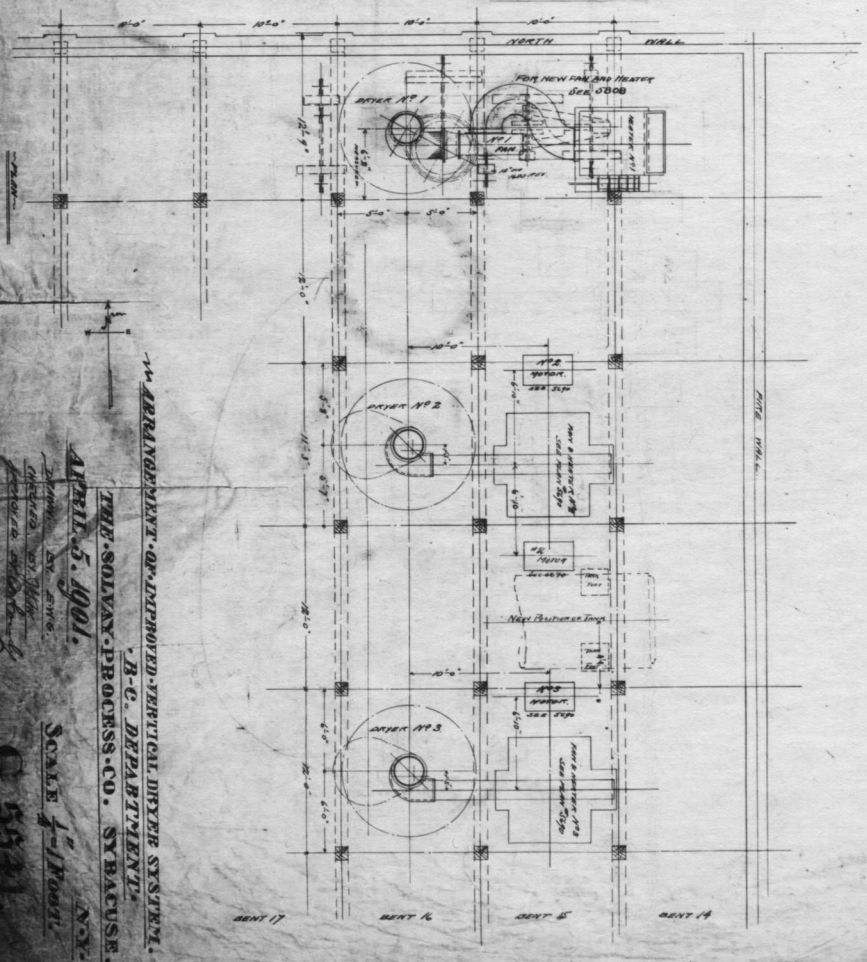
Note - No. 1 DRYER BUILT ON G.O. 377
- FOR LOCATION SEE PLAN "5018" -
FOR No. 2 DRYER SEE 5538


PLAN · BELOW · BREAK
ELEVATION & SECTIONS
SECTION A-A
DETAIL · PLAN OF ½" STEEL PLATE
IMPROVED · FEED · MEASURING · TABLE · for
FOR · VERTICAL · DRYER · B-C. DEP'T
THE · SOLVAY · PROCESS · CO.
MAR. 25 1901. SYRACUSE · N.Y.
SCALE. 3" = 1 FOOT.
DRAWN BY, E.W.G.
CHECKED BY,
APPROVED BY,
G. 5529

5529 - p. 89



— VIEW · LOOKING · NORTH —



— PLAN —

ARRANGEMENT OF IMPROVED VERTICAL DRYER SYSTEM.

THE SOLVAY PROCESS CO. SYRACUSE, N.Y.

