



Unnumbered report

E. I. DU PONT DE NEMOURS & COMPANY, INC.

FABRICS AND FINISHES

PRODUCTION DIVISION

PROCESS ENGINEERING

C-1

MARCH 1959

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8/24/65

SUPPLEMENT

"47 PROCESS" EQUIPMENT SPECIFICATIONS

Recent modifications in the design of "47 Process" equipment. Reference to "47 Process Equipment Specification Revisions" dated March 6, 1957 for full details on design.

(by Nicksch)

REFERENCE COPY

NOT FOR CIRCULATION

ABSTRACT

"47 Process" units that reflect the most up-to-date thinking in design have been evaluated under production conditions by the Parlin Plant. This design, worked out in cooperation with the fabricator, is for an easily constructed unit that gives trouble-free operation.

This report covers this design. Included are photographs of the various models and information on price of replacement parts and units.

W B Callahan

3-23-59

(Information contained is for du Pont use only)

TABLE OF CONTENTS

I. DISCUSSION

- A. Introduction
- B. 3-Gallon Unit
- C. 1/2-Gallon Unit
- D. Bottom Check Valve
- E. Shaft Speeds
- F. Bottom Stabilizers
- G. Bottom Design

II. EQUIPMENT PHOTOGRAPHS

III. EQUIPMENT COSTS (CHICAGO BOILER COMPANY)

IV. DISTRIBUTION LIST

V. EQUIPMENT DRAWINGS

I. DISCUSSION

A. INTRODUCTION

The bottom feed "47 Process" unit has undergone a lot of streamlining since the first proto-type was made at Philadelphia.

Revised equipment specifications were last issued in March 1957. These specifications covered the fabrication and installation of proven dispersion units and were set up as standard for use by du Pont and Sand Grinder licensees.

Since that time, most of the "47 Process" units constructed were made by the Chicago Boiler Company. Generally, this fabricator's work is good. His price has been the lowest and, so, he has filled orders for about 100 units of various sizes. The additional operating and construction experience has indicated certain aspects in the original design that can be improved. Some improvements were initiated by the fabricator, i.e., V-belt drive, discharge screen arrangement, 3-gallon unit design, while others result from our own operating experience, i.e., bottom arrangement disc design, shaft speeds.

In order to evaluate all recent design changes, it was decided to incorporate most up-to-date thinking into units being installed at Parlin. The plan was to evaluate these latest "wrinkles" at Parlin and, if successful, the units would serve as a proto-type for future construction.

This design was worked out by Parlin in close cooperation with the fabricator (Chicago Boiler Company). Modified units were installed, started up, and have been performing without a hitch ever since. The changes in the design are now recommended for future "47 Process" installations. Drawings of these up-to-date units are at the end of this report (see Section V Equipment Drawings).

The modifications, mostly of a minor nature, have resulted in a unit that is easily constructed and gives trouble-free operation. We anticipate little change in this recommended design in the future. This should make replacement parts less of a problem and mean less confusion when installing new equipment.

B. 3-GALLON UNIT

The first 3-gallon unit was undertaken by the Chicago Boiler Company on their own initiative. Generally, their design proved to be satisfactory and a unit of this size found eager acceptance in the industry. The comments we have received are to the effect that this unit works well with most products but the power requirements are too high for its size.

To smooth out its operation and to reduce its power requirements, a new agitator was designed by Parlin for this unit and is being evaluated. This modification will probably prove out to be an advantage and it will be included in the specifications after evaluation. Any new 3-gallon units purchased should have this modified agitator.

C. 1/2-GALLON UNIT

The bottom feed 1/2-gallon unit was originally developed to provide equipment for laboratory work that correlates with larger production units. Also, a unit of this size is handy for small scale production.

Correlation is found to be excellent. In fact, the Divisional Alignment Group is now evaluating a torque table for the 1/2-gallon unit that will enable them to align all formulations intended for production equipment on this small scale.

We know of no other "sand grinder" type equipment that gives such good correlation between laboratory scale and production. It is recommended that this unit be the only type used for evaluating performance of bases being formulated. Substitute equipment will only yield misleading data that will not correlate with the operation of the larger units.

D. BOTTOM CHECK VALVE

Of all the changes made in "47 Process" design since its beginning, the development of the bottom check valve is one of the most important. This part is relatively trouble-free and permits easier operation of the units.

Very little spring tension on the ball check is needed. Chicago Boiler presets the valves so that they will open at between 4 to 8 psi. One point to remember is that these valves can become partially bound by air during start-up. For this reason, an air bleed is included in the design to be used during start-up. Also, pieces of paper, etc. coming through from the premix tanks may block the valve in the open or closed position. Best to use strainers in the lines to prevent blockage.

E. SHAFT SPEEDS

A V-belt drive is now recommended in place of the old direct drive for "47 Process" units. This permits easier construction and takes some of the strain off the motors during start-up. In addition, the specified shaft speeds have been changed so that peripheral speeds are closer to optimum

conditions. Shaft speed of the 30-gallon unit has been dropped to 800 from 900 rpm; the 16-gallon shaft speed remains the same; the 8-gallon shaft speed has been dropped to 1145 from 1200 rpm. These lower speeds should permit smoother operation of the units without any adverse effect on their dispersing ability. However, be careful not to use too little sand in the units running at these speeds. More sand can and should be used at the lower speed.

