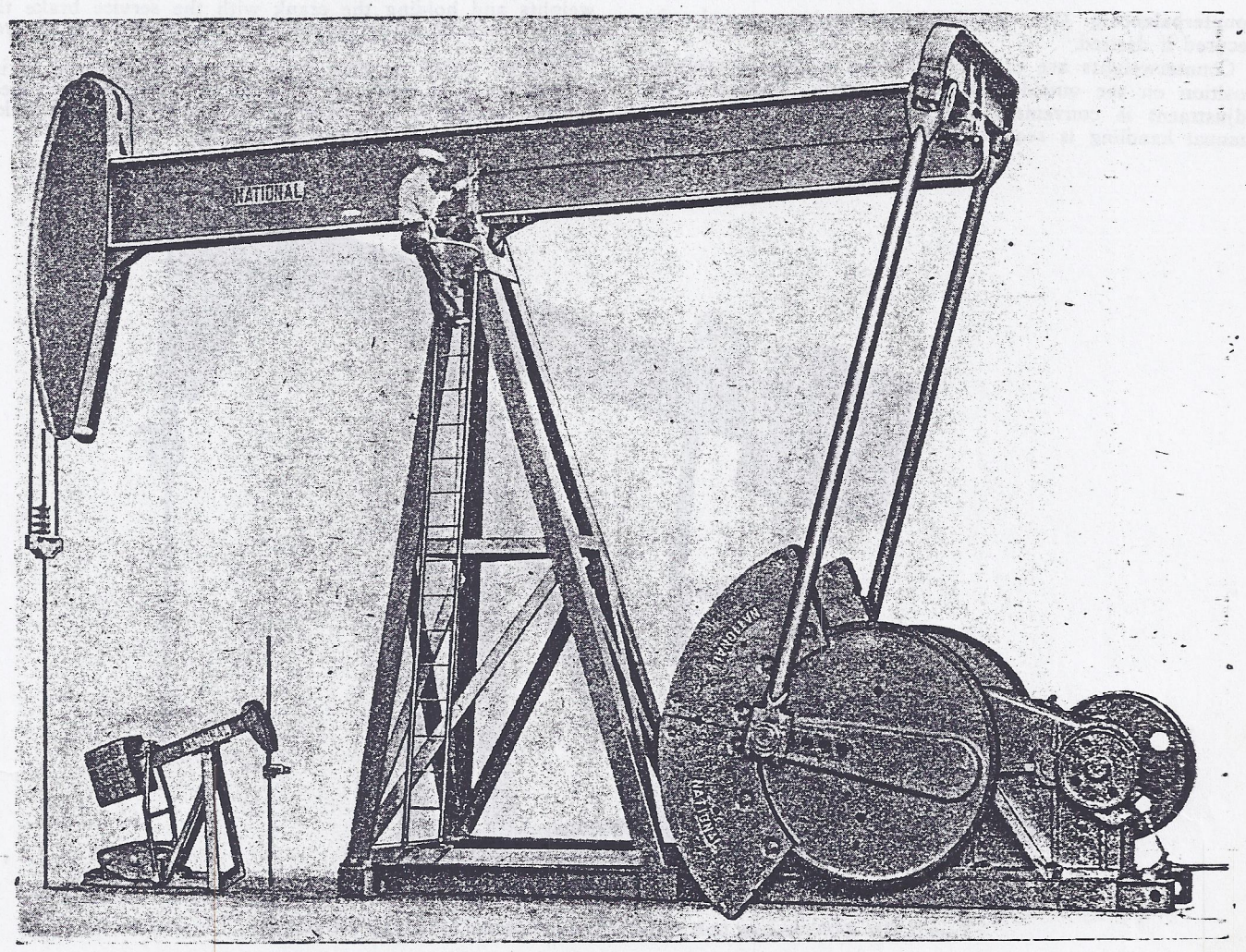
THE NATIONAL SUPPLY COMPANY

NATIONAL UNIT PUMPERS

(Patented)



Comparison of the smallest and largest National Unit Pumpers. The largest is the Type D-32SN-452DW

National Unit Pumpers are built in eleven types in beam or crank counterweighting types, thus providing an economical pumping unit for any pumping need.

FRAME AND SAMSON POSTS are arc welded into sturdy units. All Samson posts are strongly braced providing unusual resistance to stress and vibration. The Samson post is further strengthened and stiffened by welding in the saddle bracket which supports the shaft on which the walking beam is supported through the adjustable walking beam saddle.

WALKING BEAMS are of I-beam section, carried on needle bearing equipped saddles which operate on a hardened and ground shaft clamped to the saddle brackets. The needle bearings on these saddles are fully enclosed. The beam is adjustable on the saddle, this adjustment provides a means of centering the hanger over the well.

ARC TYPE BEAM HANGERS provide a straight polished rod travel at maximum stroke. This hanger is easily and quickly removable from the beam, furnishing ample clearance for well servicing without disconnecting the pitmans or disturbing the alignment of the unit with the well. This assembly includes polished rod clamp and support.

PITMANS are of the unitary type and the equalized type. On the beam counterweighted type, holes are provided in the beam for use in changing the length of stroke by adjusting the beam pitman bearing along the beam. All beam pitman and saddle bearings are of the needle type.

REDUCTION GEARS are specially designed for oil field pumping service. They are of ample proportions favorable to long wear and are carried on well supported shafts. Reduction gears of single or double reduction type are used, depending on the type of service required. All gears are generated by National and are lapped and run in under load at the factory assuring efficient and quiet operation.

All reduction gears have automatic flood oiling systems, sealed against dust and water making them truly outdoor equipment. These refinements are the result of many years experience in building pumpers for any field condition.

STRUCTURAL MEMBER. The saddle, beam, pitman and wrist pin bearings of the structural member are all antifriction type bearings. They are enclosed with oil seals and reservoirs, and may be lubricated with either oil or grease.

CRANKS AND COUNTERWEIGHTS are of two types —plain cranks for beam counterweights, and Disc Type cranks for crank counterweighting.

Beam counterweighting effect covers a wide range. Weights may be installed in increments to provide closely balanced counterweight effect.

Crank Counterbalancing on the Disc Type cranks is by eccentric type disc cranks having the advantages of rotary

(Continued on following page)

NATIONAL UNIT PUMPERS

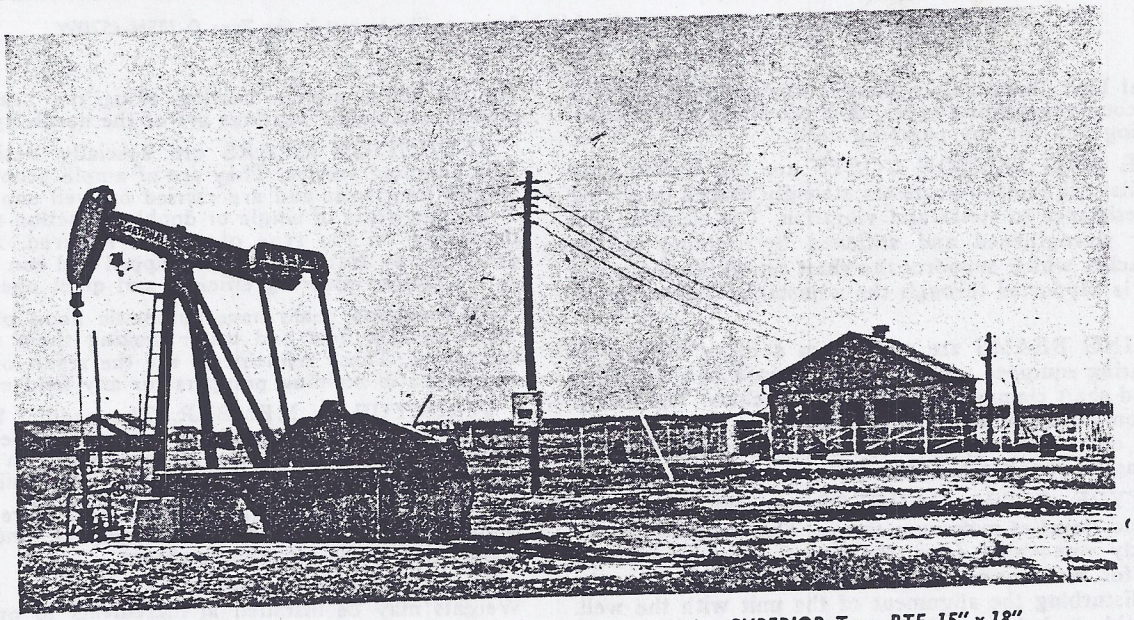
(Continued from preceding page)

counterbalancing. Counterweight lead or lag may also be secured if desired.

Counterweights are of the disc type, locked securely in position on the outside rim of the crank. Counterweight adjustment is convenient and safe because no lifting or manual handling is required. Weights cannot slide off the cranks. By using the prime mover to locate the counterweights and holding the crank with the service brake the weights may be easily moved to and locked in any desired position.

WRIST PINS on Disc Type Cranks are tapered to insure tightness in the crank. The pin is further securely held against turning by a keyway in the hole in the crank which receives a key in the tapered wrist pin.

Type D-9SN-40DP National Unit Pumper showing extended motor base and guards.

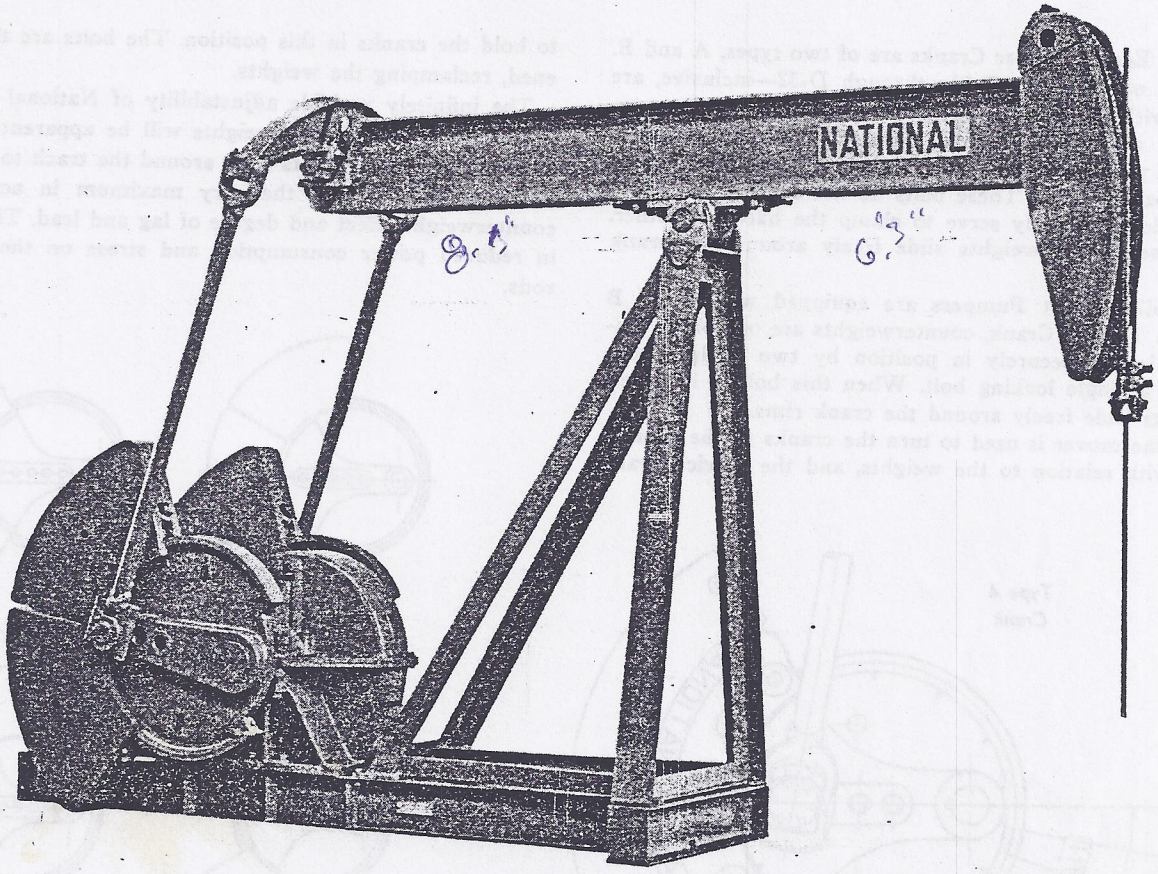


D-13SN-80DW National Unit Pumper, and Power House housing SUPERIOR Type BTE 15" x 18" Twin-Cyl. 2-cycle Gas Engine belted to 156 KVA Westinghouse Generator.

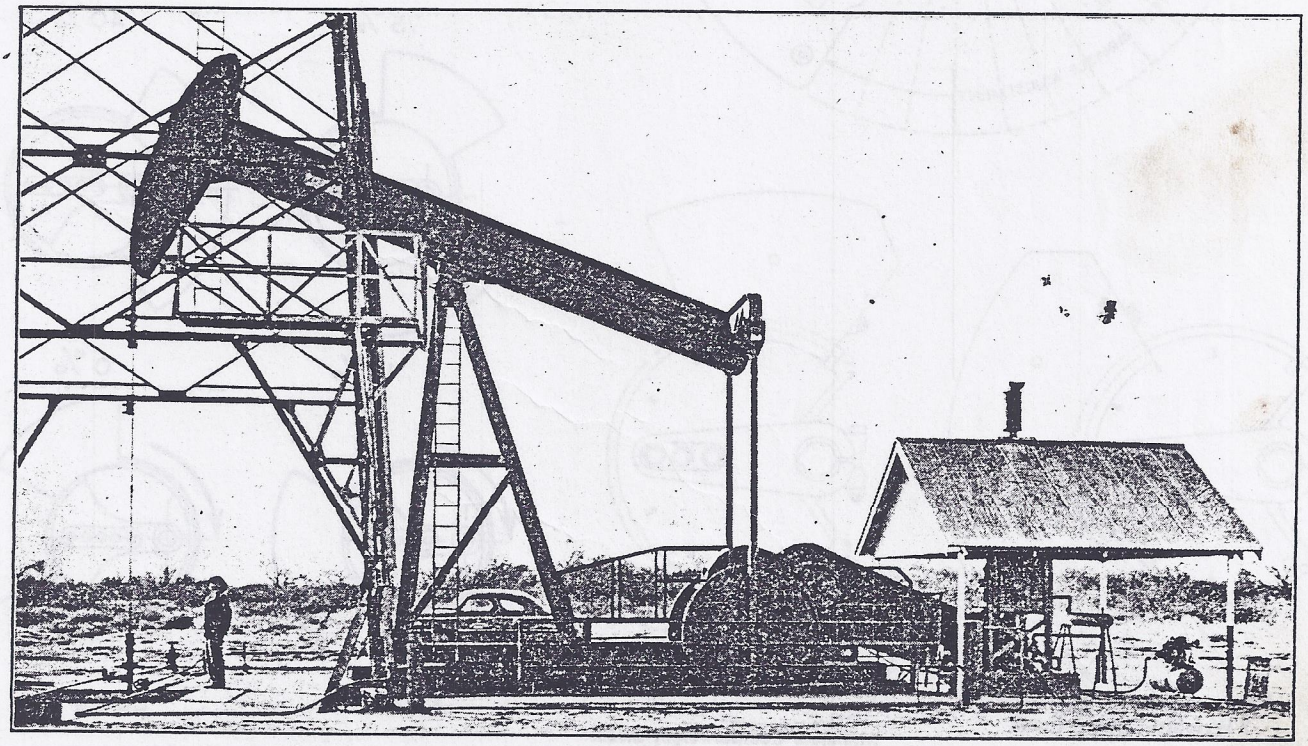
For Brief Specifications, see following pages.