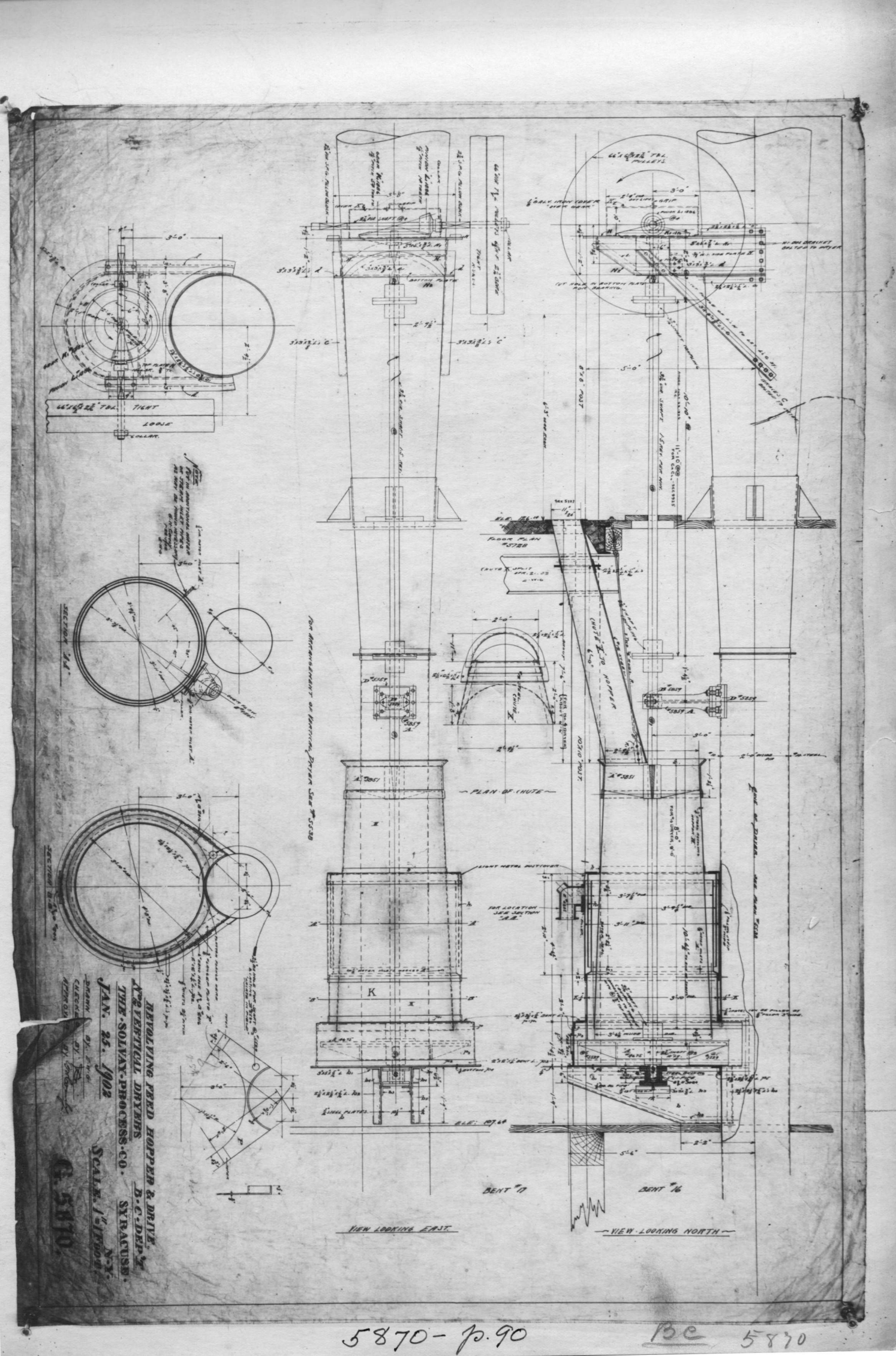
APRIL 5, 1901.