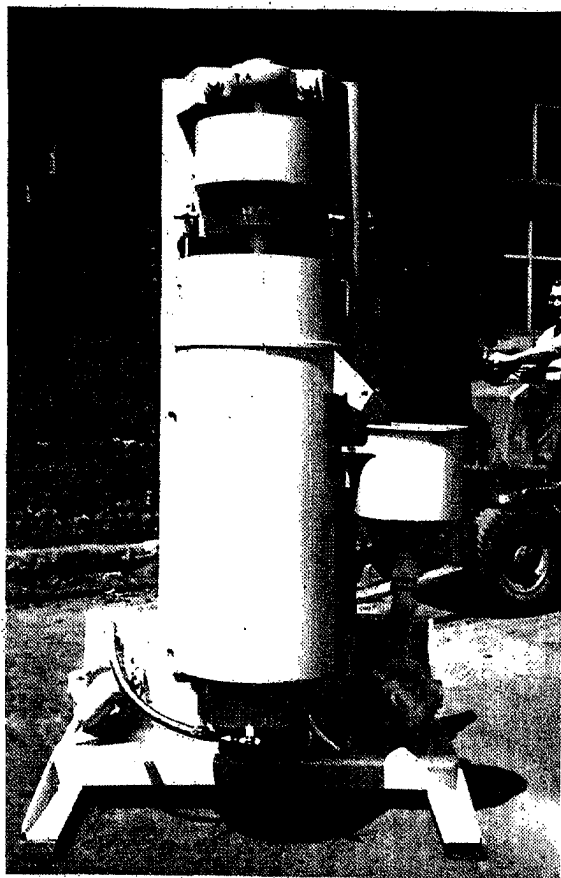
F. BOTTOM STABILIZERS

Much has been said about the stabilizers used in "47 Process" units. The cast iron flat plate pulleys, originally specified, do wear out. The Chicago and Fort Madison Plants are using especially fabricated Ni-hard stabilizers. Chicago Boiler makes and sells a hardened stabilizer of their own design. Several of these are working very well at Parlin, but it will take several years to determine how well they wear. We recommend that the stabilizer sold by Chicago Boiler be used in any future installations.

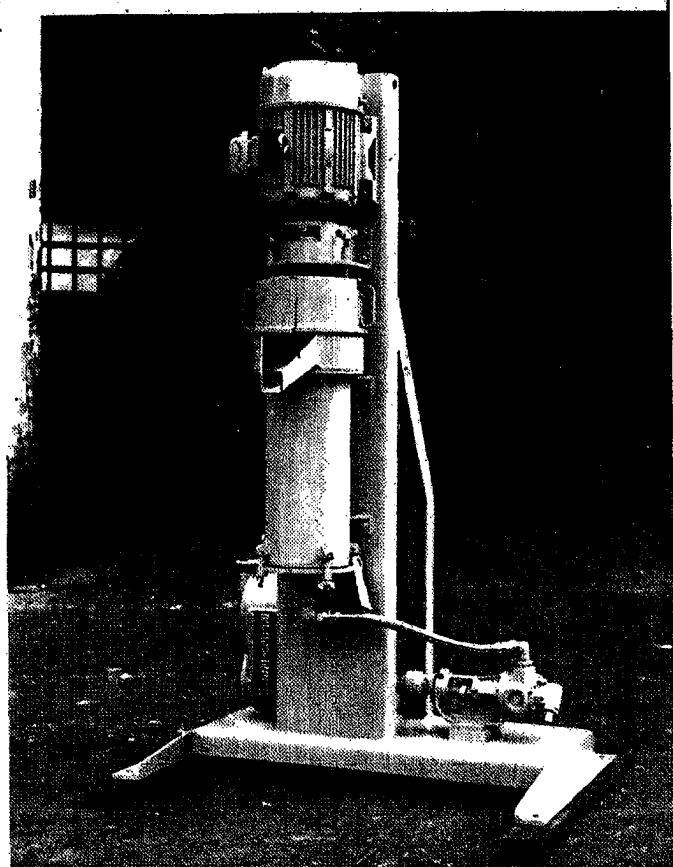
G. BOTTOM DESIGN

The bottom design is now much simplified over the older versions, since in practice, the original modifications were seldom used. Even the sand port is now left out. Experience has been that this sand port was of very little practical use, because sand being pulled would invariably get into the threads. This meant that all the sand had to be dumped anyway. If it is desirable to include a sand port to suit specific conditions, it can easily be included in the fabrication.

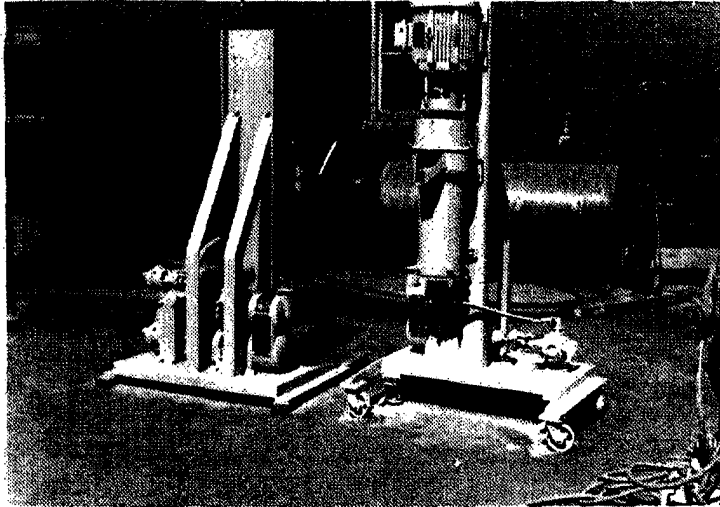
II. EQUIPMENT PHOTOGRAPHS



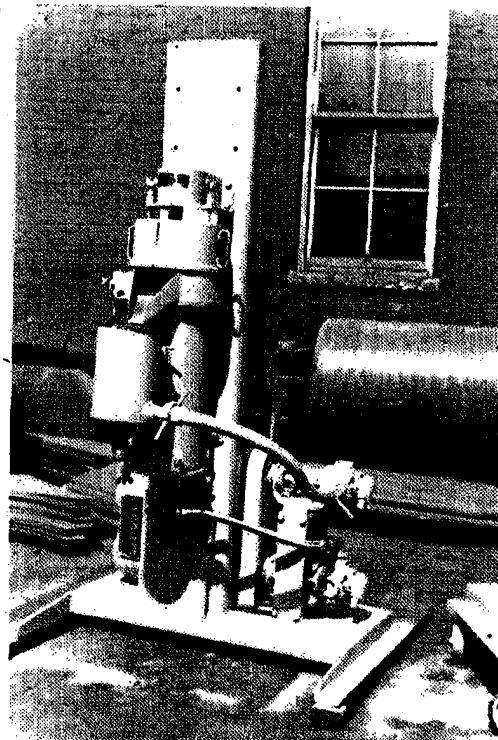
PRODUCTION TYPE UNIT
8, 16, 30-GALLON SIZES
FRONT VIEW