THE NATIONAL SUPPLY COMPANY

NATIONAL UNIT PUMPERS



D-13SN-80DW National Unit Pumper



Type D-32SN-456DW Unit Pumper Installation

THE NATIONAL SUPPLY COMPANY

NATIONAL UNIT PUMPERS

CRANKS AND COUNTERWEIGHTS

Disc Type A and B

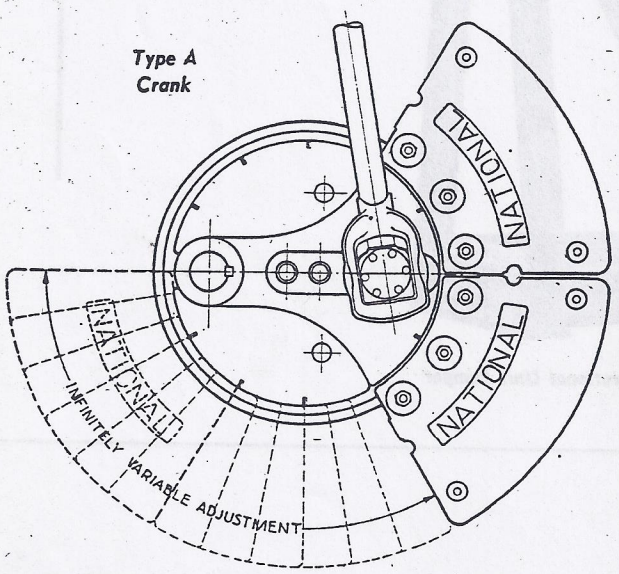
National Eccentric Disc Cranks are of two types, A and B.

Pumpers of the series D-21—through D-32—inclusive, are equipped with Type A Crank. On the Type A Crank, counterweights are made in two halves which are securely clamped in position on the outside rim of the crank by three separate locking bolts. These bolts do not support the counterweight load but only serve to clamp the halves together. When loosened the weights slide freely around the crank rims.

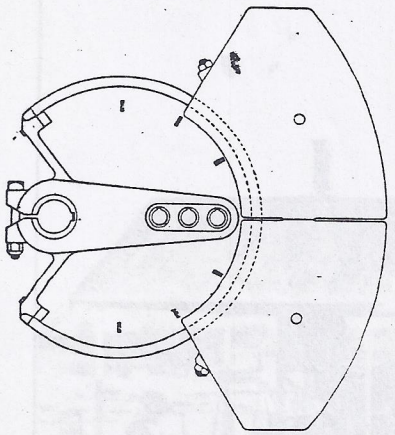
The medium Unit Pumpers are equipped with Type B Crank. On Type B Crank, counterweights are one-piece construction, locked securely in position by two wedges controlled by a single locking bolt. When this bolt is loosened the weights slide freely around the crank rims.

The prime mover is used to turn the cranks to the desired position with relation to the weights, and the service brake to hold the cranks in this position. The bolts are then tightened, reclamping the weights.

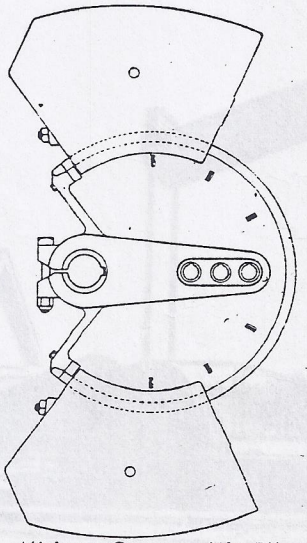
The infinitely variable adjustability of National Eccentric Disc Cranks and Counterweights will be apparent from the illustrations. The weights slide around the track to any position desired, allowing the very maximum in accuracy of counterweight effect and degree of lag and lead. This results in reduced power consumption and stress on the unit and rods.



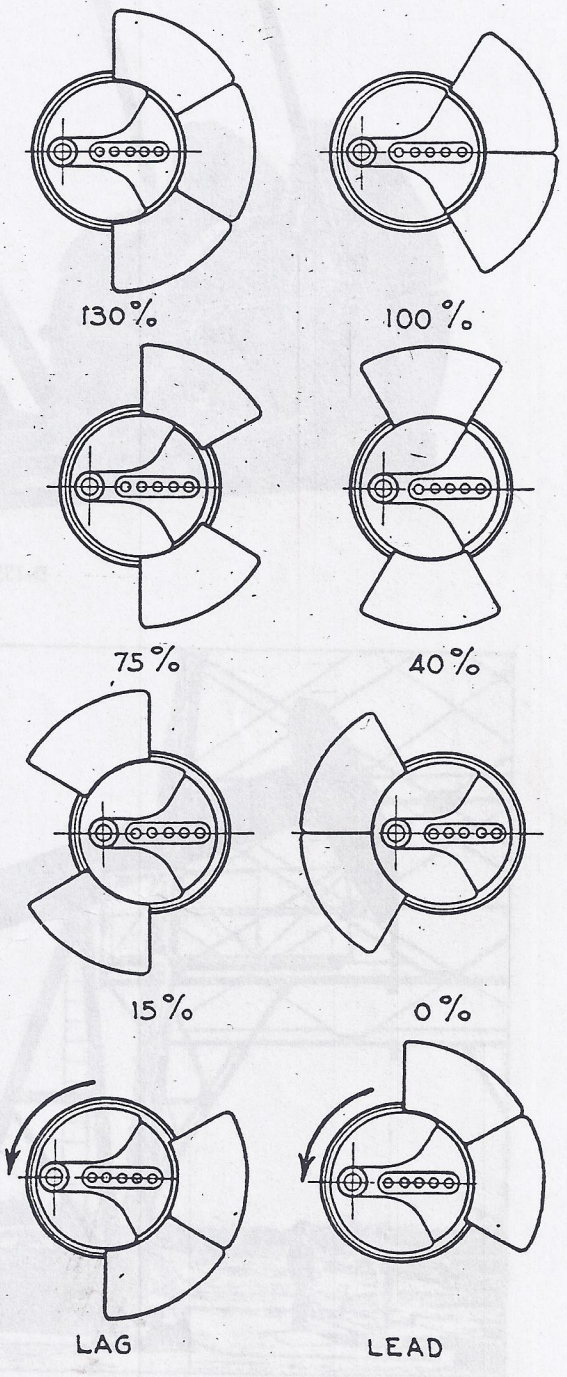
Type A Crank



Maximum Counterweight Effect
2 Weights—Type B Crank



Minimum Counterweight Effect
2 Weights—Type B Crank



A few of the Variable Adjustments

THE NATIONAL SUPPLY COMPANY

NATIONAL UNIT PUMPERS

SPECIFICATIONS—Beam Counterweighted

Type	D-3SN-6DP	D-4SN-10DP	D-5SN-16DP	D-7SN-25DP	D-9SN-40DP	D-11SN-57DP
API Walking Beam Rating, lbs.	3200	4100	5200	6725	8900	11,000
Beam Size, inches x weight	6x4″—12 lb	8x5¼″—17 lb	8x5¼″—21 lb	10x5¾″—26 lb	12x6½″—36 lb	14x8″—48 lb
Polish Rod Strokes, inches	12½, 14, 16	15, 17½, 20	16, 19, 22	21, 22½, 25, 28	26, 29, 34	27, 34½, 42
Hanger, Type	Arc	Arc	Arc	Arc	Arc	Arc
Well End Working Centers	2′ 0″	2′ 6″	2′ 9″	3′ 6″	4′ 3″	5′ 3″
Reduction Gear—Type	Double	Double	Double	Double	Double	Double
API Series Peak Torque Capacity at 20 spm, inch-lbs	6400	10,000	16,000	25,000	40,000	57,000
Overall Gear Ratio	26	29.5	31.85	29.2	29.2	30.0
Cranks—Type	Plain	Plain	Plain	Plain	Plain	Plain
Counterweights, Type	Beam	Beam	Beam	Beam	Beam	Beam
Weight of Each Counterweight, lbs	255	310	310	385	450	560
*Maximum Counterweight Effect, lbs	2526	4719	4924	5800	6873	9014
Pitman and Saddle Bearings, Type	Needle	Needle	Needle	Needle	Needle	Needle
Wrist Pin Bearings, Type	Roller	Roller	Roller	Roller	Roller	Roller
Regular Sheave—Pitch Diameter, inches x number and Belt Section	12″x2-A	12½″x3-A	16½″x3-B	18″x3-B	18″x3-C	18″x3—C
Weight Complete, less Counterweights, lbs.	590	1338	1500	1947	3500	4590

SPECIFICATIONS—Crank Counterweighted

Type	D-9SN- or D-9SB-40DW	D-11SN- or D-11SB-57DW	D-13SN- or D-13SB-80DW	D-13SN- or D-13SB-114SW	D-13SN- or D-13SB-114DW	D-15SN- or D-15SB-114SW	D-15SN- or D-15SB-114DW
API Walking Beam Rating, lbs.	8900	11,000	12,750	12,750	12,750	15,000	15,000
Beam Size, inches x weight	12x6½″—36 lb	14x8″—48 lb	16x8½″—58 lb	16x8½″—58 lb	16x8½″—58 lb	18x8¾″—70 lb	18x8¾″—70 lb
Polished Rod Strokes, inches	22,28,34	27, 34½, 42	33, 40½, 48	33, 40½, 48	33, 40½, 48	34, 44, 54	34, 44, 54
Hanger, Type	Arc	Arc	Arc	Arc	Arc	Arc	Arc
Well End Working Centers	4′ 3″	5′ 3″	6′ 0″	6′ 0″	6′ 0″	6′ 9″	6′ 9″
Reduction Gear—Type	Double	Double	Double	Single	Double	Single	Double
API Series Peak Torque Cap. at 20 spm, in.-lbs.	40,000	57,000	80,000	114,000	114,000	114,000	114,000
Overall Gear Ratio	29.2	30.0	29.6	10.2	30.8	10.2	30.8
Cranks, Type	B Disc	B Disc	B Disc	B Disc	B Disc	B Disc	B Disc
Counterweights, Type	Crank	Crank	Crank	Crank	Crank	Crank	Crank
Weight of each Counterweight, lbs	650	860	1225	1225	1225	1625	1625
*Maximum Counterweight Effect, lbs	4860	6100	8480	8480	8480	11,040	11,040
Pitman and Saddle Bearings, Type	Needle	Needle	Needle	Needle	Needle	Needle	Needle
Wrist Pin Bearings, Type	Roller	Roller	Roller	Roller	Roller	Roller	Roller
Regular Sheave—Pitch Diameter, inches x Number and Belt Section	18″x3-C	18″x3-C	18″x4-C	29″x7-C	26″x4-C	29″x7-C	26″x4—C
Weight Complete, less Counterweights, lbs.:							
(Without Sub Base)	4080	5536	8152	8971	8862	10.656	10.520
(With Sub Base)	4444	6166	8748	9567	9458	11,465	11,356

SPECIFICATIONS—Crank Counterweighted (Continued)

Type	D-21LN- or D-21LB-160SW	D-21LN- or D-21LB-160DW ✓	D-21LN- or D-21LB-228SW	D-21LN- or D-21LB-228DW	D-24LN- or D-24LB-228SW	D-24LN- or D-24LB-228DW	D-32SN-456DW
API Walking Beam Rating, lbs.	20,700	20,700	20,700	20,700	24,150	24,150	32,400
Beam Size, inches x weight	24x12″—120 lb	24x12″—120 lb	24x12″—120 lb	24x12″—120 lb	27x14″—145 lb	27x14″—145 lb	33x15¾″—200 lb
Polished Rod Strokes, inches	24, 34, 44, 54, 64	24, 34, 44, 54, 64	24, 34, 44, 54, 64	24, 34, 44, 54, 64	44, 54, 64, 74	44, 54, 64, 74	72, 84, 96, 108, 120
Hanger, Type	† Rein	† Rein	† Rein	† Rein	† Rein	† Rein	Arc
Well End Working Centers	10′ 8″	10′ 8″	10′ 8″	10′ 8″	12′ 4″	12′ 4″	15′ 0″
Reduction Gear—Type	Single	Double	Single	Double	Single	Double	Double
API Series Peak Torque Cap. at 20 spm, in.-lbs	160,000	160,000	228,000	228,000	228,000	228,000	456,000
Overall Gear Ratio	9.73	29.8	9.4	28.28	9.4	28.28	30.3
Cranks, Type	A Disc	A Disc	A Disc	A Disc	A Disc	A Disc	A Disc
Counterweights, Type	Crank	Crank	Crank	Crank	Crank	Crank	Crank
Weight of each Counterweight, and	1530—10,500	1530—10,500	1530—10,500	1530—10,500	1620—11,650	1620—11,650	
*Maximum Counterweight Effect, lbs.	1926—13,300	1926—13,300	1926—13,300	1926—13,300	2000—13,800	2000—13,800	4600—34,000
	2356—16,300	2356—16,300	2356—16,300	2356—16,300	2700—19,100	2700—19,100	
Pitman and Saddle Bearings, Type	Needle	Needle	Needle	Needle	Needle	Needle	Needle
Wrist Pin Bearings, Type	Roller	Roller	Roller	Roller	Roller	Roller	Roller
Regular Sheave—Pitch Diameter, inches x Number and Belt Section	32″x10-C	26″x6-C	36″x7-D	26″x7-C	36″x7-D	26″x7-C	48″x8—C
Weight Complete, less Counterweights, lbs.:							
(Without Sub Base)	15,200	15,000	18,425	17,060	21,000	19,635	
(With Sub Base)	15,500	15,300	18,775	17,410	21,400	20,035	39,365

* Includes Pitman Effect. Counterweight Effect is for Longest Stroke.

Note: D-21 and D-24 Series Pumpers may be furnished with Arc Type Hanger if desired.

† Arc Type Hanger is optional. When Arc Hanger is used, the unit name will then be D-21CN, D-21CB, D-24CN, or D-24CB.

THE NATIONAL SUPPLY COMPANY

IDEAL PLUNGER LIFT

(Patented, Patents Pending)

The Ultimate in Long-Stroke Pumping

The Ideal Plunger Lift is a proven and efficient method of producing oil wells, utilizing the tubing for its entire length as a cylinder, and utilizing the plunger as a piston which travels the full length of the tubing at each stroke. It is especially adapted for use in deep wells, the plunger being operated by the gas which is associated with the oil, or by additional gas that is injected into the well.

Many installations operating successfully during the past decade in domestic and foreign fields, have thoroughly proven this Plunger Lift as an efficient and economical method for producing oil. A recent survey covering about 100 installations, some of which have operated almost continuously for more than 7 years, conclusively indicates that the Plunger Lift has a unique field of application and is the most profitable production method in that field.

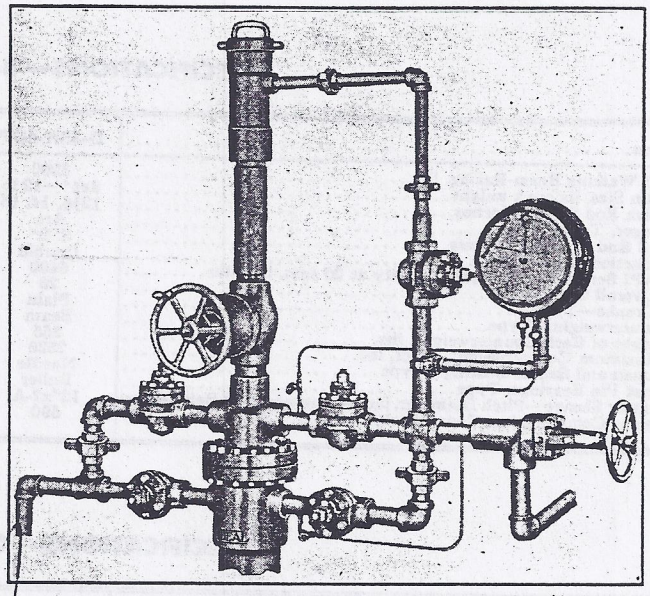
TYPE OF WELLS SUITABLE FOR PLUNGER LIFT

Wells having low productivity indices, namely those with tight sands (generally deep wells) present the producing problems for which the Ideal Plunger Lift was primarily developed and for which it is especially recommended. Wells of that type can ordinarily be produced to economical depletion by this method.

The Ideal Plunger Lift is also recommended for deep wells having high productivity indices where large volumes of fluid must be produced through 4" tubing. Under these conditions and with 400 psi Gas Pressure, as much as 700 barrels per day has been produced from a depth of 8000 feet.