SCALE 1/4" = 1'-0"

C. 5541.

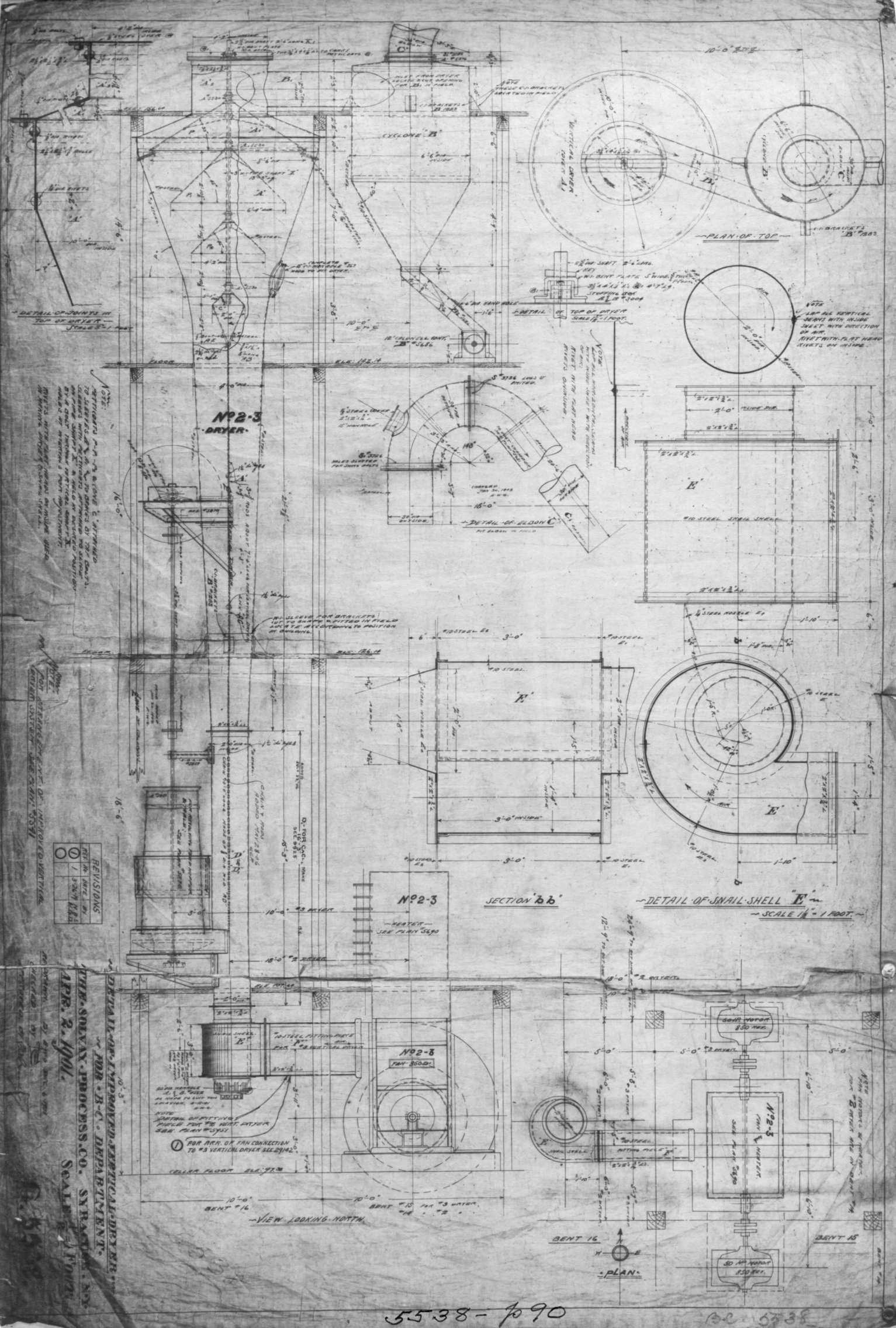
5541-Jp. 89

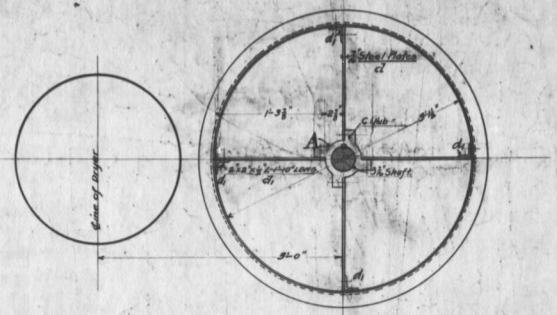
BC 5541



5870 - p. 90

Bc 5870

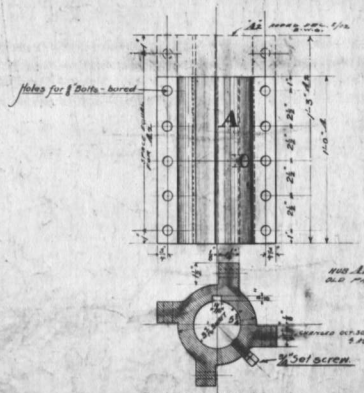

No 2-3 DRYER.
CYCLONE "B"
DETAIL OF JOINTS IN TOP OF DRYER
PLAN OF TOP
DETAIL OF TOP OF DRYER
DETAIL OF ELBOW "C"
DETAIL OF SNAIL SHELL "E"
SECTION "bb"
No 2-3 HEATER
SEE PLAN 3690
No 2-8 FAN 350 D1
VIEW LOOKING NORTH
PLAN
BENT 16
BENT 15
50 HP MOTOR 850 R.P.M.