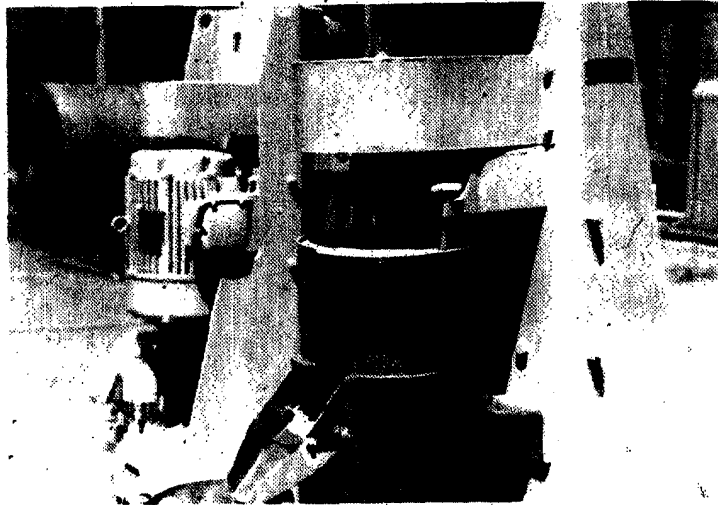
PRODUCTION TYPE UNIT
3-GALLON SIZE
FRONT VIEW



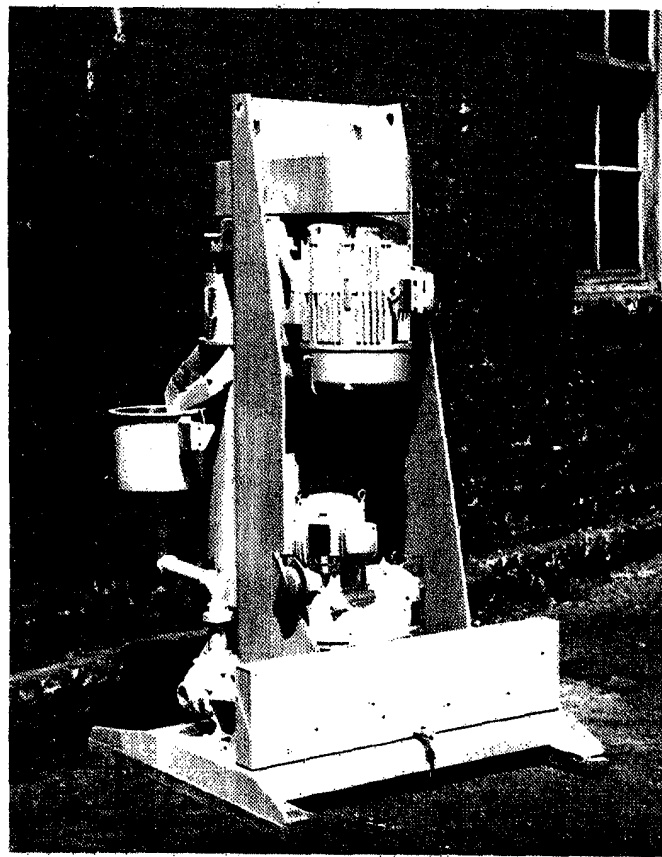
PRODUCTION TYPE UNIT
3-GALLON SIZE
ASSEMBLY VARIATIONS



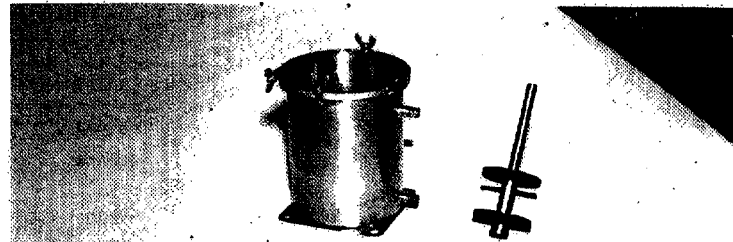
PRODUCTION TYPE UNIT
3-GALLON SIZE
DOUBLE PUMP



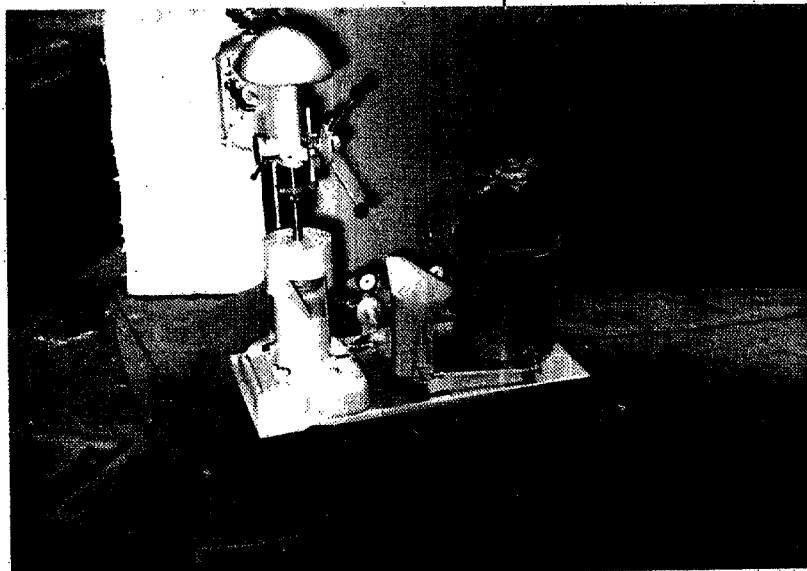
**PRODUCTION TYPE UNIT
8, 16, 30-GALLON SIZES
SCREEN HOLD-DOWN ASSEMBLY**



**PRODUCTION TYPE UNITS
8, 16, 30-GALLON SIZES
REAR VIEW**



LABORATORY UNIT
BEAKER ARRANGEMENT



LABORATORY & PRODUCTION TYPE UNIT
1/2-GALLON BOTTOM-FEED

JUNE 1968

III. EQUIPMENT COSTS (CHICAGO BOILER COMPANY)

SAND GRINDERS MADE BY CHICAGO BOILER

October 1, 1958

LABORATORY UNITS

PRICE

Batch-Type Beaker (Requires drill press)	\$ 90.00
1/2-Gallon Bottom-Feed (Includes drill press, pump, etc.)	700.00

PRODUCTION UNITS

**FLOOR
SPACE**

HEIGHT

**LOADED
WEIGHT**

**SHIPPING
WEIGHT**

3-Gallon	33" x 45"	74"	1100#	1250#
8-Gallon	42" x 48"	75"	2300#	2420#
16-Gallon	48" x 50"	85"	3100#	3190#
30-Gallon	55" x 57"	97"	4000#	4200#

Note 1 - Includes motors, pumps, integral piping, safety switch, such spare parts and accessories deemed desirable, and assistance at start-up on all sizes except laboratory sizes.

Note 2 - Variations from specifications are available to suit unusual products or plants.

Note 3 - Stock is held on all sizes as far as possible.