Since the Ideal Plunger Lift utilizes all of the formation gas energy of the well, it is evident at once that wells having a relatively high formation gas-oil ratio will give the best performance record from the standpoint of economical operation. This has been demonstrated many times in wells that ceased to flow naturally, but later produced for several years on the formation gas alone after the Plunger Lift was installed.

In fields where repressuring is practiced, a considerable saving in horsepower and compressor investment may be realized by using the Ideal Plunger Lift on wells that lack sufficient gas to flow, generally edge wells.



Installation of Surface Equipment

TUBING

Because the plunger travels the full length of the tubing at each stroke, it is necessary that the tubing be furnished with certain specified tolerances for the inside diameter. Consult your National Supply Company representative for tubing specifications.

EXCESS GAS UTILIZED

On many leases there are flowing wells which will make their allowable production and yet have excess gas that may be available to operate other wells on Plunger Lift at the lower operating pressures.

Since the operating pressure of injected gas for the Ideal Plunger Lift seldom exceeds 250 psi, the cost of recycling the gas is extremely low.

SIZE OF PLUNGER LIFT UNIT

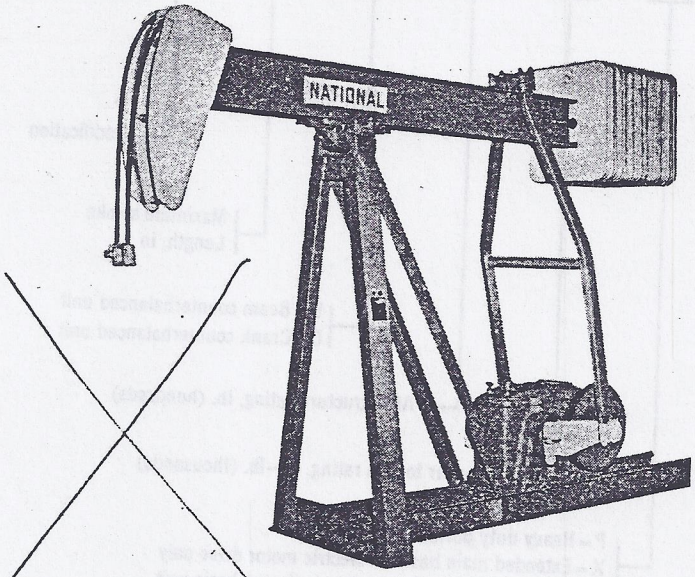
The rate of production with a given operating pressure increases with the size of the tubing, which is the same as the size of the Plunger Lift Unit. This is illustrated for a 6000-foot well in the following table:

Size of Tubing	Operating Pressure, Pounds per Square Inch	Rate of Production Barrels per Day
2½"	100	115
3"	100	182
4"	100	400

ARMCO National Supply Division

Pumping Units

NATIONAL PUMPING UNITS . . . CONSTRUCTION FEATURES



A Typical "E" Series Beam Counterbalanced Pumping Unit

CONSTRUCTION FEATURES — BEAM COUNTERWEIGHTED UNITS

FRAME

The box construction, cross-braced and jig welded, provides maximum strength and rigidity. The samson post is integral with the base with the front legs vertical to allow maximum well clearance.

PITMAN ASSEMBLY

The unitary, twin pitman assembly is integrally welded and cross-braced for strength and rigidity. Holes are provided in the beam for changing the stroke length except in the E-109B which uses three tapered holes in the crank for stroke length adjustment.

Saddle and pitman bearings are needle type, anti-friction bearings unequaled for this type of oscillating service.

WRIST PINS

Self-aligning bearings with predetermined factory adjustment in all wrist pins assure long trouble-free life. The pin is pressed into the crank and locked in place by a set screw. The E-109B of the beam counterweighted units has tapered wrist pins as in crank counterweighted units.

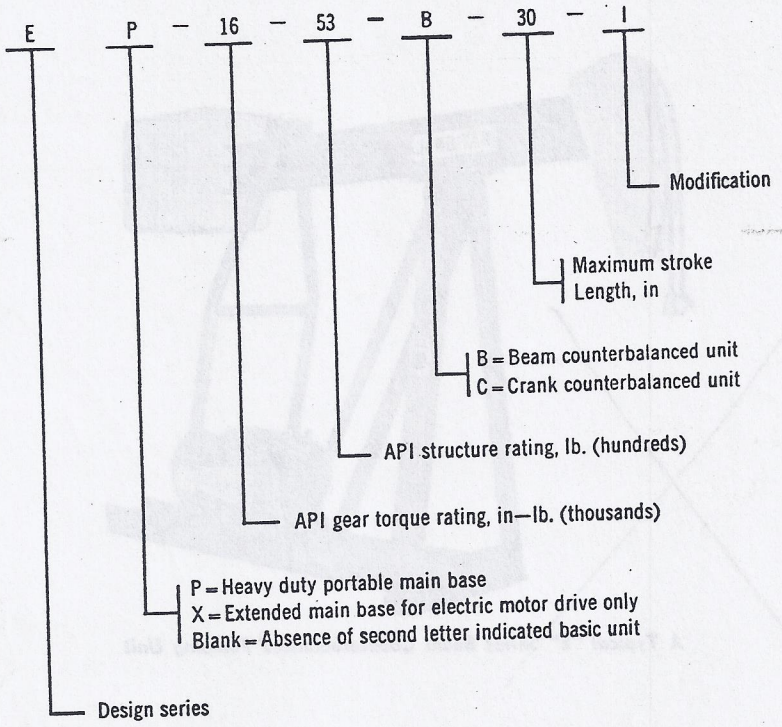
GEAR REDUCERS

Gear reducers, designed and manufactured to API standards, are available in sizes from 16,000 in. lbs. to 57,000 in. lbs. for beam counterweighted units. All reducers feature herringbone gears and anti-friction bearings for long, trouble-free life. Crankshaft and pinion shaft seals will not leak. This is made possible by the use of a unique sealing method.

Pumping Units

NATIONAL PUMPING UNITS . . .

API NOMENCLATURE



NATIONAL PUMPING UNIT SELECTION CHART—BEAM COUNTERBALANCED UNITS

API Gear Sizes Torque Ratings in Thousandths of Inch-Pounds	Maximum Stroke Length	Structure Rating (Lbs.)	Maximum Counterweight Effect (Lbs.)	National Pumping Unit
16	24	5300	4299	E-16-53B-24 EP-16-53B-24
	30	4300	3577	E-16-43B-30 EP-16-43B-30
	30	5300	4314	E-16-53B-30 EP-16-53B-30
25	30	6700	5605	E-25-67B-30 EP-25-67B-30
	36	5600	4642	E-25-56B-36 EP-25-67B-36
	36	6700	5580	E-25-67B-36 EP-25-67B-36
40	36	8900	7215	E-40-89B-36 EP-40-89B-36 EX-40-89B-36
	42	7600	6246	E-40-76B-42 EP-40-76B-42 EX-40-76B-42
	42	8900	7292	E-40-89B-42 EP-40-89B-42 EX-40-89B-42
57	36	8900	7215	E-57-89B-36 EP-57-89B-36 EX-57-89B-36
	42	7600	6246	E-57-76B-42 EP-57-76B-42 EX-57-76B-42
	42	8900	7292	E-57-89B-42 EP-57-89B-42 EX-57-89B-42
57	42	10900	9120	E-57-109B-42 EP-57-109B-42 EX-57-109B-42
	48	9500	7747	E-57-95B-48 EP-57-95B-48 EX-57-95B-48
	48	10900	9020	E-57-109B-48 EP-57-109B-48 EX-57-109B-48

ARMCO National Supply Division

NATIONAL PUMPING UNIT SPECIFICATIONS

BEAM COUNTERWEIGHTED PUMPING UNITS

Type	E-16-53B-24 EP-16-53B-24	E-16-43B-30 EP-16-43B-30	E-16-53B-30 EP-16-53B-30	E-25-67B-30 EP-25-67B-30	E-25-56B-36 EP-25-56B-36
*Structural Rating, lbs.	5300	4300	5300	6700	5600
Beam Size, Inches x Weight per foot	10x5¾-21#	10x5¾-21#	10x5¾-25#		
***Wellhead Clearance	32¼	28⅞	25⅝	37	29¾
Polished Rod Stroke, inches	17, 19, 21, 24	21½, 23½, 26½, 30	21, 24, 26, 30	22, 24, 26½, 30	32, 36
Working Center, Well End	36	45	45	42	
Working Center, Pitman End, Inches	29, 34, 39, 44	29, 34, 39, 44	29, 34, 39, 44	31½, 36½, 41½, 46½	34, 39
Gear Reducer, Type	Double	Double	Double	Double	Double
API Peak Torque @ 20 SPM, in-lbs.	16,000	16,000	16,000	25,000	25,000
Overall Gear Ratio	31.85	31.85	31.85	29.2	29.2
**Max. Counterweight Eff., lbs.	4299	3577	4314	5605	4642
Available Sheaves Pitch Dia. Inches x No. & Belt Section	16½-3B	16½-3B	16½-3B	18-3B	18-3B

*Within API Rating for Walking Beam.
**Includes Pitman Effect and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

BEAM COUNTERWEIGHTED PUMPING UNITS

Type	E-25-67B-36 EP-25-67B-36	E-40-89B-36 EP-40-89B-36 EX-40-89B-36	E-40-76B-42 EP-40-76B-42 EX-40-76B-42	E-40-89B-42 EP-40-89B-42 EX-40-89B-42	E-57-89B-36 EP-57-89B-36
*Structural Rating, lbs.	6700	8900	7600	8900	8900
Beam Size, Inches x Weight per foot		12x6⅝-36#	12x8-40#	12x8-45#	12x6⅝-36#
***Wellhead Clearance	42	37½	30½	29¼	37½
Polished Rod Stroke, inches	23, 25, 28, 36	29½, 31½, 36	32, 35, 38, 42	34½, 36½, 42	29½, 31½, 36
Working Center, Well End	42	51	63	59½	51
Working Center, Pitman End, inches	25¼, 30¼, 35¼, 40¼	38¾, 44, 49¼	41½, 46¾, 52, 57¼	38¾, 44, 49¼	38¾, 44, 49¼
Gear Reducer, Type	Double	Double	Double	Double	Double
API Peak Torque @ 20 SPM, in-lbs.	25,000	40,000	40,000	40,000	57,000
Overall Gear Ratio	29.2	31.482	31.482	31.482	31.186
**Max. Counterweight Eff., lbs.	5580	7215	6246	7292	7215
Available Sheaves Pitch Dia. Inches x No. & Belt Section	16-3B	19.5-4B 19.5-3C	19.5-4B 19.5-3C	19.5-4B 19.5-3C	23-4B 23-3C 18-3C

*Within API Rating for Walking Beam.
**Includes Pitman Effect and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

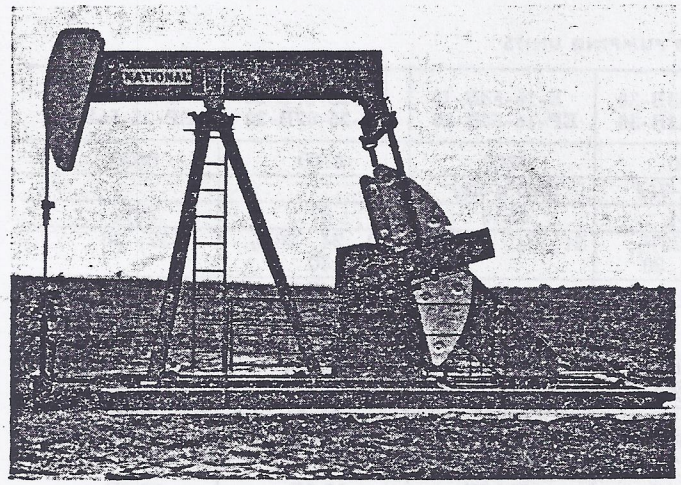
BEAM COUNTERWEIGHTED PUMPING UNITS

Type	E-57-76B-42 EP-57-76B-42	E-57-89B-42 EP-57-89B-42	E-57-109B-42 EP-57-109B-42 EX-57-109B-42	E-57-95B-48 EP-57-95B-48 EX-57-95B-48	E-57-109B-48 EP-57-109B-48 EX-57-109B-48
*Structural Rating, lbs.	7600	8900	10900	9500	10900
Beam Size, Inches x Weight per foot	12x8-40#	12x8-45#	14x8-48#	14x8-53#	14x8-48#
***Wellhead Clearance	30½	29¼	49	41	46
Polished Rod Stroke, inches	32, 35, 38, 42	34½, 36½, 42	27, 34½, 42	31, 39½, 48	30½, 39, 48
Working Center, Well End	63	59½	63	72	63
Working Center, Pitman End, inches	41½, 46¾, 52, 57¼	38¾, 44, 49¼	62⅛	62⅛	53¼
Gear Reducer, Type	Double	Double	Double	Double	Double
API Peak Torque @ 20 SPM, in-lbs.	57,000	57,000	57,000	57,000	57,000
Overall Gear Ratio	31.186	31.186	31.186	31.186	31.186
**Max. Counterweight Eff., lbs.	6246	7292	9120	7747	9020
Available Sheaves Pitch Dia. Inches x No. & Belt Section	23-4B 23-3C 18-3C	23-4B 23-3C 18-3C	18-3C 23-4B 23-3C	18-3C 23-4B 23-3C	18-3C 23-4B 23-3C

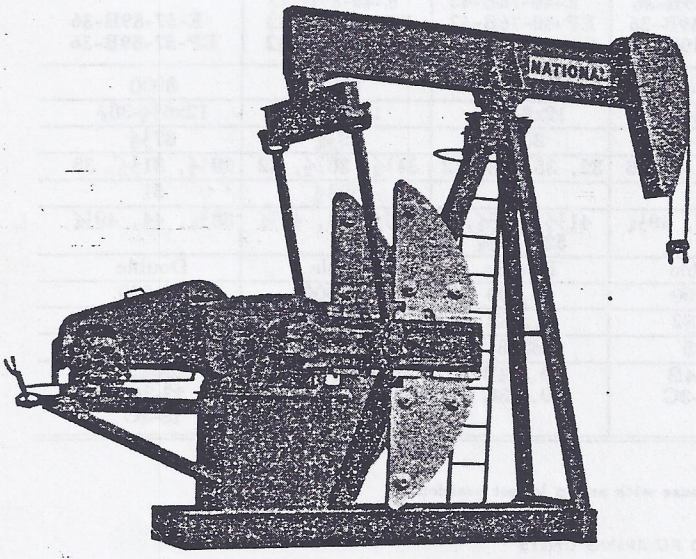
*Within API Rating for Walking Beam.
**Includes Pitman Effect and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

Pumping Units

NATIONAL PUMPING UNITS — CONSTRUCTION FEATURES



Heavy Duty Portable



High Drive

TYPE F CRANK COUNTERWEIGHTED PUMPING UNITS

NATIONAL crank counterweighted pumping units are available in eight gear reducer sizes with beam and structure sizes from 6700 lb. to 24,600 lb. Within this comprehensive range of sizes and ratings, there is a NATIONAL pumping unit to meet most pumping requirements.

MAIN BASE

The compact, box section main base of the F design allows a smaller, less expensive foundation. Crank and counterweights are given adequate clearance without cutting the top flange of the main base runners.

The main base incorporates the "building block" design for accommodation of all high speed engines, slow speed engines, electric motor or high drive extension. This design permits changing the type of drive in the field without alteration in the main base.

A heavy reinforced cross-member supports the rear samson post leg. This removes the load from the upper flange of the main base runners.

SAMSON POST

Tripod construction of the samson post has wide spread front legs for improved stability. These legs are made of wide flanged beams for maximum strength. The heavy mating flanged connection between front and rear legs means faster field assembly. The flanges, not the bolts, support the structure load.

SADDLE AND PITMAN BEARINGS

A *five year warranty* on the saddle and pitman bearing is made possible by improved lubrication and by placing the load zone on the bottom of the bearing. The diameter of the shaft is reduced at the oil seal. This maintains lubrication in the bearing load zone even if leaks occur.