REVISIONS
THE SOLVAY PROCESS CO. SYRACUSE, N.Y.
APR. 2, 1941.
SCALE 1" = 1 FOOT.
5538 - 1090



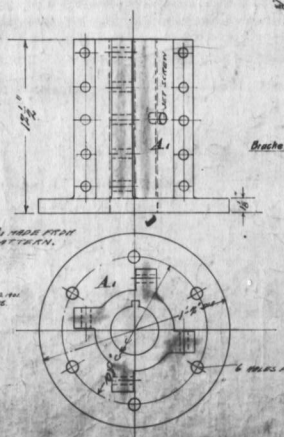
Top View of Revolving Hopper showing shaft support

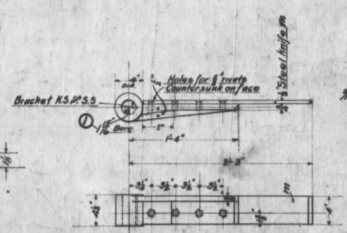
For Shaft and operating lever see drawing # 5529

Section 'A-A'



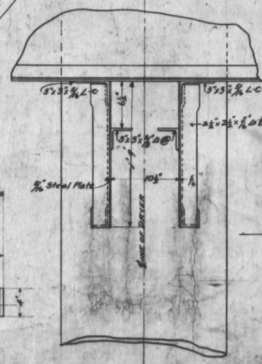
Detail of C.I. Hub





Detail of Knife and Bracket

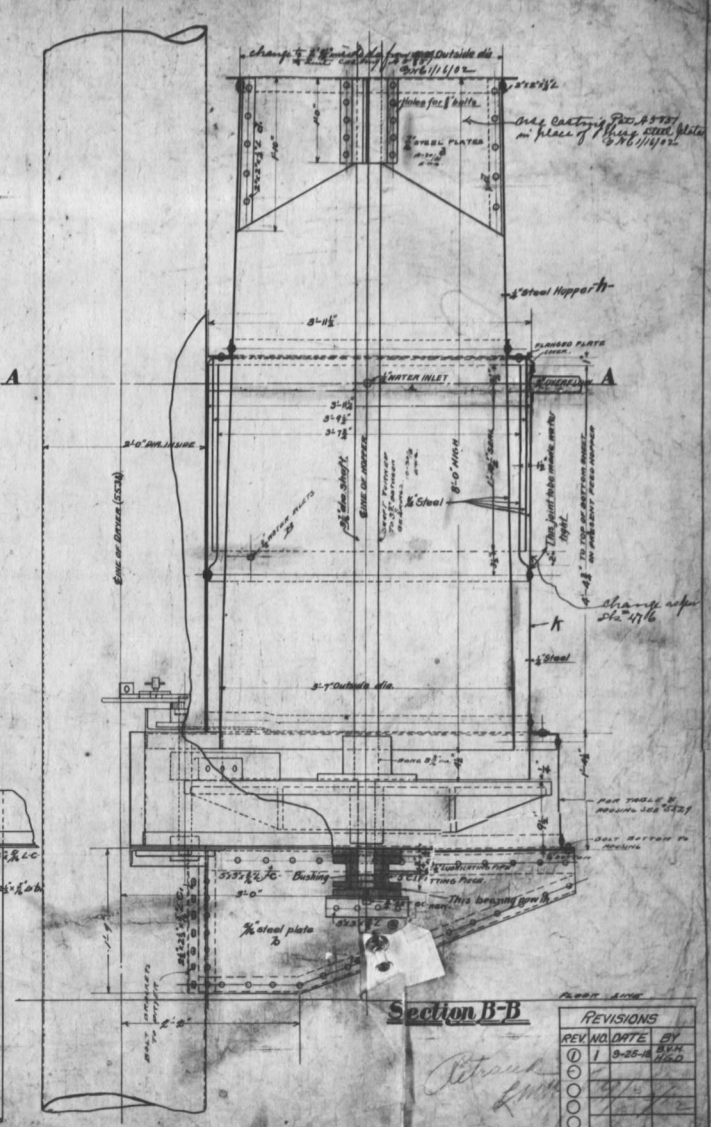
Bracket made from Patt. 'O' 5330.