Note 4 - Prices F.O.B. Chicago, Illinois, on terms of 1/2% ten days, net thirty days.

CHICAGO BOILER COMPANY
January 1, 1959

-1-

DETAILED PRICES AND SPARE PARTS PRICES

SAND GRINDERS COMPLETE WITH BOTH MOTORS, PUMPS, FLOAT SWITCH,
SAND PAN, INTEGRAL PIPING AND SPARE SCREEN ASSEMBLY, (EXCEPT 3-GALLON
SIZE, WHICH HAS NO TAKEAWAY PUMP, NO SAND PAN AND NO SPARE SCREEN
ASSEMBLY.)

	<u>LOTS OF 1</u>	<u>LOTS OF 2 TO 4</u>	<u>5 AND UP</u>
3 GALLON	\$ 1,800.00	\$ 1,750.00	\$ 1,700.00
8 GALLON	3,600.00	3,500.00	3,450.00
16 GALLON	3,850.00	3,750.00	3,700.00
30 GALLON	4,400.00	4,250.00	4,200.00
30 GALLON SPECIAL (40 H.P. DRIVE)	4,690.00	4,540.00	4,500.00

SAND GRINDERS AS ABOVE, EXCEPT TO HAVE STAINLESS VESSEL CONTACT
PARTS FOR CERTAIN AQUEOUS SOLUTIONS. SCREEN FRAME, PIPING AND SHAFT
REMAIN CARBON STEEL.

3-GALLON	-	ADD	\$100.00
8- "	-	"	330.00
16- "	-	"	460.00
30- "	-	"	600.00

SAND GRINDERS AS ABOVE, EXCEPT SCREEN FRAME AND SHAFT ARE ALSO
OF STAINLESS STEEL (STAINLESS PUMPS & PIPING - PRICES ON REQUEST)

3-GALLON	-	ADD	\$125.00
8- "	-	"	410.00
16- "	-	"	590.00
30- "	-	"	745.00

CHICAGO BOILER COMPANY

-2-

SAND GRINDERS PER ITEM 1, EXCEPT ARRANGED FOR GRAVITY DUMPING INTO DRUMS OR THINDOWN TANKS. ONE PUMP AND ITS ASSOCIATED DRIVE PARTS IS REMOVED ALTHOUGH POWER AND OTHER PROVISION FOR LATER ADDITION IS PROVIDED. HOPPER, HOPPER SCREEN, SAFETY OVERFLOW SWITCH AND ASSOCIATED PIPING ARE REMOVED.

8-GALLON	-	SUBTRACT	\$190.00
16-	"	-	" 240.00
30-	"	-	" 212.00

SAND GRINDER - 3-GALLON ONLY, MAY BE PURCHASED WITH TWO INTEGRAL THERMAL TYPE EXPLOSION PROOF STARTERS MOUNTED, WIRED, AND SEALED - ADD \$150.00.

SPARE VESSELS ARE ADAPTABLE TO 3-GALLON MILL WITHOUT MECHANICAL REVISION, FOR USE IN CERTAIN DYES AND INKS WHERE IT IS DESIRABLE TO ELIMINATE CAREFUL WASHING. THEY ARE NOT GENERALLY RECOMMENDED ON LARGER UNITS. PRICES ARE:

CARBON STEEL	-	3-GAL.	\$150.00
STAINLESS STEEL	-	"	250.00
SHAFTS, WITH COUPLING HALF	-	"	160.00

SPARE HOPPER SCREENS ARE OFFERED WITH ELECTROLYTIC NICKEL MESH, FOR REPLACEMENT OF ORIGINAL STEEL WIRE MESH HOPPER SCREENS IN APPLICATIONS WHERE PUFFY PRODUCTS ARE ENCOUNTERED OR WHERE FREQUENT CLEANING IS NECESSARY.

8-GAL.	\$	61.00
16-	"	77.00
30-	"	99.00

CHICAGO BOILER COMPANY

-3-

SPARE VESSEL SCREEN ASSEMBLIES FOR REPLACEMENT OR CONVENIENCE

IN FREQUENT COLOR CHANGES:

3-GALLON	-	\$ 54.00
8-	"	- 115.00
16-	"	- 155.00
30-	"	- 190.00

PARTS FOR "47 PROCESS" UNITS, PER PRINTS ATTACHEDBOTTOM CHECK VALVES, COMPLETE B/P A-3319 OR 3354 \$29.00 EA.IMPELLER DISCS, CAST, B/P A-3331

<u>ROUGH:</u>	<u>3-GALLON</u>	<u>8-GALLON</u>	<u>16-GALLON</u>	<u>30-GALLON</u>
Lots of 1 to 4	\$ 6.00	\$12.50	\$13.75	\$18.00
5 to 19	5.00	10.50	11.75	16.00
20 & Up	4.00	9.50	10.75	14.00

FINISHED:

Lots of 1 to 4	\$11.00	\$21.50	\$22.50	\$27.00
5 to 19	10.00	19.50	21.50	25.00
20 & Up	9.00	18.50	20.50	24.00

STABILIZERS, MACHINED, BORED, HARDENED - B/P A-3327

<u>3-GALLON</u>	<u>8-GALLON</u>	<u>16-GALLON</u>	<u>30-GALLON</u>
\$18.00	\$49.00	\$65.00	\$75.00

NOTE: ALL SAND GRINDERS ARE PROVIDED WITH 220/440 OR 550 VOLT,
 3 PHASE, 60 CYCLE MOTORS, HIGH STARTING TORQUE, CLASS 1,
 GROUP "D" EXPLOSION-PROOF. PUMPS ARE VIKING HEAVY DUTY
 GEAR TYPE. AGITATOR DISCS ARE CAST CHROME ALLOY, AS IS
 STABILIZER FOR 3-GALLON UNITS.

CHICAGO BOILER COMPANY

-4-

STABILIZER FOR 8, 16 AND 30 GALLON UNITS IS HARDENED STEEL. ALL
SHAFTS ARE DYNAMICALLY BALANCED PLUS/MINUS 2-INCH/OUNCES AT
OPERATING SPEED. UNITS ARE SHIPPED CRATED FOR DOMESTIC SHIPMENT.
VARIATIONS FROM STANDARD SPECIFICATIONS ARE EASILY AVAILABLE AND
SPARE PARTS (EXCEPT MAJOR STRUCTURAL UNITS) ARE STOCK.

MOST UNITS ARE IN STOCK AT ALL TIMES EXCEPT MOTORS UNMOUNTED.
SPECIAL VOLTAGES, ETC., MAY NECESSITATE SHORT DELAYS.