CRANKS AND COUNTERWEIGHTS

Blade type cranks using the rack and pinion principle make counterweight adjustment easy. Maximum flexibility of counterbalancing is accomplished by using a combination of master, auxiliary and insert weights. This gives a multitude of combinations for optimum counterweight effect. A cross section is shown on the next page.

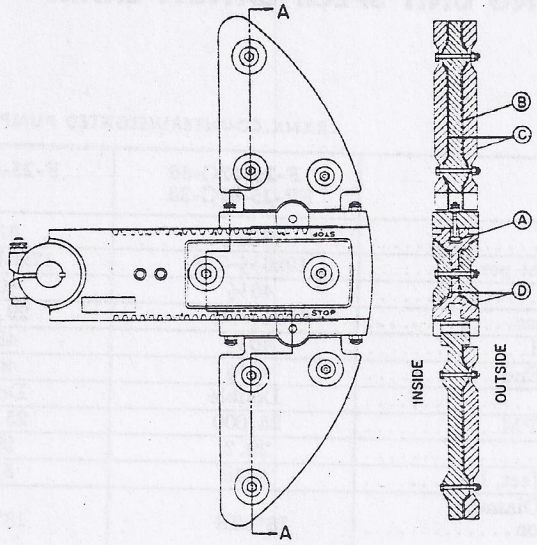
GEAR REDUCER

Gear reducers manufactured to API standards cover the full range of popular sizes from 25,000 to 320,000 in.-lbs. All reducers feature herringbone gears.

Crankshaft and pinion shaft seals *will not* leak. This is made possible by using a unique sealing method.

ARMCO National Supply Division

NATIONAL TYPE F PUMPING UNIT CRANK AND COUNTERWEIGHT SYSTEM



A—T Bolt
B—Master Weight
C—Auxiliary Weight
D—Insert Weight

PUMPING UNIT SELECTION CHART—CRANK COUNTERWEIGHTED UNITS

SEE SPECIFICATIONS—PAGES 3366-3368

API Gear Size	Maximum Stroke, In.	Structure Rating, Lb.	Maximum Ctwt. Effect, Lb.	Unit Nomenenclature	
25	30	6700	6249	F-25-67C-30	FP-25-67C-30
	36	6700	5167	F-25-67C-36	FP-25-67C-36
40	30	6700	6249	F-40-67C-30	FP-40-67C-30
	36	6700	5167	F-40-67C-36	FP-40-67C-36
		8900	8277	F-40-89C-36	FP-40-89C-36
	42	7600	7030	F-40-76C-42	FP-40-76C-42
		8900	7097	F-40-89C-42	FP-40-89C-42
57	36	8900	8277	F-57-89C-36	FP-57-89C-36
	42	7600	7032	F-57-76C-42	FP-57-76C-42
		8900	7097	F-57-89C-42	FP-57-89C-42
		10,900	9495	F-57-109C-42	FP-57-109C-42
	48	9500	8250	F-57-95C-48	FP-57-95C-48
		10,900	8345	F-57-109C-48	FP-57-109C-48
80	42	10,900	9495	F-80-109C-42	FP-80-109C-42
	48	9500	8250	F-80-95C-48	FP-80-95C-48
		10,900	8345	F-80-109C-48	FP-80-109C-48
		13,300	11,940	F-80-133C-48	FP-80-133C-48
	54	11,900	10,550	F-80-119C-54	FP-80-119C-54
		13,300	10,650	F-80-133C-54	FP-80-133C-54
114	48	13,300	11,940	F-114-133C-48	FP-114-133C-48
	54	11,900	10,550	F-114-119C-54	FP-114-119C-54
		13,300	10,650	F-114-133C-54	FP-114-133C-54
		16,900	15,570	F-114-169C-54	FP-114-169C-54
	64	14,300	13,035	F-114-143C-64	FP-114-143C-64
		16,900	13,195	F-114-169C-64	FP-114-169C-64
160	54	16,900	15,570	F-160-169C-54	FP-160-169C-54
	64	14,300	13,035	F-160-143C-64	FP-160-143C-64
		16,900	13,195	F-160-169C-64	FP-160-169C-64
		20,000	18,550	F-160-200C-64	FP-160-200C-64
	74	17,300	15,915	F-160-173C-74	FP-160-173C-74
		20,000	16,150	F-160-200C-74	FP-160-200C-74
228	64	20,000	18,550	F-228-200C-64	FP-228-200C-64
	74	17,300	15,915	F-228-173C-74	FP-228-173C-74
		20,000	16,150	F-228-200C-74	FP-228-200C-74
		24,600	21,400	F-228-246C-74	FP-228-246C-74
	86	21,200	18,250	F-228-212C-86	FP-228-212C-86
		24,600	18,555	F-228-246C-86	FP-228-246C-86
320	74	24,600	21,400	F-320-246C-74	FP-320-246C-74
	86	21,200	18,250	F-320-212C-86	FP-320-212C-86
		24,600	18,555	F-320-246C-86	FP-320-246C-86

Pumping Units

NATIONAL PUMPING UNIT SPECIFICATION CHART

CRANK-COUNTERWEIGHTED PUMPING UNITS

	F-25-67C-30 FP-25-67C-30	F-25-67C-36	F-40-67C-30	F-40-67C-36
*Structural Rating, lbs.	6700	6700	6700	6700
Beam Size, Inches x Weight per ft.	12x6½–27#	12x6½–27#	12x6½–27#	12x6½–27#
***Wellhead Clearance	46½	40¼	46½	40¼
Polished Rod Stroke, Inches	24, 30	29, 36	24, 30	29, 36
Working Center, Well End	40½	48⅝	40½	48⅝
Working Center, Pitman End	40½	40½	40½	40½
Gear Reducer Type	Double	Double	Double	Double
API Peak Torque @ 20 SPM	25,000	25,000	40,000	40,000
Overall Gear Ratio	29.2	29.2	31.482	31.482
**Max. Counterweight effect, lbs.	6249	5167	6249	5167
Available Sheaves, Pitch Diameter Inches x No. & Belt Section	18″x3B	18″x3B	19½″x4B 19½″x3C	19½″x4B 19½″x3C

*Within API Rating for Walking Beam.
**Includes Pitman Effect and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

CRANK-COUNTERWEIGHTED PUMPING UNITS

	F-57-109C-42 FP-57-109C-42	F-57-95C-48 FP-57-95C-48	F-57-109C-48 FP-57-109C-48	F-80-109C-42 FP-80-109C-42
*Structural Rating, lbs.	10,900	9,500	10,900	10,900
Beam Size, Inches x Weight per foot	16x7–40#	16x7–40#	18x7½–45#	16x7–40#
***Wellhead Clearance	57⅛	51¼	51¼	57½
Polished Rod Stroke, Inches	26, 34, 42	29½, 38½, 48	32, 40, 48	26, 34, 42
Working Center, Well End	56¾	64¾	63	56¾
Working Center, Pitman End	56¾	56¾	63	56¾
Gear Reducer, Type	Double	Double	Double	Double
API Peak Torque @ 20 SPM	57,000	57,000	57,000	80,000
Overall Gear Ratio	31.186	31.186	31.186	31.111
**Max. Counterweight effect, lbs.	10,245	8903	8998	10,245
Available Sheaves, Pitch Diameter Inches x No. & Belt Section	18x3C 23x4B 23x3C	18x3C 23x3C 23x4B	18x3C 22x3C 23x4B	18x3D 18x4C 24x4C

*Within API Rating for Walking Beam.
**Includes Pitman Effect and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

CRANK-COUNTERWEIGHTED PUMPING UNITS

	F-114-133C-48 FP-114-133C-48	F-114-119C-54 FP-114-119C-54	F-114-133C-54 FP-114-133C-54	F-114-169C-54 FP-114-169C-54
*Structural Rating, lbs.	13,300	11,900	13,300	16,900
Beam Size, Inches x Weight per Foot	18x7½–55#	18x7½–55#	18x7½–55#	21x8¼–62#
***Wellhead Clearance	65¾	59 9/16	59 9/16	73¾
Polished Rod Stroke, Inch	32, 40, 48	36, 45, 54	38, 46, 54	34, 44, 54
Working Center, Well End	64¾	72⅞	72	72⅞
Working Center, Pitman End	64¾	64¾	72	72⅞
Gear Reducer Type	Double	Double	Double	Double
API Peak Torque @ 20 SPM	114,000	114,000	114,000	114,000
Overall Gear Ratio	31.141	31.141	31.141	31.141
**Max. Counterweight effect, lbs.	12,290	10,865	10,965	15,875
Available Sheaves, Pitch Diameter Inches x No. & Belt Section	18x3D 18x4C 24x4C	18x3D 18x4C 24x4C	18x3D 18x4C 24x4C	18x3D 18x4C 24x4C

*Within API Rating for Walking Beam.
**Includes Pitman Effect and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

ARMCO National Supply Division

NATIONAL PUMPING UNIT SPECIFICATION CHART

CRANK-COUNTERWEIGHTED PUMPING UNITS

F-40-89C-36 FP-40-89C-36	F-40-76C-42 FP-40-76C-42	F-40-89C-42 FP-40-89C-42	F-57-89C-36 FP-57-89C-36	F-57-76C-42 FP-57-76C-42	F-57-89C-42 FP-57-89C-42
8900	7600	8900	8900	7600	8900
16x5½–31#	16x5½–31#	16x7–36#	16x5½–31#	16x5½–31#	16x7–36#
52	43¼	43¼	52	43¼	43¼
36, 29	42, 34	42, 37, 28½	29, 36	34, 42	28½, 35, 42
48⅝	56¾	54	48⅝	56¾	54
48⅝	54	54	48⅝	48⅝	54
Double	Double	Double	Double	Double	Double
40,000	40,000	40,000	57,000	57,000	57,000
31.482	31.482	31.482	31.186	31.186	31.186
8277	7072	7097	8277	7032	7097
19½"x4B 19½"x3C	19½"x4B 19½"x3C	19½"x4B 19½"x3C	18"x3C 23x3C 23"x4B	18x3C 23"x3C 23x4B	18"x3C 23x4B 23x3C

*Within API Rating for Walking Beam.
**Includes Pitman Effect and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

CRANK-COUNTERWEIGHTED PUMPING UNITS

F-80-95C-48 FP-80-95C-48	F-80-109C-48 FP-80-109C-48	F-80-133C-48 FP-80-133C-48	F-80-119C-54 FP-80-119C-54	F-80-133C-54 FP-80-133C-54
9500	10,900	13,300	11,900	13,300
16x7–40#	18x7½–45#	18x7½–55#	18x7½–55#	18x7½–55#
51¼	51¼	65¾	59 9/16	59 9/16
29½, 38½, 48	32, 40, 48	32, 40, 48	36, 45, 54	38, 46, 54
64¾	63	64¾	72⅞	72
56¾	63	64¾	64¾	72
Double	Double	Double	Double	Double
80,000	80,000	80,000	80,000	80,000
31.111	31.111	31.111	31.111	31.111
8903	8998	12,290	10,865	10,965
18x3D 18x3C 24x4C	18x3D 18x4C 24x4C	18x3D 18x4C 24x4C	18x3D 18x4C 24x4C	18x3D 18x4C 24x4C

*Within API Rating for Walking Beam.
**Includes Pitman Effect and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

CRANK-COUNTERWEIGHTED PUMPING UNITS

F-114-143C-64 FP-114-143C-64	F-114-169C-64 FP-114-169C-64	F-160-169C-54 FP-160-169C-54	F-160-143C-64 FP-160-143C-64	F-160-169C-64 FP-160-169C-64
14,300	16,900	16,900	14,300	16,900
21x8¼–68#	21x8¼–68#	21x8¼–62#	21x8¼–68#	21x8¼–68#
59⅛	59⅛	73¾	59⅛	59⅛
40½, 52, 64	44, 54, 64	34, 44, 54	40½, 52, 64	44, 54, 64
86⅜	81	72⅞	86⅜	81
72⅞	81	72⅞	72⅞	81
Double	Double	Double	Double	Double
114,000	114,000	160,000	160,000	160,000
31.141	31.141	31.297	31.297	31.297
13,291	13,451	15,875	13,291	13,451
18x3D 18x4C 24x4C	18x3D 18x4C 24x4C	18x4D 26x5C 31x5C	18x4D 26x5C 31x5C	18x4D 26x5C 31x5C

*Within API Rating for Walking Beam.
**Includes Pitman Effect and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

CONTINUED ON PAGE 3368

NATIONAL PUMPING UNIT SPECIFICATIONS (CONTINUED FROM PAGE 3367)

CRANK WEIGHTED PUMPING UNITS

	F-160-200C-64 FP-160-200C-64	F-160-173C-74 FP-160-173C-74	F-160-200C-74 FP-160-200C-74	F-228-200C-64 FP-228-200C-64
*Structural Rating, lbs.	20,000	17,300	20,000	20,000
Beam Size, Inches x Weight Per Foot	24 x 9-84 lbs.	24 x 9-84 lbs.	24 x 9-84 lbs.	24 x 9-84 lbs.
***Wellhead Clearance	6'-10½	71¾	71¾	6-10½
Polished Rod Strokes, Inches	44, 54, 64	51, 61½, 74	54, 64, 74	44, 54, 64
Working Ctr., Well End	86⅜	99⅞	96	86⅜
Working Ctr., Pitman End	86⅜	86⅜	96	86⅜
Gear Reducer Type	Double	Double	Double	Double
API Peak Torque @ 20 SPM	160,000	160,000	160,000	228,000
Overall Gear Ratio	31.297	31.297	31.297	31.297
**Maximum Counterweight effect, lbs.	15,875	13,291	13,451	18,919
Available Sheaves, Pitch Diameter Inches x No. & Belt Section	18x4D 26x5C 31x5C	18x4D 26x5C 31x5C	18x4D 26x5C 31x5C	18x4D 26x6C 34x6C

	F-228-173C-74 FP-228-173C-74	F-228-200C-74 FP-228-200C-74	F-228-246C-74 FP-228-246C-74	F-228-212C-86 FP-228-212C-86
*Structural Rating, lbs.	17,300	20,000	24,600	21,200
Beam Size, Inches x Weight Per Foot	24 x 9-84 lbs.	24 x 9-94 lbs.	24 x 12-100 lbs.	24 x 12-100 lbs.
***Wellhead Clearance	71¾	71¾	95¼	82½
Polished Rod Stroke, Inches	51, 62½, 74	54, 64, 74	50, 62, 74	58, 72, 86
Working Ctr., Well End	99⅞	96	99⅞	116⅛
Working Ctr., Pitman End	86⅜	96	99⅞	99⅞
Gear Reducer Type	Double	Double	Double	Double
API Peak Torque @ 20 SPM	228,000	228,000	228,000	228,000
Overall Gear Ratio	31.297	31.297	31.297	31.297
Maximum Counterweight effect, lbs.	16,235	16,470	22,954	19,592
Available Sheaves, Pitch Diameter Inches x No. & Belt Section	18x4D 26x6C 34x6C	18x4D 26x6C 34x6C	18x4D 26x6C 34x6C	18x4D 26x6C 34x6C

	F-228-246C-86 FP-228-246C-86	F-320-246C-74	F-320-212C-86	F-320-246C-86
*Structural Rating, lbs.	24,600	24,600	21,200	24,600
Beam Size, Inches x Weight Per Foot	27x10⅛-114 lbs.	24x12-100 lbs.	24x12-100 lbs.	27x10⅛-114 lbs.
***Wellhead Clearance	82½	95¼	82½	82½
Polished Rod Stroke, Inches	62, 74, 86	50, 62, 74	58, 72, 86	62, 74, 86
Working Ctr., Well End	111	99⅞	116⅛	111
Working Ctr., Pitman End	111	99⅞	99⅞	111
Gear Reducer Type	Double	Double	Double	Double
API Peak Torque @ 20 SPM	228,000	320,000	320,000	320,000
Overall Gear Ratio	31.297	31.111	31.111	31.111
**Max. Counterweight effect, lbs.	19,897	22,954	19,592	19,897
Available Sheaves, Pitch Diameter Inches x No. & Belt Section	18x4D 26x6C 34x6C	34x8C 18x6D 26x6D 48x8C	34x8C 18x6D 48x8C 20x0D	34x8C 18x6D 48x8C 26x6D

*Within API Rating for Walking Beam.
**Includes Pitman Effect and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

THE NATIONAL SUPPLY COMPANY

PORTABLE DRILLING RIG

NATIONAL PORTABLE DRILLING MACHINES . . .