View showing Brackets

Use ¾" Rivets unless otherwise specified

Note: FOR FEED TABLE SEE 5528
FOR DRIVE SEE 5527



REVISIONS			
REV. NO.		DATE	BY
1		9-25-18	B.V.H. V.G.D.

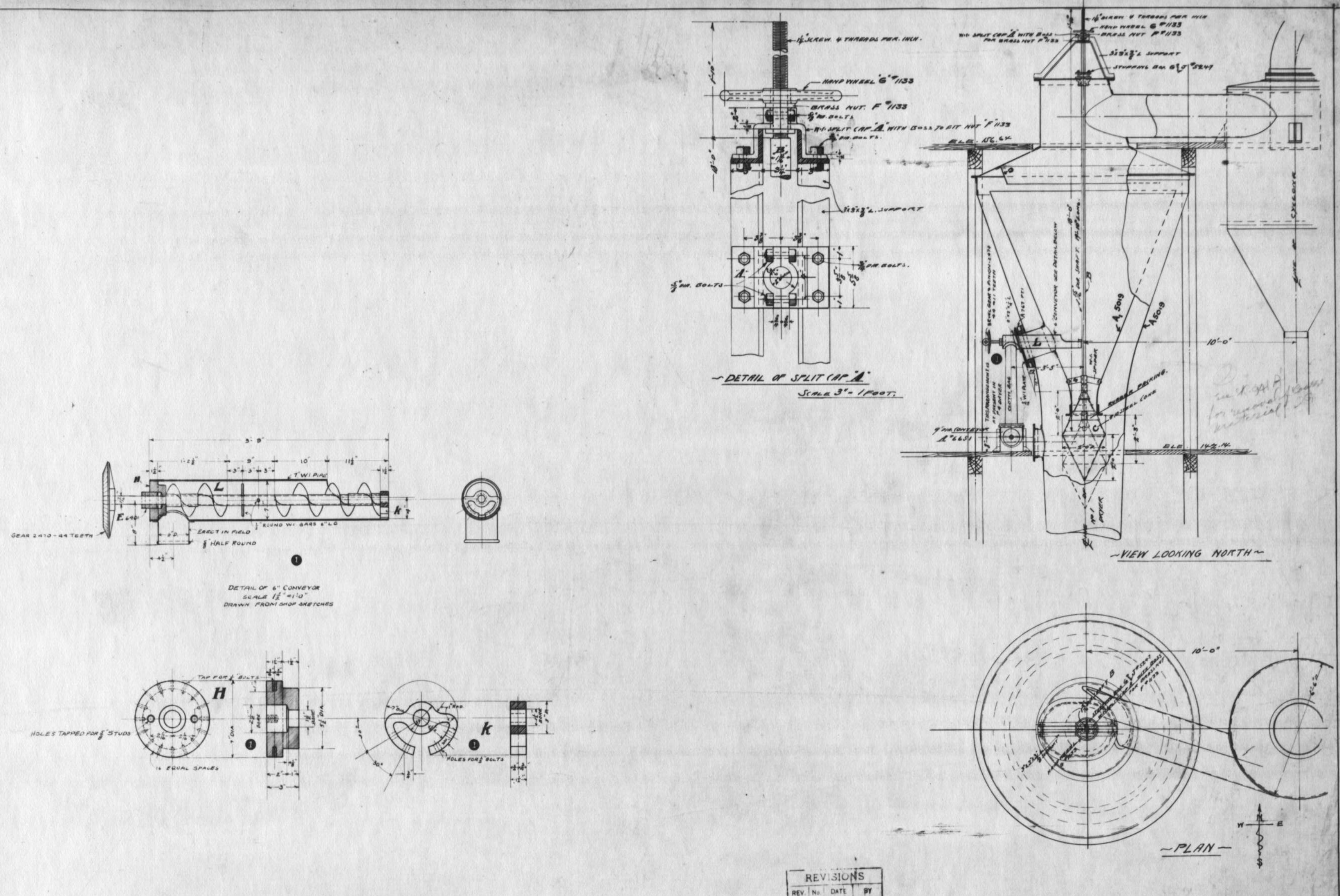
Revolving Hopper for Vertical Dryer
Feed Table B.C. Dept.