PRICES ARE F.O.B. CHICAGO, ON TERMS OF 1/2% 10 DAYS, NET 30 DAYS.

IV. DISTRIBUTION LIST

F. H. BEADLES	}	IN TURN	WILMINGTON
E. E. FURST			
J. S. ALLEN			WILMINGTON
E. T. BREUER			WILMINGTON
P. C. OLIN			WILMINGTON
D. G. KENNEDY			WILMINGTON
H. R. AYRES (2)			CHICAGO
R. E. DURFEE (2)			EVERETT
H. R. STINE (2)			FLINT
R. J. KNAKE (2)			FORT MADISON
F. E. WALTER (2)			PARLIN
N. I. DRESS (2)			PHILADELPHIA
M. L. BYRON (2)			SO. SAN FRAN.
H. L. PRIDDY (2)			TOLEDO
K. E. ACKLEY (2)			TUCKER
W. H. TOOLE			PHILADELPHIA
T. S. STEVENS			PARLIN

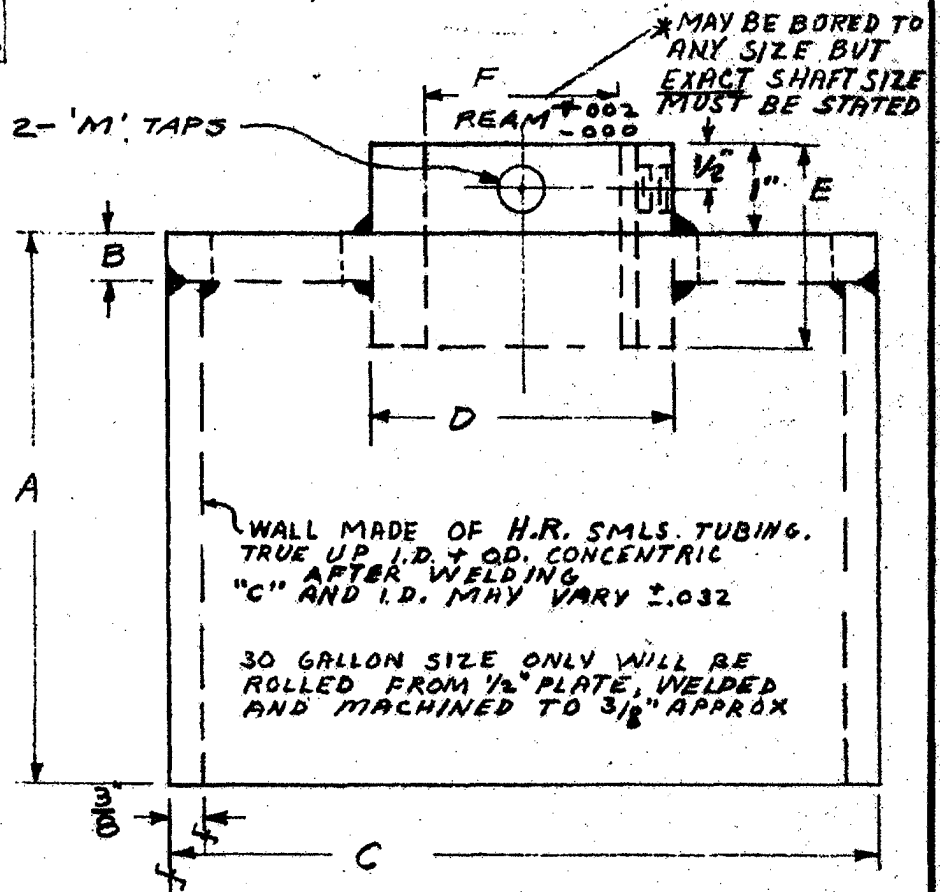
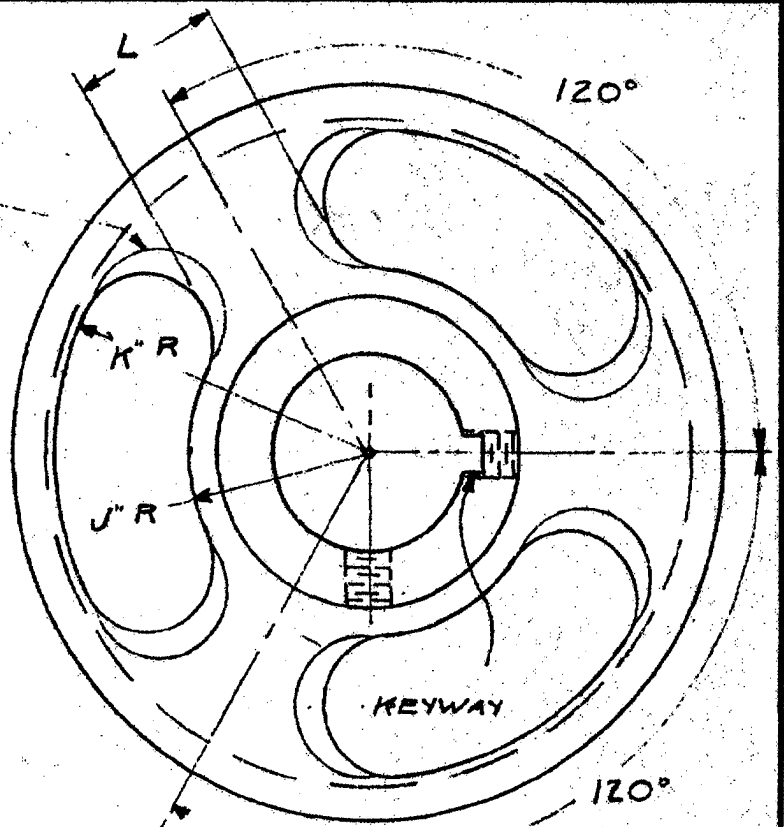
V. EQUIPMENT DRAWINGS

8-Gallon Unit, Assembly
16-Gallon Unit, Assembly
30-Gallon Unit, Assembly
3-Gallon Unit, Assembly
3-Gallon Agitator, Parts



BEVEL SLOT ENDS
BY HAND GRINDING

	8 GAL.	16 GAL.	30 GAL.
A	4"	6"	8"
B	1/2"	1/2"	5/8"
C	6	8	10
D	2 7/8	3 3/8	4
E	2	2 1/4	2 1/2
F *	1 1/16	2 3/16	2 7/16
J	1 3/4	2 1/16	2 3/8
K	2 1/4	3 1/4	4 1/4"
L	1"	1"	1 1/2
'M' TAP	3/8"-16	1/2"-13	1/2"-13
KEYWAY	3/8" x 3/16	1/2" x 1/4	5/8" x 5/16



1020 H.R. STEEL.

CASE HARDEN TO
50-60 ROCKWELL "C".