(Patented)

NATIONAL Portable Drilling Machines for cable tool drilling have been in successful use for many years. Through constant improvement and the addition of new models they have been made especially economical and effective for present day cable tool drilling requirements.

Where moving conditions are unusually difficult, these machines are especially efficient. Their solid foundations and compactness of design make an installation of unusual stability and strength.

AVAILABLE IN 3 SIZES . . .

Three sizes of NATIONAL Drilling Machines are made to cover the complete range of cable tool drilling from medium to the heaviest depth requirements as follows:

No. 2-A

Rated capacity 3500 ft.
Safe casing load 25 tons
Total weight with sills 25,400 lbs.

No. 3A-6

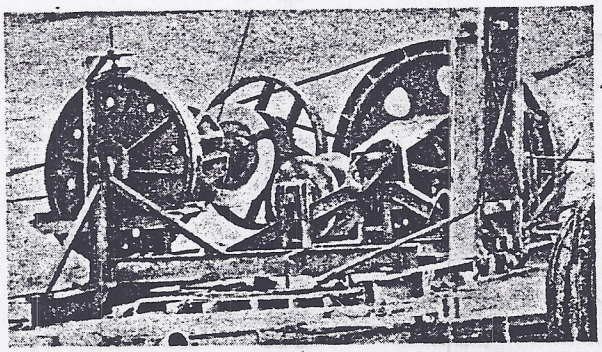
Rated capacity 4000 ft.
Safe casing load 25 tons
Total weight with sills 36,000 lbs.

No. 3A-6-60

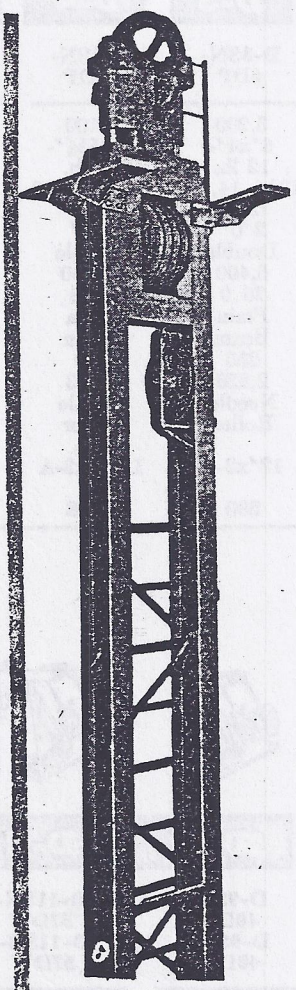
Rated capacity 6000 ft.
Safe casing load 60 tons
Total weight with sills 40,500 lbs.

All of above machines are adapted to straight wire line spudding, as well as wire line beam drilling, through the use of practical mast-top and beam shock absorbers.

For further particulars ask for descriptive Bulletin 314-A.



Wooden brake wheels are furnished only on the No. 2-A and No. 3A-6 Machines. Steel brake wheels are optional.



Top of No. 3A-6-60 Machine

No. 3A-6-60 Machine

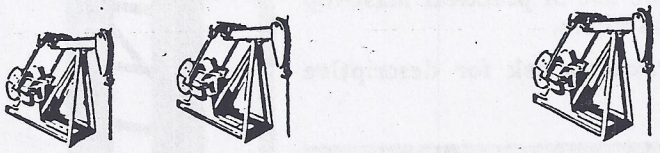
PUMPING UNITS

NATIONAL PUMPING UNITS . . .

(Patented and Patents Pending)

ILLUSTRATIONS SHOW APPROXIMATE COMPARATIVE SIZE ONLY

SPECIFICATIONS	D-3	D-4	D-5	D-7	D-9	D-11
BEAM COUNTERWEIGHTED TYPES . . .	D-3SN-6DP	D-4SN-10DP	D-5SN-16DP	D-7SN-25DP	D-9SN-40DP	D-11SN-57DP
API Walking Beam Rating, Lbs.	3,200	4,100	4,790	6,500	8,900	11,000
Beam Size, Inches x Weight, per Foot	6″x4″-12 lb.	8″x5¼″-17 lb.	8″x5¼″-20 lb.	10″x5¾″-25 lb.	12″x6½″-36 lb.	14″x8″-48 lb.
Polished Rod Strokes, inches	12½, 14, 16	15, 17½, 20	18, 21, 24	21, 22½, 25, 28	26, 29, 34	27, 34½, 42
Hanger, Type	Arc	Arc	Arc	Arc	Arc	Arc
Well End Working Centers	2′0″	2′6″	3′0″	3′6″	4′3″	5′3″
Gear Reducer—Type	Double	Double	Double	Double	Double	Double
API Peak Torque at 20 SPM in-lbs.	6,400	10,000	16,000	25,000	40,000	57,000
Overall Gear Ratio	26.0	29.5	31.85	29.2	29.2	30.0
Cranks, Type	Plain	Plain	Plain	Plain	Plain	Plain
Counterweights, Type	Beam	Beam	Beam	Beam	Beam	Beam
Weight of Each Counterweight, lbs.	255	310	310	385	450	560
*Maximum Counterweight Effect, lbs.	2,526	3,193	3,577	5,110	6,873	9,310
Pitman and Saddle Bearings, Type	Needle	Needle	Needle	Needle	Needle	Needle
Wrist Pin Bearings, Type	Roller	Roller	Roller	Roller	Roller	Roller
Regular Sheave—Pitch Diameter: Inches x Number and Belt Section	12″x2-A	12½″x3-A	16½″x3-B	18″x3-B	18″x3-C	18″x3-C
Weight Complete, Less Cwts. Lbs.: Without Subbase	590	1,338	1,500	1,947	3,500	5,400



SPECIFICATIONS	D-9	D-11	D-13		
CRANK COUNTERWEIGHTED TYPES . . .	D-9SN-40DW D-9SB-40DW	D-11SN-57DW D-11SB-57DW	D-13SN-80DW D-13SB-80DW	D-13SN-114SW D-13SB-114SW	D-13SN-114DW D-13SB-114DW
API Walking Beam Rating, lbs.	8,900	11,000	12,750	12,750	12,750
Beam Size, Inches x Weight, per foot	12″x6½″-36 lb.	14″x8″—48 lb.	16″x8½″—58 lb.	16″x8½″—58 lb.	16″x8½″—58 lb.
Polished Rod Strokes, inches	22, 28, 34	27, 34½, 42	33, 40½, 48	33, 40½, 48	33, 40½, 48
Hanger Type	Arc	Arc	Arc	Arc	Arc
Well End Working Centers	4′3″	5′3″	6′0″	6′0″	6′0″
Gear Reducer, Type	Double	Double	Double	Single	Double
API Peak Torque at 20 SPM in-lbs.	40,000	57,000	80,000	114,000	114,000
Overall Gear Ratio	29.2	30.0	29.6	10.2	30.8
Cranks, Type	E Disc Crank	E Disc Crank	E Disc Crank	E Disc Crank	E Disc Crank
Counterweights, Type	650	860	1,225	1,225	1,225
Weight of Each Counterweight, lbs.	4,810	6,000	8,280	8,280	8,280
*Maximum Counterweight Effect, lbs.	Needle	Needle	Needle	Needle	Needle
Pitman and Saddle Bearings, Type	Roller	Roller	Roller	Roller	Roller
Wrist Pin Bearings, Type					
Regular Sheave—Pitch Diameter, Inches x Number and Belt Section	18″x3-C	18″x3-C	18″x4-C	29″x7-C	26″x4-C
Weight, Complete, Less Cwts. lbs.: Without Subbase	4,080	5,700	8,152	8,970	8,860
With Subbase	4,444	6,166	8,748	9,565	9,460

*Includes Pitman Effect. Counterweight Effect is for Longest Stroke.

THE NATIONAL SUPPLY COMPANY

PUMPING UNITS

SPECIFICATIONS — D-15

CRANK COUNTERWEIGHTED TYPES . . .	D-15SN-114SW D-15SB-114SW	D-15SN-114DW D-15SB-114DW	D-15SB-160SW	D-15SB-160DW
API Walking Beam Rating, lbs.	15,000	15,000	15,000	15,000
Beam Size, Inches x Weight, per foot	18″x8¾″—70 lb.	18″x8¾″—70 lb.	18″x8¾″—70 lb.	18″x8¾″—70 lb.
Polished Rod Strokes, inches	34, 44, 54	34, 44, 54	34, 44, 54	34, 44, 54
Hanger Type	Arc	Arc	Arc	Arc
Well End Working Centers	6′9″	6′9″	6′9″	6′9″
Gear Reducer, Type	Single	Double	Single	Double
API Peak Torque at 20 SPM in-lbs.	114,000	114,000	160,000	160,000
Overall Gear Ratio	10.2	30.8	9.73	29.8
Cranks, Type	E Disc Crank	E Disc Crank	E Disc Crank	E Disc Crank
Counterweights, Type	1,625	1,625	1,625	1,625
Weight of Each Counterweight, lbs.	10,840	10,840	10,840	10,840
*Maximum Counterweight Effect, lbs.	Needle	Needle	Needle	Needle
Pitman and Saddle Bearings, Type	Roller	Roller	Roller	Roller
Wrist Pin Bearings, Type				
Regular Sheave—Pitch Diameter, Inches x Number and Belt Section	29″x7-C	26″x4-C	32″x10-C	26″x6-C
Weight, Complete, Less Cwts. lbs.:				
Without Subbase	10,650	10,520	.....	.....
With Subbase	11,465	11,350	14,150	13,750

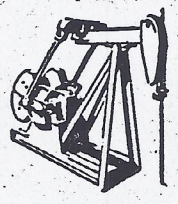
SPECIFICATIONS — D-21

CRANK COUNTERWEIGHTED TYPES . . .	D-21LN-D-21CN-D-21LB-D-21CB-160SW	D-21SB-160SW	D-21LN-D-21CN-D-21LB-D-21CB-160DW	D-21SB-160DW	D-21LN-D-21CN-D-21LB-D-21CB-228SW	D-21SB-228SW	D-21LN-D-21CN-D-21LB-D-21CB-228DW	D-21SB-228DW
API Walking Beam Rating, lbs.	20,700	21,000	20,700	21,000	20,700	21,000	20,700	21,000
Beam Size, Inches x Weight, per foot	24″x12″-120 lb.	24″x12″-100 lb.	24″x12″-120 lb.	24″x12″-100 lb.	24″x12″-120 lb.	24″x12″-100 lb.	24″x12″-120 lb.	24″x12″-100 lb.
Polished Rod Strokes, inches	34, 44 54, 64	Same for All D-21 Pumping Unit Series.						
Hanger, Type	**	Arc	**	Arc	**	Arc	**	Arc
Well End Working Centers	10′8″	8′0″	10′8″	8′0″	10′8″	8′0″	10′8″	8′0″
Gear Reducer, Type	Single	Single	Double	Double	Single	Single	Double	Double
API Peak Torque at 20 SPM in-lbs.	160,000	160,000	160,000	160,000	228,000	228,000	228,000	228,000
Overall Gear Ratio	9.73	9.73	29.8	29.8	9.4	9.4	28.28	28.28
Cranks, Type	A Disc Crank							
Counterweights, Type								
Weight of Each Counterweight, and *Maximum Counterweight Effect, lbs.	1530-10,400 1925-13,200 2350-16,200	Same for all D-21 Pumping Unit Series						
Pitman and Saddle Bearings, Type	Needle							
Wrist Pin Bearings, Type	Roller							
Regular Sheave—Pitch Diameter Inches x Number and Belt Section	32″x10-C	32″x10-C	26″x6-C	26″x6-C	36″x7-D	36″x7-D	26″x7-C	26″x7-C
Weight, Complete, Less Cwts. lbs.:								
Without Subbase	17,050	.....	16,650	.....	18,550	.....	17,650	.....
With Subbase	18,250	17,150	17,850	16,750	19,750	18,650	18,850	17,750

*Includes Pitman Effect. Counterweight Effect is for Longest Stroke.
**All L Type Pumping Units are Equipped with Rein Type Hangers. All C Type Pumping Units have Arc Type Hangers.

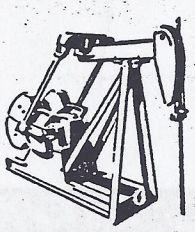
PUMPING UNITS

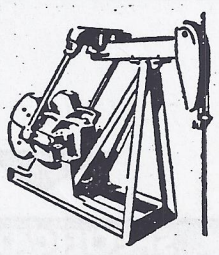
NATIONAL PUMPING UNITS (Contd.) . . .



SPECIFICATIONS — D-24

CRANK COUNTERWEIGHTED TYPES . . .	D-24LN-D-24CN-D-24LB-D-24CB-228SW	D-24SB-228SW	D-24LN-D-24CN-D-24LB-D-24CB-228DW	D-24SB-228DW	D-24LN-D-24CN-D-24LB-D-24CB-320SW	D-24SB-320SW	D-24LN-D-24CN-D-24LB-D-24CB-320DW	D-24SB-320DW
API Walking Beam Rating, lbs.	24,150	24,000	24,150	24,000	24,150	24,000	24,150	24,000
Beam Size, Inches x Weight, per foot	27"x14"–145 lb.	24"x12"–110 lb.	27"x14"–145 lb.	24"x12"–110 lb.	27"x14"–145 lb.	24"x12"–110 lb.	27"x14"–145 lb.	24"x12"–110 lb.
Polished Rod Strokes, inches	44, 54, 64, 74	Same for all D-24 Series						
Hanger, Type	**	Arc	**	Arc	**	Arc	**	Arc
Well End Working Centers	12'4"	9'3"	12'4"	9'3"	12'4"	9'3"	12'4"	9'3"
Gear Reducer, Type	Single	Single	Double	Double	Single	Single	Double	Double
API Peak Torque at 20 SPM in-lbs.	228,000	228,000	228,000	228,000	320,000	320,000	320,000	320.000
Overall Gear Ratio	9.4	9.4	28.28	28.28	10.52	10.52	30.0	30.0
Cranks, Type	A Disc							
Counterweights, Type	Crank							
Weight of Each Counterweight, and *Maximum Counterweight Effect, lbs.	1620-11,650 / 2000-13,800 / 2700-19,100	Same for all D-24 Series						
Pitman and Saddle Bearings, Type	Needle							
Wrist Pin Bearings, Type	Roller							
Regular Sheave—Pitch Diameter, Inches x Number and Belt Section	36"x7-D	36"x7-D	26"x7-C	26"x7-C	42"x9-D	42"x9-D	34"x8-C	34"x8-C
Weight, Complete, Less Cwts. lbs.:								
Without Subbase	21,600	.....	20,700	.....	24,700	.....	23,700	.....
With Subbase	23,000	21,200	22,100	20,300	26,100	24,300	25,100	23,300





SPECIFICATIONS — D-29 — D-32

CRANK COUNTERWEIGHTED TYPES . . .	D-29LN-D-29LB-320SW	D-29SB-320SW	D-29LN-D-29LB-320DW	D-29SB-320DW	D-32SN-456DW
API Walking Beam Ratings, lbs.	29,000	29,800	29,000	29,800	32,400
Beam Size, Inches x Weight, per foot	30"x15"–190 lb.	27"x14"–145 lb.	30"x15"–190 lb.	27"x14"–145 lb.	33"x15¾"–200 lb.
Polished Rod Strokes, inches	56, 66, 76, 86	Same for all D-29 Series.			72, 84, 96, 108, 120
Hanger, Type	Rein	Arc	Rein	Arc	Arc
Well End Working Centers	14'4"	10'9"	14'4"	10'9"	15'0"
Gear Reducer, Type	Single	Single	Double	Double	Double
API Peak Torque at 20 SPM in-lbs.	320,000	320,000	320,000	320,000	456,000
Overall Gear Ratio	10.52	10.52	30.0	30.0	30.3
Cranks, Type	A Disc				A Disc
Counterweights, Type	Crank				Crank
Weight of Each Counterweight, and *Maximum Counterweight Effect, lbs.	3330-23,430	Same for all D-29 Series			4510-27,500
Pitman and Saddle Bearings, Type	Needle				Needle
Wrist Pin Bearings, Type	Roller				Roller
Regular Sheave—Pitch Diameter, Inches x Number and Belt Section	42"x9-D	42"x9-D	34"x8-C	34"x8-C	48"x8-C
Weight, Complete, Less Cwts. lbs.:					
Without Subbase	31,100	.....	30,100	.....	.....
With Subbase	32,600	29,950	31,600	28,950	40,180

*Includes Pitman Effect. Counterweight Effect is for Longest Stroke.
**All L Type Pumping Units are Equipped with Rein Type Hangers. All C Type Pumping Units have Arc Type Hangers.