Scale ½"-1'-0"

The Solvay Process Co. Syracuse N.Y.

June 21-1910.

5643 - 1908



REVISIONS			
REV.	No.	DATE	BY
4		11/4/17	O.K.

ADJUSTABLE CONE FOR No. 1 VERTICAL DRYER

B.C. DEPARTMENT.

THE SOLVAY PROCESS CO. SYRACUSE. N.Y.

MAY. 30. 1903.

SCALE ½" = 1 FOOT.

DRAWN. BY. E.W.G.

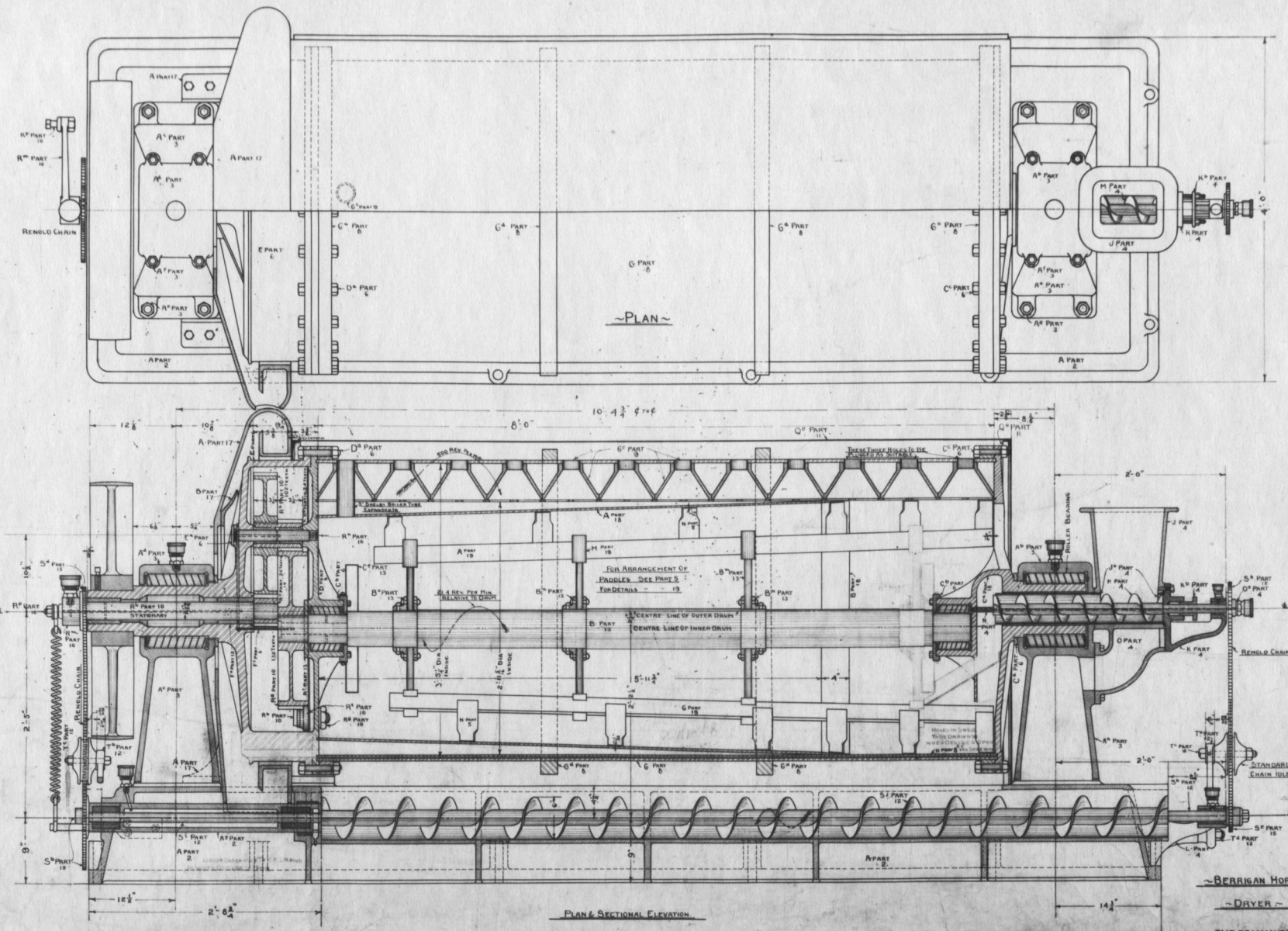
CHECKED. BY. [illegible]