EXACT SHAFT D. MUST
BE SPECIFIED ON
STABILIZERS SOLD LOOSE

CHICAGO BOILER COMPANY

'Red Head'

WELDED METAL PRODUCTS

DESCRIPTION 8, 16, 30 STABILIZERS

FOR CHICAGO BOILER CO SAND GRINDERS

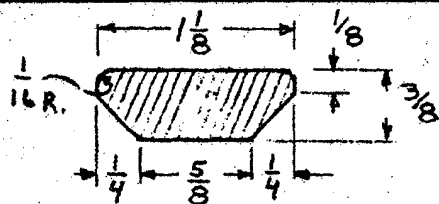
DATE 5-16-56 SCALE NO

DRAWING

DWN. BY R.L. CKD. BY 9

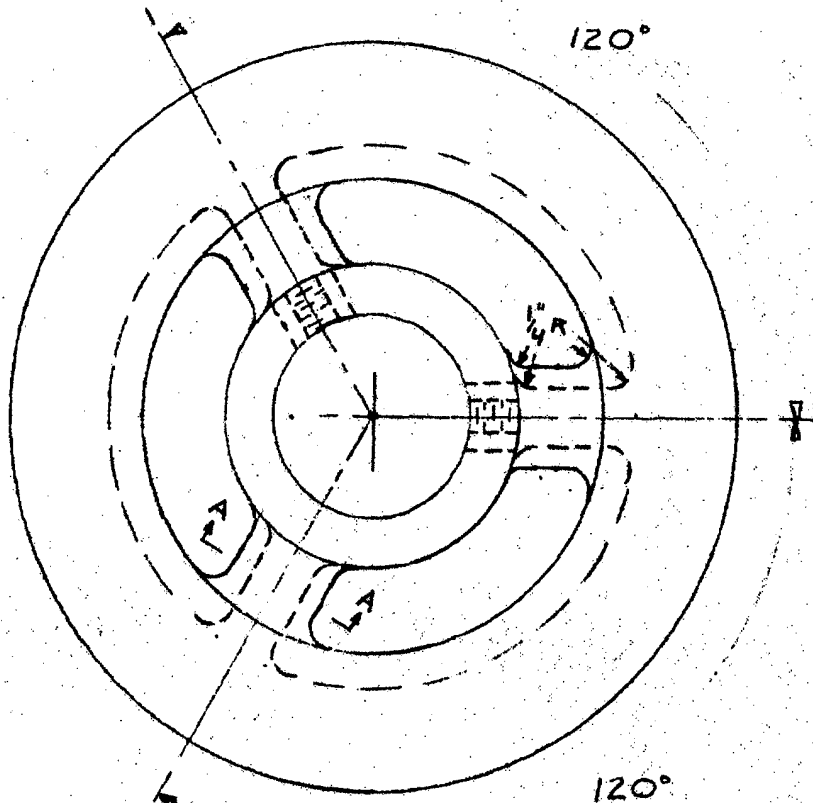
NO.

A-3327



SECTION A-A

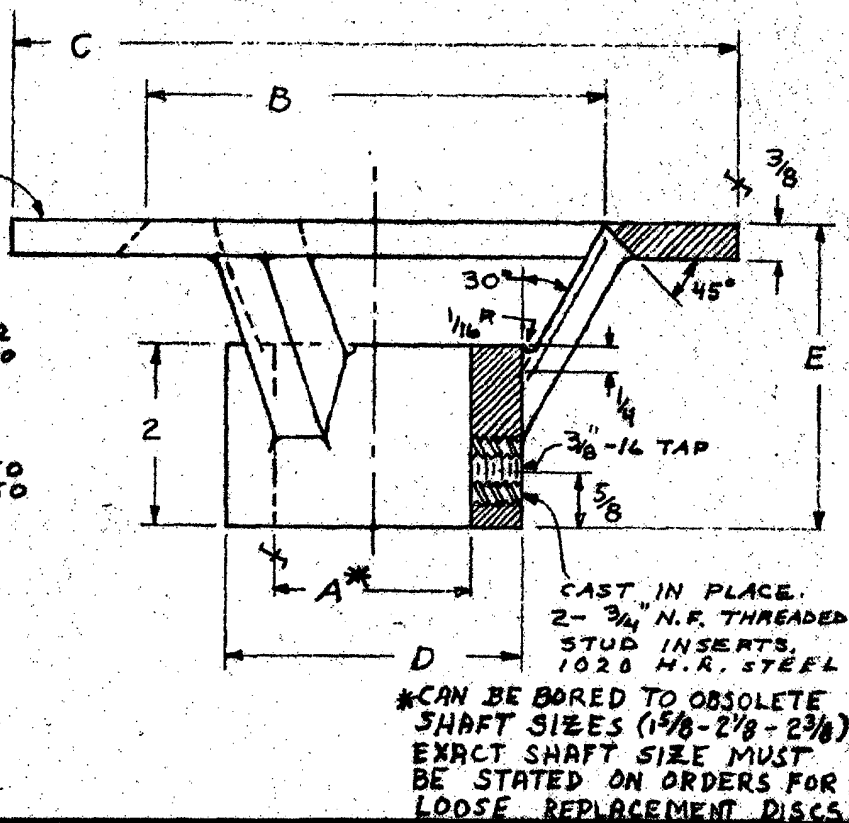
COMPOSITION
24 TO 30. % CH
2.25 TO 2.85 C
.5 TO 1.25 MN
MIN. TRACE- NI



"C" DIA. CONCENTRIC
WITH BORE $\pm .015$.