THE NATIONAL SUPPLY COMPANY

PUMPING UNITS

COUNTERWEIGHTS FOR NATIONAL PUMPING UNITS . . .

BEAM COUNTERWEIGHTS

A wide range of counterbalance effect is provided by beam-type counterweights. These weights fit the beam closely at all points and are available in increments from one to nine. They are split so they can be installed from the side rather than threaded over the end of the beam. Guide rails on the beam hold them in place until they can be locked securely by an adjusting screw.

POLISHED ROD BEAM COUNTERWEIGHT EFFECT—POUNDS . . .

Number of Weights	TYPE D-3		TYPE D-4		TYPE D-5		TYPE D-7		TYPE D-9		TYPE D-11	
	255 lb. Ctwt.	Cumulative Total	310 lb. Ctwt.	Cumulative Total	310 lb. Ctwt.	Cumulative Total	385 lb. Ctwt.	Cumulative Total	450 lb. Ctwt.	Cumulative Total	560 lb. Ctwt.	Cumulative Total
None	50	50	100	100	150	150	200	200	400	400	600	600
1	494	544	682	782	637	787	785	985	825	1225	991	1591
2	462	1006	650	1432	611	1398	755	1740	799	2024	964	2555
3	429	1435	619	2051	581	1982	730	2470	772	2796	938	3493
4	396	1831	587	2638	558	2540	700	3170	746	3542	911	4404
5	364	2195	555	3193	532	3072	675	3845	719	4261	884	5288
6	331	2526	.....	.....	505	3577	645	4490	693	4954	858	6146
7	.....	.....	.....	.....	.....	.....	620	5110	666	5620	831	6977
8	.....	.....	.....	.....	.....	.....	.....	.....	640	6260	804	7781
9	.....	.....	.....	.....	.....	.....	.....	.....	613	6873	778	8559
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	751	9310

CRANK COUNTERWEIGHTS

NATIONAL Eccentric Disc Cranks are of two types, A and E.

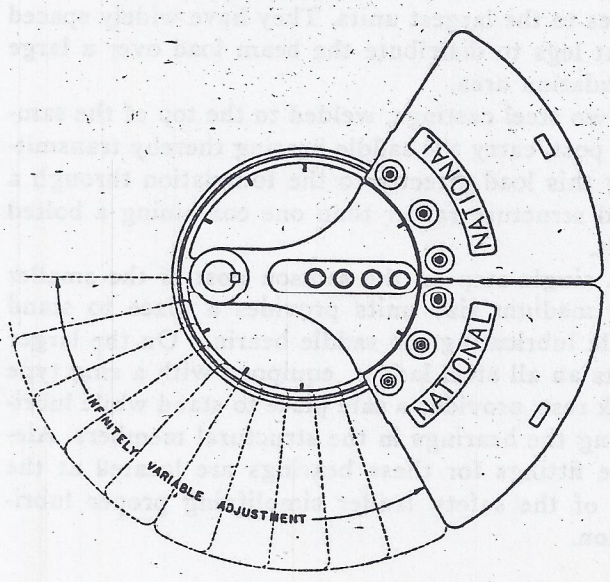
Pumping Units of the series D-21—through D-32—inclusive, are equipped with Type A Crank. On the type A Crank, counterweights are made in two halves which are securely clamped in position on the outside rim of the crank by three separate locking bolts. These bolts do not support the counterweight load but only serve to clamp the halves together. When loosened the weights slide freely around the crank rims.

The medium Pumping Units are equipped with Type E Cranks. On Type E Cranks, counterweights are one-piece construction, securely locked to both faces of the crank rim by three separate self-aligning clamp arrangements. These clamps do not support the counterweight load but serve to lock the weight in position.

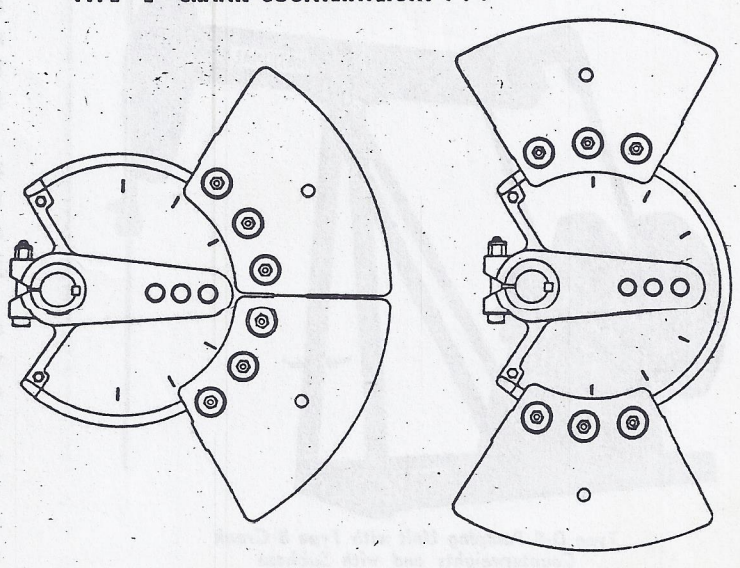
The prime mover is used to turn the cranks to the desired position with relation to the weights, and the service brake to hold the cranks in this position. The bolts are then tightened, reclamping the weights.

The infinitely variable adjustability of NATIONAL Eccentric Disc Cranks and Counterweights will be apparent from the illustrations. The weights slide around the track to any position desired, allowing the very maximum in accuracy of counterweight effect and degree of lag and lead. This results in reduced power consumption and stress on the unit and rods.

TYPE "A" CRANK COUNTERWEIGHT . . .



TYPE "E" CRANK COUNTERWEIGHT . . .

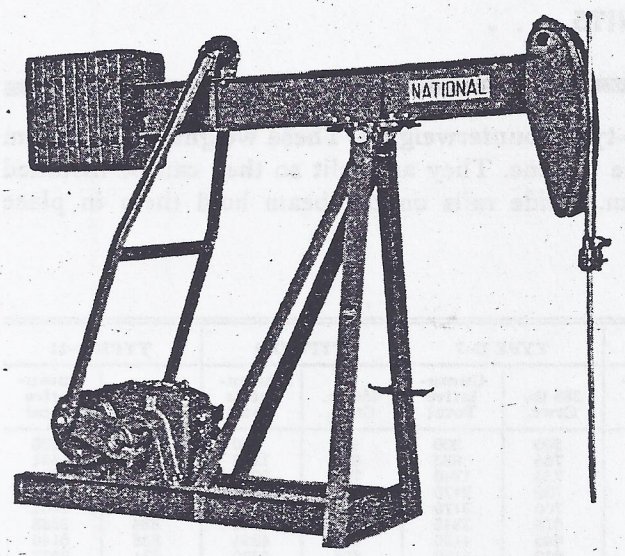


Maximum Counterweight Effect *Minimum Counterweight Effect*

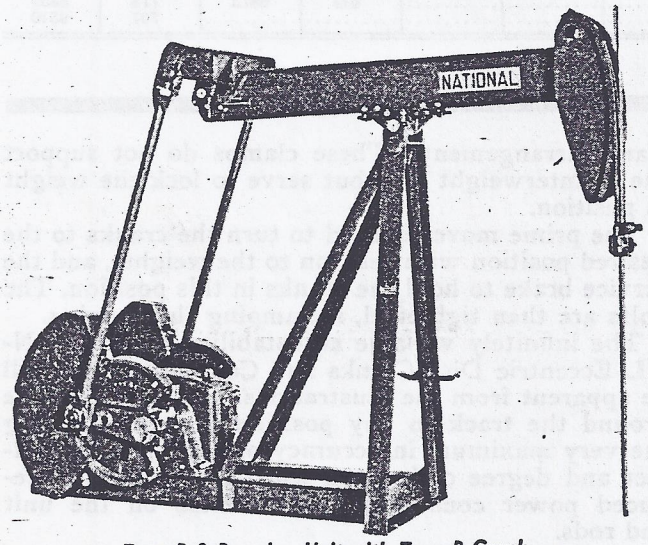
PUMPING UNITS

THE NATIONAL SUPPLY COMPANY

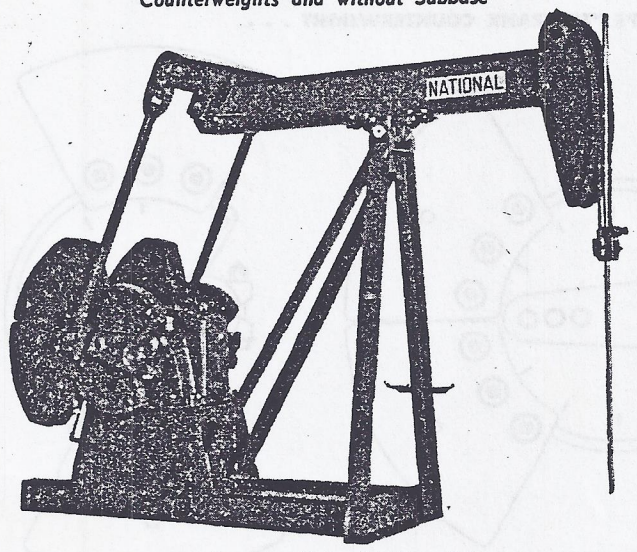
NATIONAL PUMPING UNITS . . .



Type D-9 Pumping Unit with Beam Counterweights



Type D-9 Pumping Unit with Type B Crank Counterweights and without Subbase



Type D-9 Pumping Unit with Type B Crank Counterweights and with Subbase

MAIN BASE

The sturdy box section main base, fabricated of integrally welded, cross-braced beams, is made in two styles to accommodate the different methods of installation. The gear reducer of the beam counterweighted unit is mounted directly on girder sections of the main base. Since the crank clears the bottom of the base, this unit can be installed on any type foundation.

The crank counterweighted unit, similarly mounted, requires a foundation sufficiently high to clear the counterweighted cranks, depending upon the size unit involved. A main frame with an integrally welded subbase under the gear reducer is available for the crank balanced units when it is to be installed on the derrick floor or on a flat concrete slab.

Leveling screws in the pumper base simplify its alignment to the well.

The prime mover is mounted on an extension base which bolts to the main frame. A series of extension bases are available as accessory equipment to accommodate any type of prime mover.

SAMSON POST

The vertical front, four leg type samson post is integrally welded to the main base on all units through the D-11 series. The samson post is removable from the main base on all units from the D-13 series to the largest units. They have widely spaced front legs to distribute the beam load over a large foundation area.

Two steel castings, welded to the top of the samson post, carry the saddle bearing thereby transmitting this load directly to the foundation through a solid structure rather than one containing a bolted joint.

A single step on the samson post of the smaller and medium size units provides a place to stand while lubricating the saddle bearing. On the larger units an all steel ladder, equipped with a ring type back rest, provides a safe place to stand while lubricating the bearings in the structural members. Alemite fittings for these bearings are located at the top of the safety ladder simplifying proper lubrication.

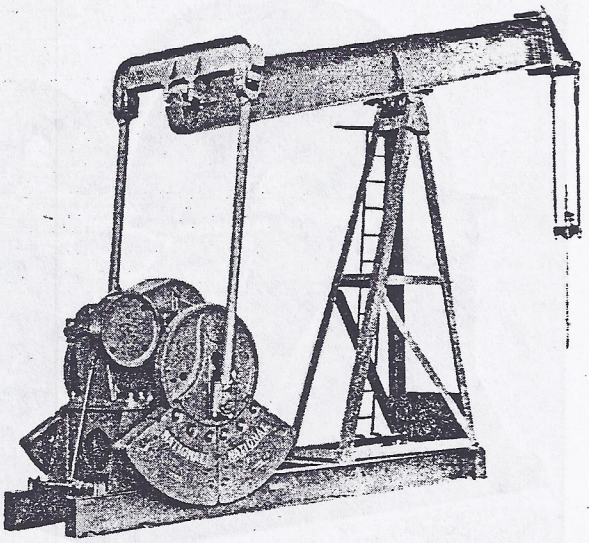
. . . CONSTRUCTION . . . FEATURES

PITMAN ASSEMBLY

Pitmans are either of the unitary type or the equalized type. On the beam counterweighted type, holes are provided in the beam for use in changing the length of stroke by adjusting the beam pitman bearing along the beam, except type D-11 which has a three hole adjustment on the crank with a tapered wrist pin.

All beam pitman and saddle bearings are of the needle type.

Crank counterweighted units have a fully equalized pitman assembly which consists of a fabricated I section equalizer and tubular type pitmans. These two parts are connected through grease lubricated plain bearings. The equalizer is clamped to the shaft of the equalizer bearings. The lower ends of the pitman bolt to the wrist pin housing, making it possible to remove the pitman assembly without disturbing the wrist pin. On all crank counterweighted units, the stroke adjustment is accomplished by a multiple hole arrangement on the crank with a tapered wrist pin.



Type D-21 Pumping Unit with Type A Crank Counterweights and with Subbase (Showing Rein Type Hanger)

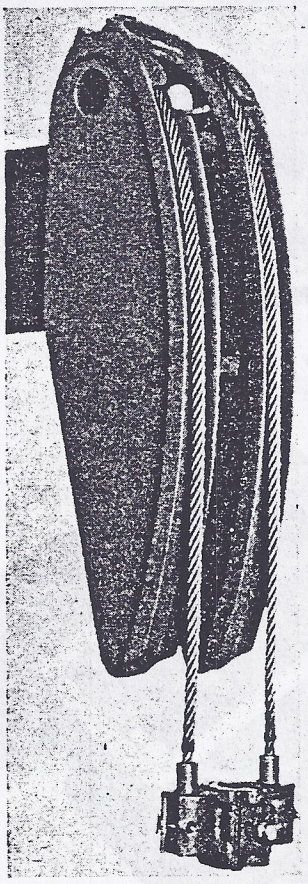
BEAM HANGERS

Beam hangers on NATIONAL pumping units are of two types (1) arc type (2) needle bearing equipped rein type. Arc type hangers are standard on all short working center pumping units. Arc or rein type hangers are optional on long working center units (D-21, D-24 and D-29 series) and are completely interchangeable.

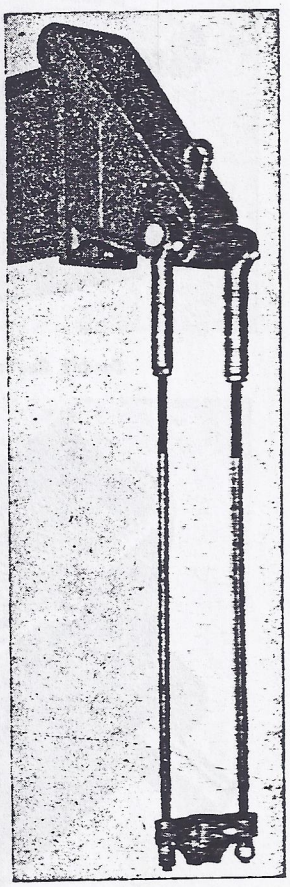
Both types of hangers are easily and quickly removable from the beam, furnishing ample clearance for well servicing without disconnecting the pitman or disturbing the alignment of the unit with the well.

On the arc type beam hanger, a babbitted socket on each end of the wire carries the polished rod clamp support. The support is of the side door opening type which makes it unnecessary to strip it over the polished rod. A NATIONAL jaw type slip-over polished rod clamp completes the assembly.