APPROVED. BY. [illegible]

FOR DRYER No. 1 SEE # 5019 (5332)

G. 6672 VI

6672 - p 91



Plan & Sectional Elevation

Scale 2 in. = 1 Ft.

For Other Elevations See Part 14

~Berrigan Horizontal Centrifugal~

~Dryer~ ~Assembly Drawing~

THE SOLVAY PROCESS CO. SYRACUSE, N.Y.

DRAWN BY _____ SCALE 2"=1'-0" DATE April 4, 1904

RETRACED BY W.S.G. Hoyle

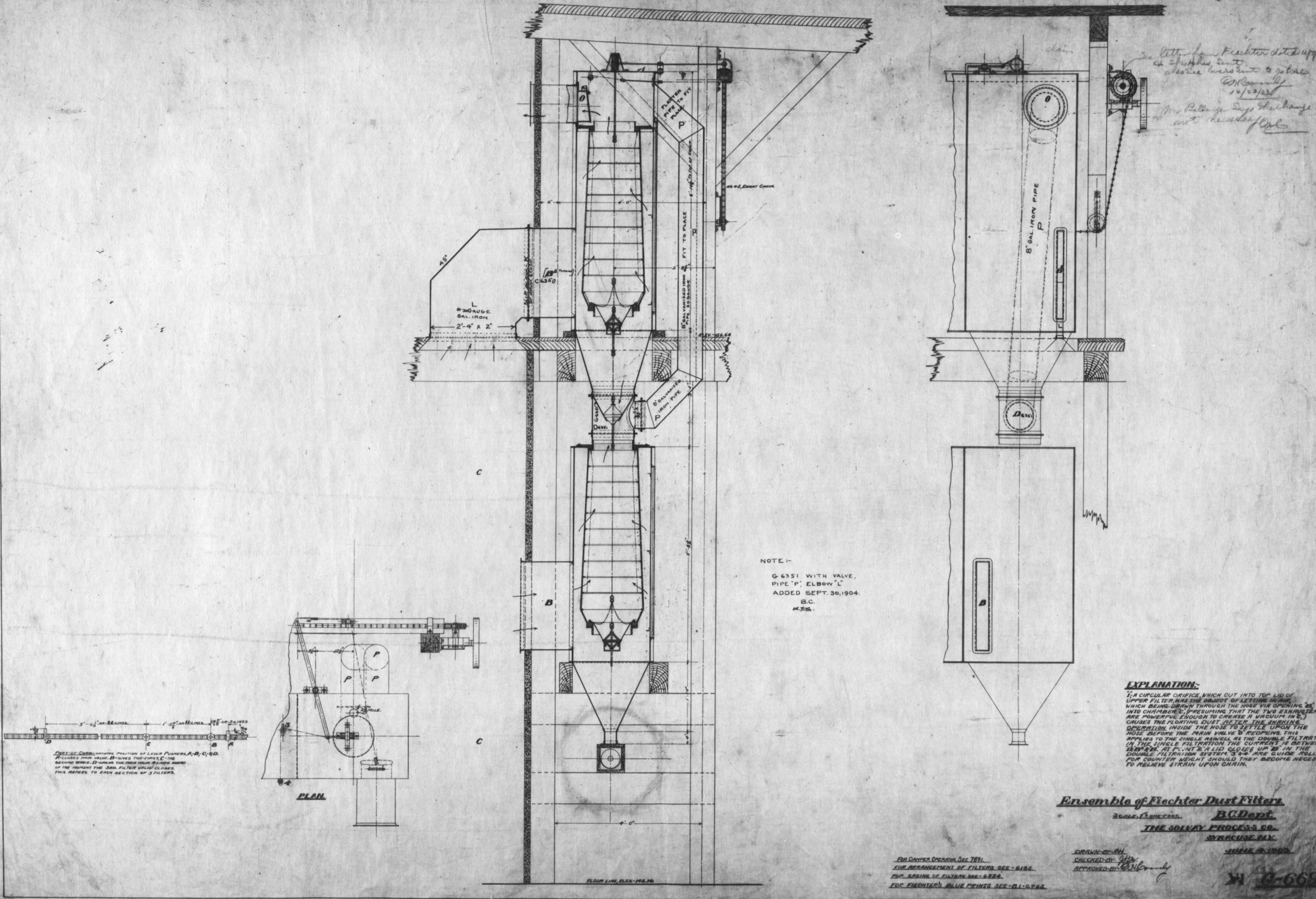
CHECKED BY _____

APPROVED BY _____

G-7552.

VII

7552 # 91



NOTE:-

G 6351 WITH VALVE,
PIPE "P", ELBOW "L"
ADDED SEPT. 30, 1904.
B.C.

EXPLANATION:-

"1"-A CIRCULAR ORIFICE, WHICH CUT INTO TOP LID OF UPPER FILTER, HAS THE OBJECT OF LETTING IN AIR, WHICH BEING DRAWN THROUGH THE HOSE VIA OPENING "B" INTO CHAMBER "C", (PRESUMING THAT THE TWO EXHAUSTERS ARE POWERFUL ENOUGH TO CREATE A VACUUM IN "C",) CAUSES THE FLOATING DUST AFTER THE SHAKING OPERATION INSIDE THE HOSE