FACE OF DISC MUST BE
PERPENDICULAR TO BORE $\pm .010$
AFTER MACHINING STATIC
BALANCE ON RAILS TO
APPROX. 1 IN/OZ BY GRINDING

	8 GAL.	16 GAL.	30 GAL.	
A-ROUGH	1.56	2.06	2.31	
A-FINISH	1.6875	2.1875	2.4375	$+002$ -000
B	4	5 1/4	6 1/4	
C-ROUGH	6 1/2	8 1/4	10	
C-FINISH	6.450	8.200	9.950	$+050$ -050
D	2 7/8	3 3/8	3 5/8	
E	2 3/4	3 3/8	4	



*CAN BE BORED TO OBSOLETE
SHAFT SIZES (1 5/8-2 1/8-2 3/8)
EXACT SHAFT SIZE MUST
BE STATED ON ORDERS FOR
LOOSE REPLACEMENT DISCS

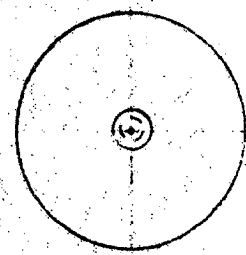
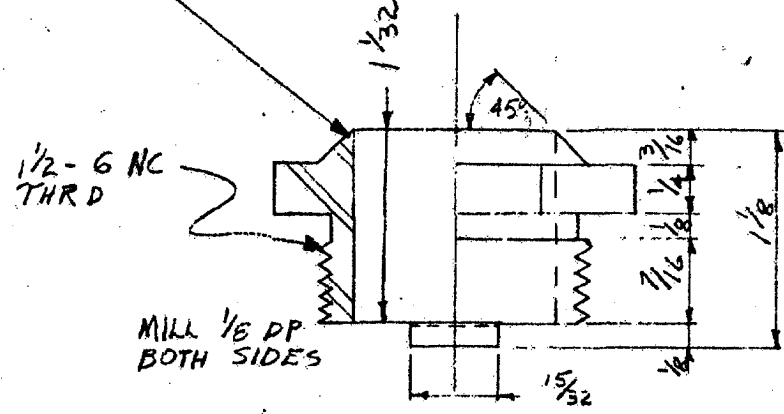
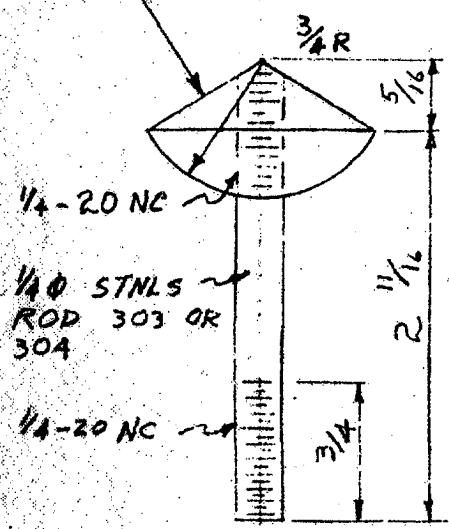
CHICAGO BOILER COMPANY
'Red Head'
WELDED METAL PRODUCTS

DESCRIPTION 8, 16, 30 GALLON DISCS
FOR CHICAGO BOILER SAND GRINDERS.