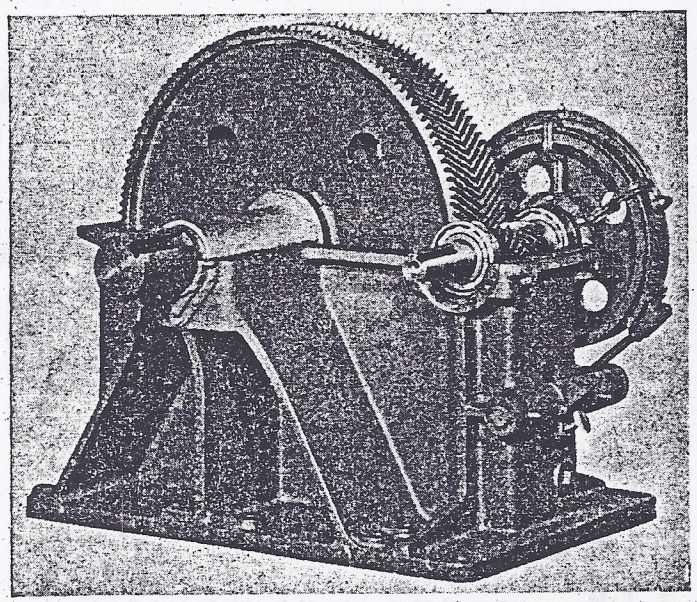
On the rein type beam hanger the polished rod clamp support is also of the side door opening type and is secured to the threaded reins by means of bolts and lock nuts.



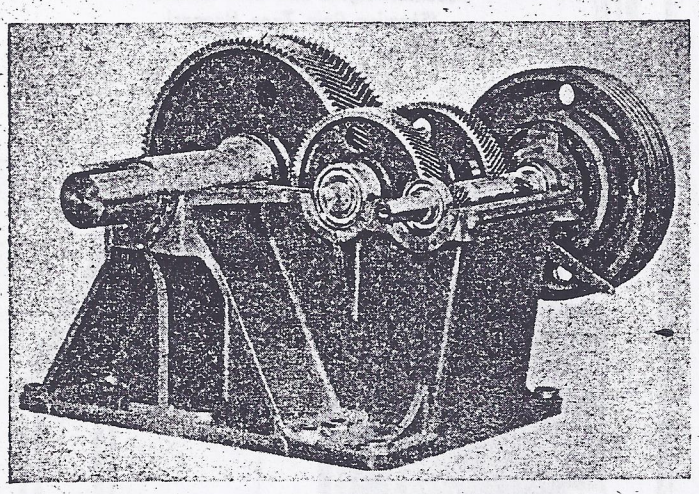
Arc Type Hanger



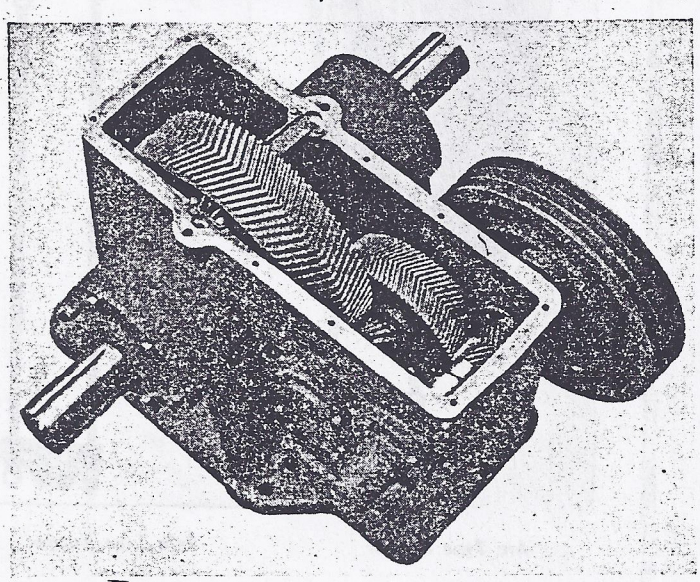
Rein Type Hanger



Single Reduction Symmetrical Gear Reducer



Double Reduction Symmetrical Gear Reducer



Double Reduction Non-symmetrical Gear Reducer

NATIONAL PUMPING UNITS . . .

WALKING BEAM

Walking beams are made in two styles, depending upon the type of counterbalance used. The beam for the crank counterweighted unit is reinforced with an integrally welded steel casting at the equalizer end while that for the beam counterweighted unit is extended to carry the counterweights. A simple and effective method of aligning the hanger over the well to compensate for slight errors in erection is provided by shifting the entire beam along the slotted walking beam saddle by means of adjusting screws.

GEAR REDUCERS

NATIONAL reduction gears are of two basic designs (1) Symmetrical and (2) Non-symmetrical.

The symmetrical design gear reducer is made in both double and single reduction types. These units have herringbone gears, sleeve bearings on the crankshaft and the housing is split through the center line of the shafts. This design is used on all Pumping Unit series D-13 and larger.

The non-symmetrical design is furnished in double reduction type only and features herringbone gears, Timken bearings on the crankshaft and a one-piece cast housing. This design is used on the smaller Pumping Unit series D-3 through D-11.

All the above units are cascade lubricated. A pocket in the oil chamber collects any condensation of foreign matter and an easily accessible magnetic drain plug is provided to drain this pocket and attract any metal particles.

These reducers are designed and manufactured to API standards based on minimum gear hardness. Quiet and efficient operation is assured, as all gears are run-in under load at the factory.

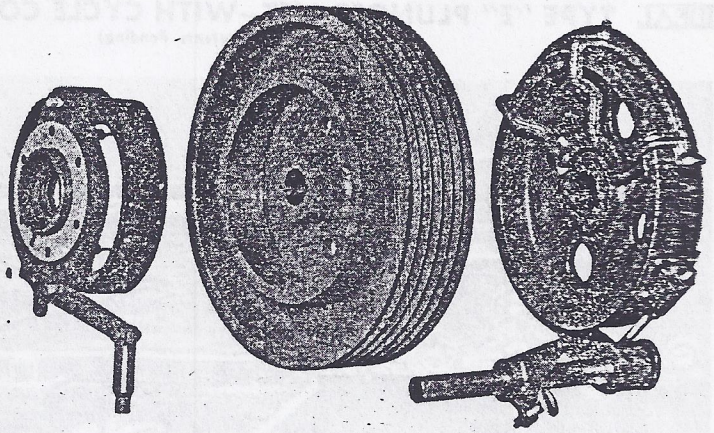
CRANKS & COUNTERWEIGHTS

Cranks and counterweights are of two types (1) plain crank for beam counterweights and (2) disc type cranks for crank counterweighting. Crank counterweights are of two styles, Type A and Type E. Complete description of these counterweights and effects will be found on page 3591.

. . . CONSTRUCTION . . . FEATURES

SERVICE BRAKE AND V-BELT DRIVE SHEAVE

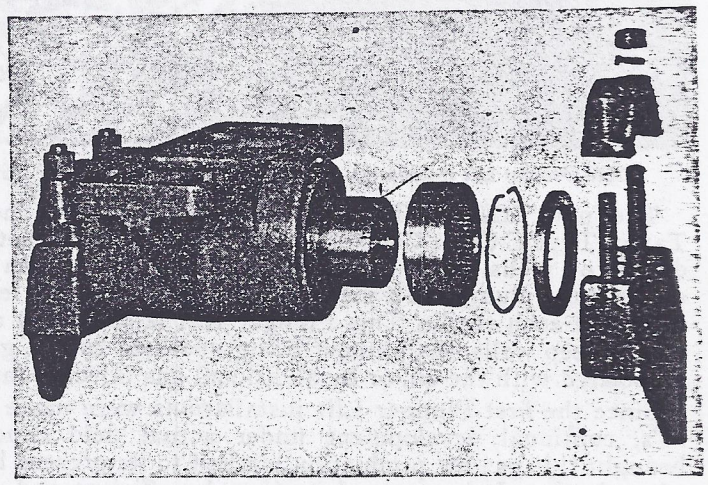
An automotive type service brake and V-belt drive sheave with its integrally cast brake drum is supplied on the double reduction gears. The single reduction gears are equipped with a band type brake mounted on the side opposite the drive sheave. All the gear reducers can be driven from either side. Changing drive sheaves is facilitated by a tapered shaft which includes a combination locking plate and puller.



Brake for Double Gear Reducer — *V-belt Drive Sheave* — *Brake for Single Gear Reducer*

SADDLE BEARING

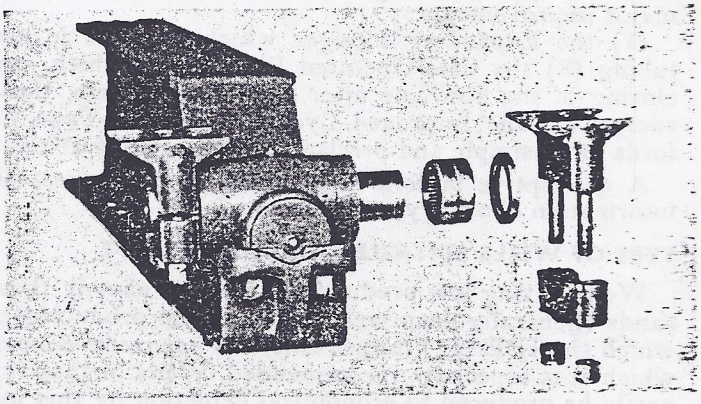
The beam is carried on needle roller bearings which lend themselves ideally to this type of oscillating service. Ample lubrication is provided through a single Alemite grease fitting. The bearings are protected from outside elements by oil seals and from over-lubrication by a pressure relief fitting. The hardened and ground alloy steel shaft, which acts as the inner race of the saddle bearing, is clamped securely in the brackets on top of the samson post.



Exploded View Type D-9 Saddle Bearing

BEAM PITMAN BEARING

The beam load is transmitted to the pitman assembly through needle type anti-friction bearings. These low torque, high efficiency bearings are enclosed in a semi-steel casting and run on a hardened and ground steel shaft. Oil seals protect the bearings from dirt and a pressure relief fitting prevents over-lubication.



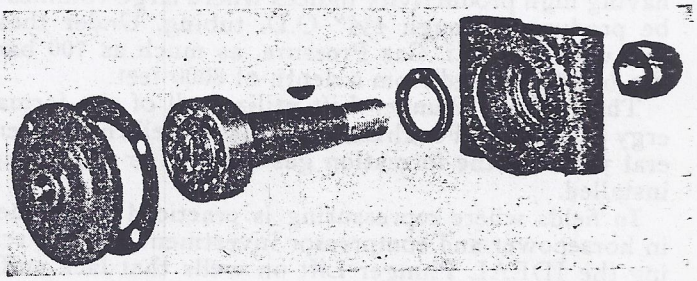
Exploded View Type D-9 Beam Pitman Bearing

WRIST PINS

On beam counterweighted pumping units a wrist pin is pressed into each crank and held securely by a countersunk head set screw. The semi-steel cranks have split hubs tightened by bolts and are keyed to the shaft.

On crank counterweighted pumping units, the use of a tapered joint between the wrist pins and cranks creates a solid but easily removable connection and an elastic stop nut is employed to prevent it from becoming loose. The wrist pin is equipped with a key so that it will not turn while the joint is tightened.

Wrist pin bearings are self-aligning roller bearings protected by an oil seal and pressure relief fitting and a steel snap ring prevents any lateral movement of the bearing on the pin.



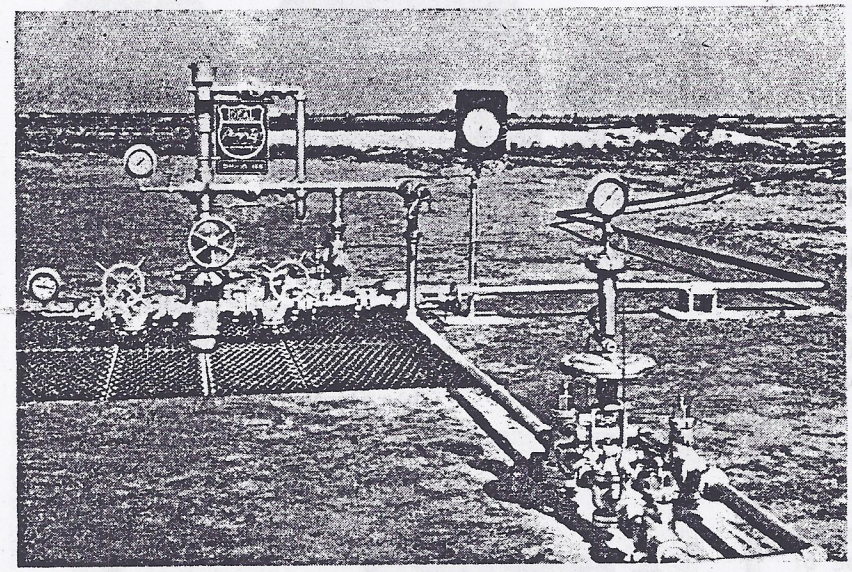
Exploded View Type D-9 Wrist Pin

PLUNGER LIFT

THE NATIONAL SUPPLY COMPANY

IDEAL TYPE "E" PLUNGER LIFT—WITH CYCLE CONTROLLER . . .

(Patented and Patents Pending)



IDEAL *Plunger Lift Installation producing through 10,000 feet of 2½" Tubing*

The new IDEAL Type E Plunger Lift with the IDEAL-Taylor Type C Cycle Controller is a highly effective method of producing oil wells, using the tubing for its entire length as a cylinder, and the plunger as a piston which travels the full length of the tubing at each stroke. This Plunger Lift is especially adapted for use in deep wells, the plunger being operated by the gas which is associated with the oil, or by additional gas injected into the well.

Since the first Plunger Lift installations were made during the 30's, continual development under actual field conditions has brought this gas-lift production method to its present high degree of perfection. It has proved itself to be efficient and economical.

In the Type E Plunger Lift, NATIONAL offers three recent major improvements:

(1) the Expanding Plunger which operates in standard API tubing (2) the Cam-Operated Pilot Valve which assures proper closing of the flow line after each plunger trip, thus saving gas energy (3) the Improved Cycle Controller—Type C—which affords more simple and precise control, entirely at the surface.

A descriptive bulletin is available upon request—it gives full information about Type E Plunger Lift.

TYPE OF WELLS SUITABLE FOR PLUNGER LIFT

Wells having low productivity indices, namely those with tight sands (generally deep wells) present the producing problems for which the IDEAL Plunger Lift was primarily developed and for which it is especially recommended. Wells of that type can ordinarily be produced to economical depletion by this method.

The IDEAL Plunger Lift is also recommended for deep wells having high productivity indices where large volumes of fluid must be produced through 4½" O.D. tubing. Under these conditions and with 400 p.s.i. Gas Pressure, as much as 700 barrels per day has been produced from a depth of 8000 feet.

The IDEAL Plunger Lift utilizes all of the formation gas energy of the well. For this reason, many wells have operated for several years on the formation gas alone after the Plunger Lift was installed.

In fields where repressuring is practiced a considerable saving in horsepower and compressor investment may be realized by using the IDEAL Plunger Lift on wells that lack sufficient gas to flow, generally edge wells.

EXCESS GAS UTILIZED

On many leases there are flowing wells which will make their allowable production and yet have excess gas that may be available to operate other wells on Plunger Lift at the lower operating pressures.

Since injection gas pressures for Plunger Lift are generally low, the cost of recycling is less than for most ordinary gas lift installations.

PLUNGERS

The IDEAL Expanding Plunger is standard equipment for modern installations—it is described on the opposite page.

The IDEAL Non-Expanding Plunger—which has been in use for many years — will continue to be available for replacement in existing installations, and it can still be used by operators who have tubing that has been specially drifted for Plunger Lift.

PRODUCING THROUGH THE CASING

When gas-oil ratios are sufficiently high and other conditions are favorable, the new expanding type plunger may be used to produce through the casing instead of the tubing. This often enables the operator to salvage a string of tubing.