TO SETTLE UPON THE HOSE BEFORE THE MAIN VALVE "O" REOPENS. THIS APPLIES TO THE SINGLE AS WELL AS THE DOUBLE FILTRATION. IN THE SINGLE FILTRATION THE CURRENT IS BETWEEN "1", "B" & "B". AT POINT "2" A LID CLOSES UP "B" IN THE DOUBLE FILTRATION SYSTEM. "3" & "4" ARE GUIDE ROLLERS FOR COUNTER WEIGHT SHOULD THEY BECOME NECESSARY TO RELIEVE STRAIN UPON CHAIN.

See letter from Fiechter dated 11/7/03 & Specifications, Sent also the Eversheet to Solvay
C.N. Connolly
12/23/03
Mr. Belknap says the change is not necessary

For Damper Operator See 7891.
For Arrangement of Filters See - 6185.
For Casing of Filters See - 6334.
For Fiechter's Blue Prints See - B.1-0.763.

Ensemble of Fiechter Dust Filters.

Scale, 1" = one foot.

B.C. Dept.

THE SOLVAY PROCESS CO.
SYRACUSE, N.Y.

DRAWN BY AH
CHECKED BY JHW
APPROVED BY C.N. Connolly

JUNE 4, 1903.

K G-6693

6693 P 91