DATE 5-22-58 SCALE NO. DRAWING
DWN. BY R.L. CKD. BY Q. NO. A-3331

CUT FROM $1\frac{1}{2}$ ϕ SAE 52100
HARDENED & POLISHED STL BALL
ANNEAL FOR MACH THEN RE
HARDEN TO 50-60 ROCKWELL C

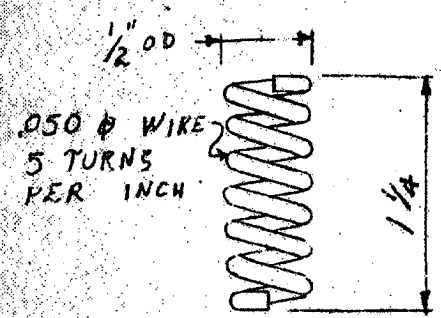
SEAT TO BE SPHERICALLY
GROUND W/ GRINDING
COMPOUND & BALL



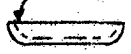
$\frac{1}{32}$ ϕ DRILL
1 HOLE

$\frac{1}{8}$ DRILL
 $2\frac{5}{32}$ DEEP

$1\frac{3}{4}$ " A140 HEX.
CR BAR
HARDEN TO 50-60
ROCKWELL C



CUP WASHER

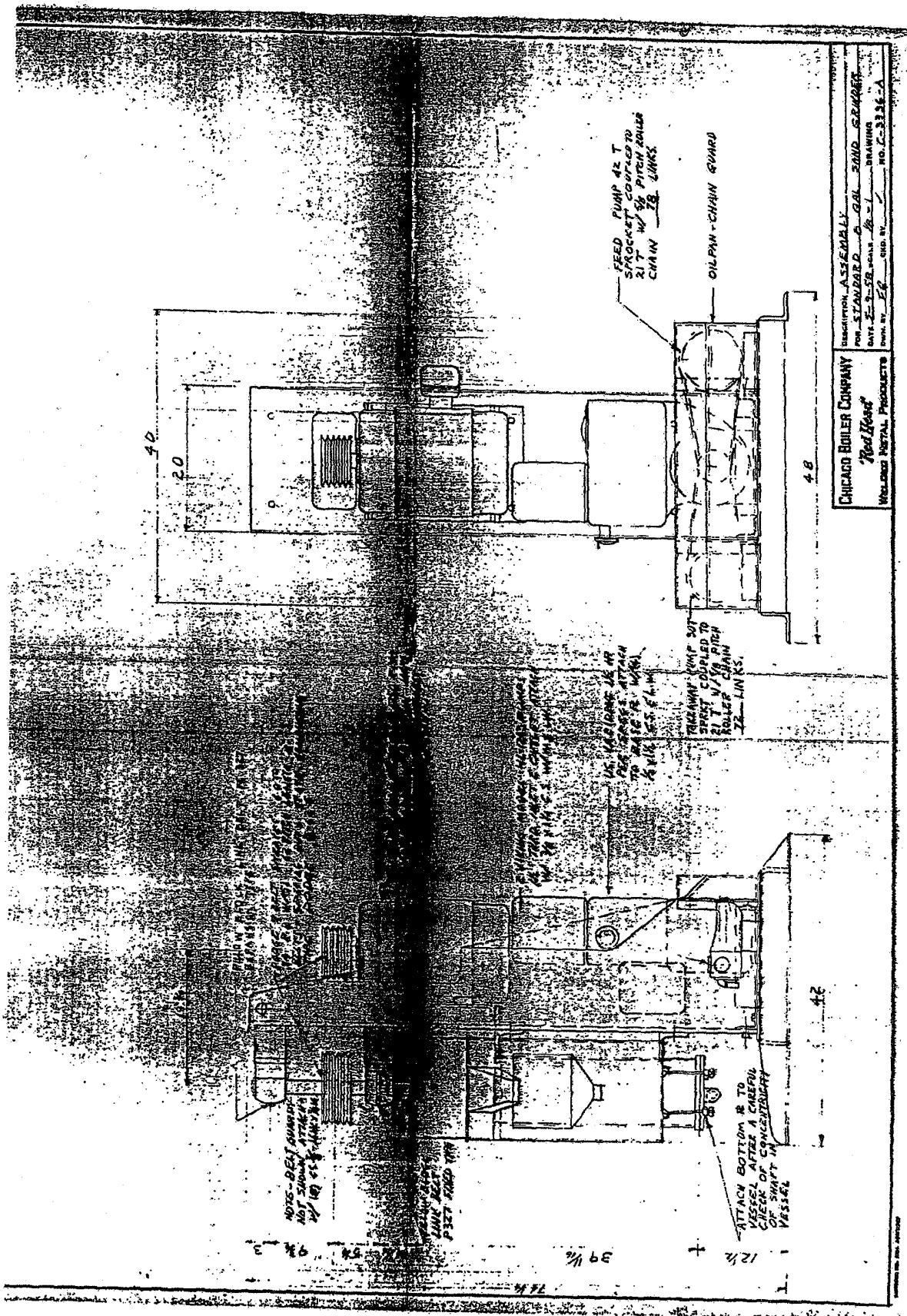


$\frac{1}{4}$ " LOCK NUT CASTELATED
TYPE NO FIBER

ADJUST SPRING TENSION TO APPROX 4 lb.

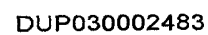
CHICAGO BOILER COMPANY
'Red Head'
WELDED METAL PRODUCTS

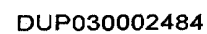
DESCRIPTION	FEEP CHECK VALVE SPECIAL
FOR	CHICAGO BOILER CO
DATE	10-10-58
SCALE	FULL
DRAWING	
DWN. BY	EG
CKD. BY	
NO.	A-3377

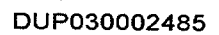


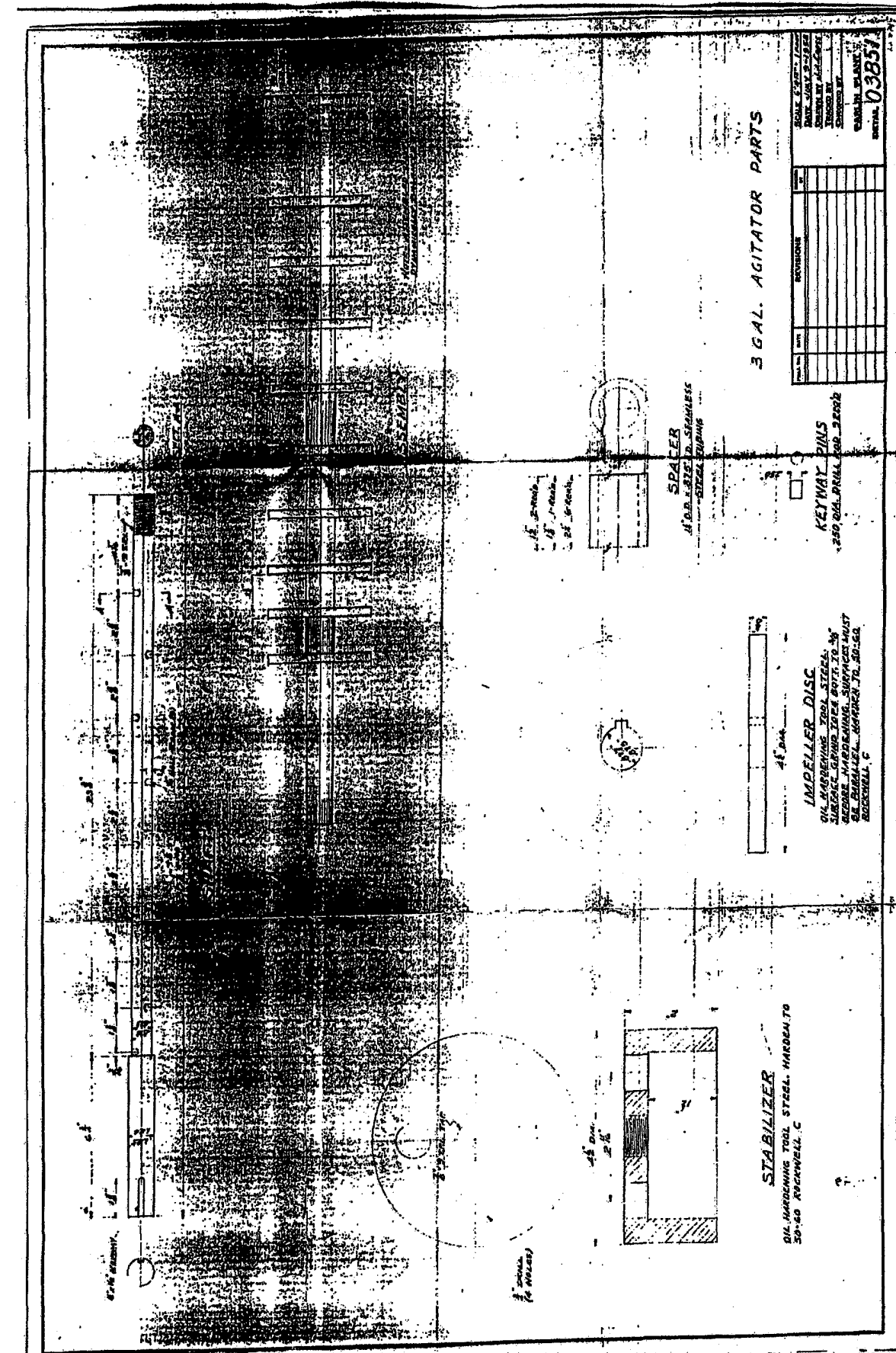
CHICAGO BOILER COMPANY
"Red Head"
WELDED STEEL PRODUCTS

DESCRIPTION: ASSEMBLY
FOR STANDARD 8-GAL SAND GRABBER
DATE: 2-2-58 SCALE: 1/4"=1' DRAWING
BY: E.E. CHECK BY: NO. C-3336-A









3 GAL. AGITATOR PARTS

REV.	DESCRIPTION	DATE	BY
1	AS SHOWN	JULY 1952	JULY 1952
2	REVISION		
3	REVISION		
4	REVISION		
5	REVISION		
6	REVISION		
7	REVISION		
8	REVISION		
9	REVISION		
10	REVISION		
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