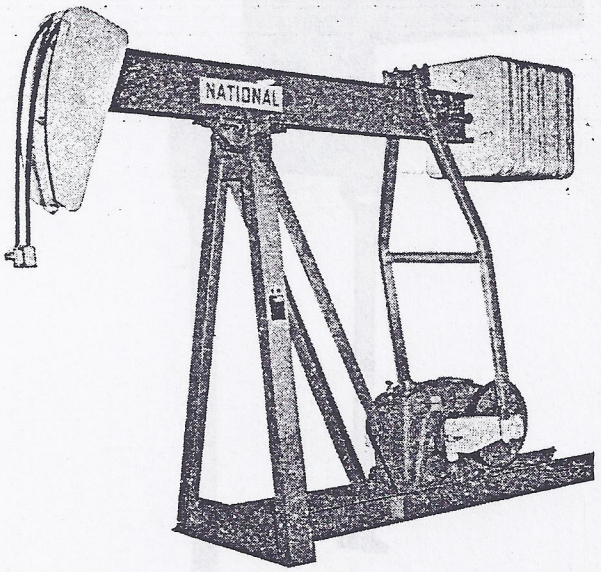
For running in 4½" casing or larger, the expanding type plunger is available on special order. Further information will be furnished upon request.

ADVISORY SERVICE

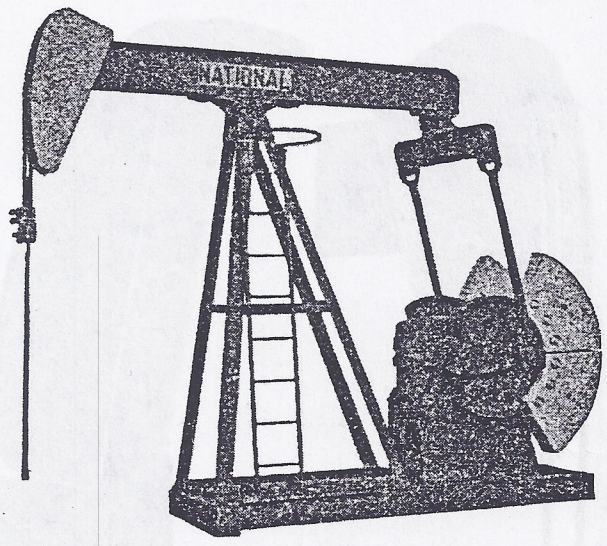
An advisory service is offered by The NATIONAL Supply Company to those desiring specific information regarding the possibilities for successful production of any certain well by Plunger Lift.

SEE SELECTION CHART—PAGES 3924-3925
SEE SPECIFICATIONS—PAGES 3926-3927

NATIONAL PUMPING UNITS . . . CONSTRUCTION FEATURES



Type E-7 Pumping Unit with Beam Counterweights



Type E-11SB-57DW Pumping Unit with Type E Crank Counterweight (Representative of E-9, E-11, E-13, E-15, E-18, E-21 and E-24 Series Pumping Units)

NATIONAL Pumping Units are available in 13 basic sizes with 148 standard specifications in beam and crank counterweighted types. They are structurally rated from 2,065 to 32,400 pounds on the walking beam. Within this comprehensive range of sizes and ratings, there is always a NATIONAL Pumping Unit available to meet pumping requirements closely.

MAIN BASE

The sturdy box section main base, fabricated of integrally welded, cross-braced beams, is made in two styles to accommodate the different methods of installation. The gear reducer of the beam counterbalanced unit is mounted directly on girder sections of the main base. Since the crank clears the bottom of the base, this unit can be installed on any type foundation.

The main base on the crank counterbalanced unit has an integrally welded sub base under the gear reducer. This construction provides clearance for the counterweights, permitting the unit to be installed on the derrick floor or a concrete slab.

Extension bases, slide rails, belt guards, etc., are available as accessory equipment to accommodate any type of prime mover.

SAMSON POST

The vertical front, four leg type samson post is integrally welded to the main base on all beam counterbalanced type units through the E-11 series. The samson post is removable from the main base on all crank counterbalanced type units from the E-11 series to the largest units. They have widely spaced front legs to distribute the beam load over a large foundation area.

Two steel castings, welded to the top of the samson post, carry the saddle bearing, thereby transmitting this load directly to the foundation through a solid structure rather than one containing a bolted joint.

The larger units are equipped with an all steel ladder with a ring type back rest for bearing inspection and servicing.

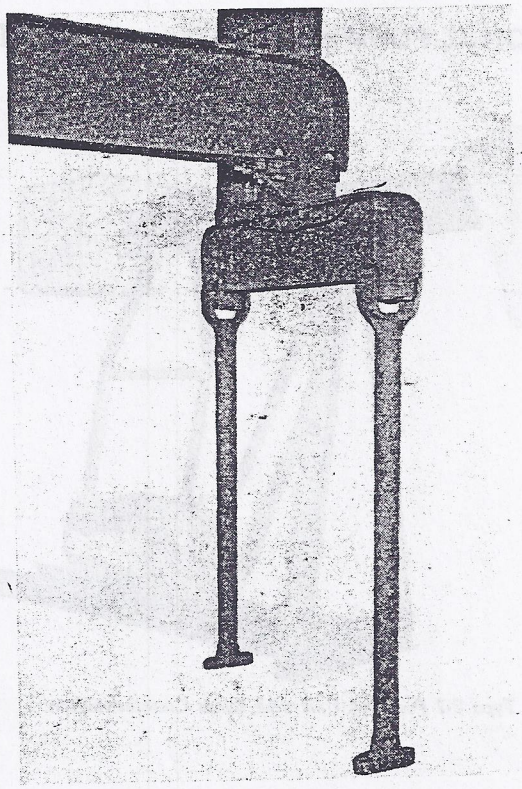
NATIONAL PUMPING UNITS . . .

PITMAN ASSEMBLY

Pitmans are either the unitary type or the equalized type. On the beam counterbalanced type, holes are provided in the beam for use in changing the length of stroke by adjusting the beam pitman bearing along the beam, except Type E-11 which has a three hole adjustment on the crank with a tapered wrist pin.

All beam pitman and saddle bearings are the needle type.

Crank counterbalanced units have a fully equalized pitman assembly which consists of a fabricated I section equalizer and tubular type pitmans. These two parts are connected through pin joints. The equalizer is clamped to the shaft of the equalizer bearings. The lower ends of the pitman bolt to the wrist pin housing, making it possible to remove the pitman assembly without disturbing the wrist pin. On all crank counterbalanced units, the stroke adjustment is accomplished by a multiple hole arrangement on the crank with a tapered wrist pin.



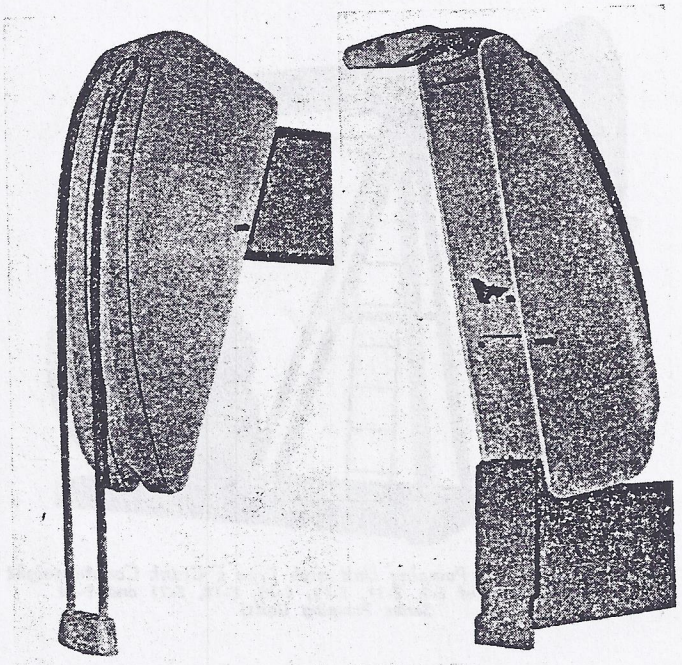
Pitman Assembly for Crank Counterbalanced "E" Series Units

BEAM HANGERS

Beam hangers on NATIONAL Pumping Units are the arc type. All "D" series arc type hangers are easily and quickly removable from the beam, furnishing ample clearance for well servicing without disconnecting the pitman or disturbing the alignment of the unit with the well. The "E" Series Pumping Units have a hinged arc type hanger which can be swung on top of the beam to provide ample well clearance without disconnecting the pitman.

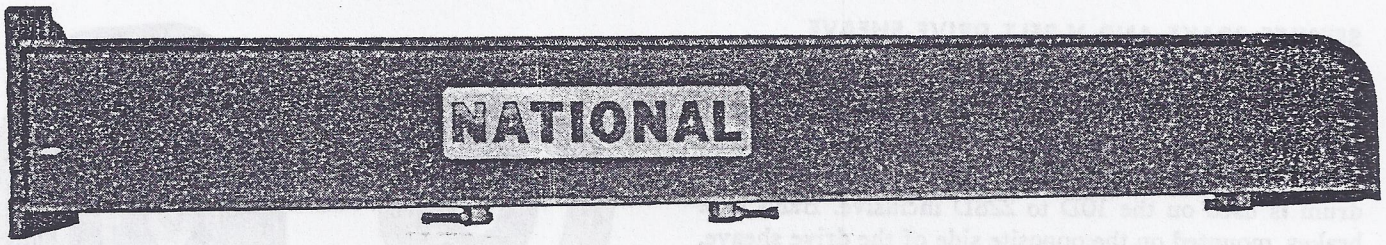
The polished rod hanger is a new streamlined design to allow the standard hanger to be used on dual pumping installations, thus eliminating the necessity of purchasing special polished rod hangers.

Also the new arc design for the type "E" units has a "hook-latch" feature that allows the well service crew to "unlatch" the arc hanger from the ground.



Hinged Type Beam Hanger for "E" Series Units

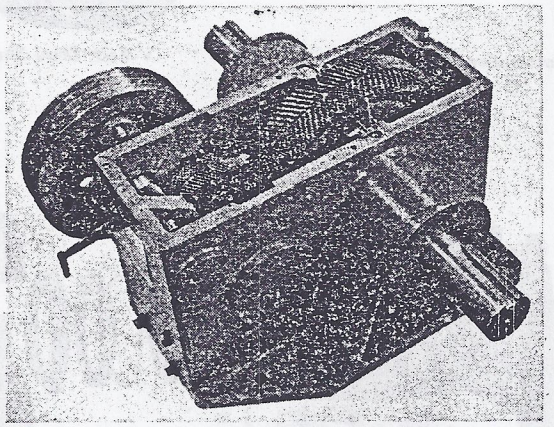
NATIONAL PUMPING UNITS . . . CONSTRUCTION FEATURES



Walking Beam for "E" Series Crank Counterbalanced Pumping Unit

WALKING BEAM

Walking beams are made of heavy CB section steel beam rated in accordance with API specifications. The hanger end is strongly reinforced by a heavy steel plate which allows quick and accurate attachment and alignment of the beam hanger. Large contacting area with saddle bearing housing provides minimum critical stress. A simple and effective method of aligning the hanger over the well to compensate for slight errors in erection is provided by shifting the entire beam along the slotted walking beam saddle by means of adjusting screws.



Double Reduction Non-Symmetrical Gear Reducer — API Sizes 40, 57, 80, 114, 160 and 228

GEAR REDUCERS

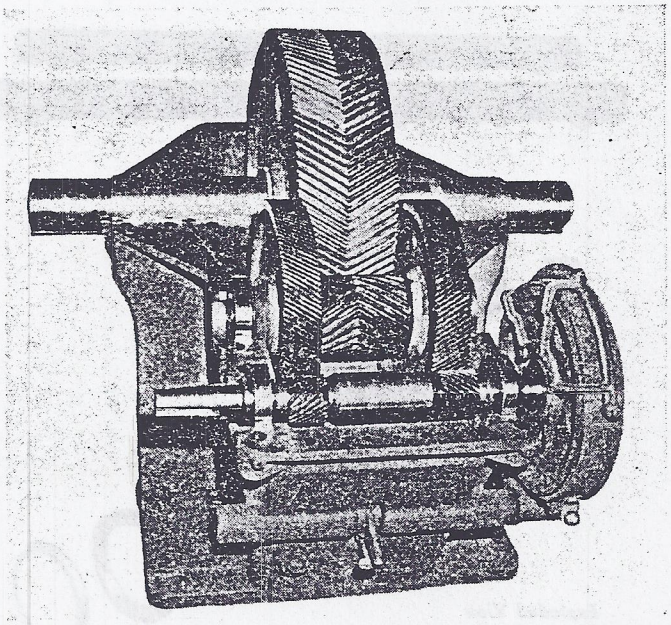
NATIONAL reduction gears are of two basic designs (1) Non-symmetrical and (2) Symmetrical.

The non-symmetrical design is the double-reduction type, featuring herringbone gears, tapered roller bearings on the crankshaft, straight roller bearings on the intermediate and high speed pinion shafts, and a one-piece housing. Covers are dowel-pinned in place for maximum rigidity and minimum housing deflection. Dirt excluders are provided on all exposed shaft extensions to protect the oil seals from grit and sand. This design is used on all series of pumping units except those using 320D and 456D Gear Reducers.

The symmetrical design gear reducer is also the double reduction type. These reducers have herringbone gears, sleeve bearings on the crankshaft and the housing is split through the centerline of the shafts. This design is used on pumping units series D-24 and larger.

All the above reducers are cascade lubricated. A pocket in the oil chamber collects any condensation of foreign matter and an easily accessible magnetic drain plug is provided to drain this pocket and attract any metal particles.

They are designed and manufactured to API standard pumping unit reducer sizes and ratings. Quiet and efficient operation is assured as all gears are run-in under load at the factory.



Double Reduction Symmetrical Gear Reducer — API Sizes 320 and 456

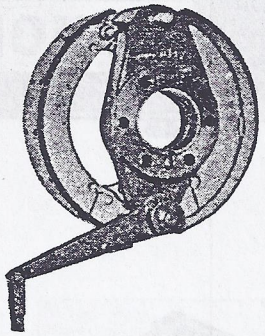
CRANKS AND COUNTERWEIGHTS

Cranks and counterweights are of two types (1) plain crank for beam counterweights and (2) disc type cranks for crank counterweighting. Crank counterweights are of two styles, Type A and Type E. Complete description of these counterweights and effects will be found on page 3928.

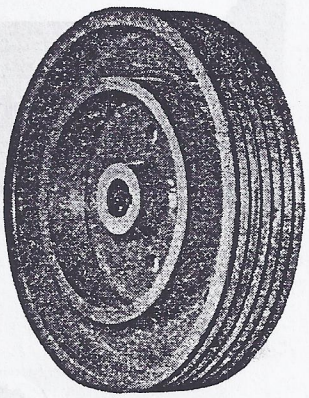
NATIONAL PUMPING UNITS . . . CONSTRUCTION FEATURES

SERVICE BRAKE AND V-BELT DRIVE SHEAVE

All gear reducers are equipped with a service brake except the 6D, for which a service brake may be purchased as optional equipment. An automotive type brake with V-belt drive sheave cast integral with the brake drum is used on the 10D to 228D inclusive. Band type brakes, mounted on the opposite side of the drive sheave, are used on the 320D and 456D gear reducers. The 320D and 456D Gear Reducers can be driven from either side since they are symmetrical. Changing drive sheaves is facilitated by a tapered shaft which includes a combination locking plate and puller.



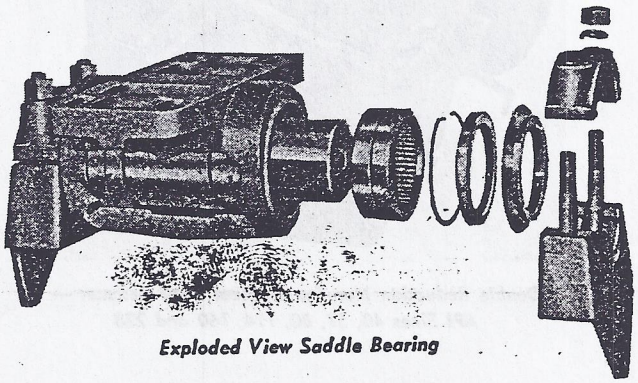
Automotive Type Brake



V-Belt Drive Sheave

SADDLE BEARING

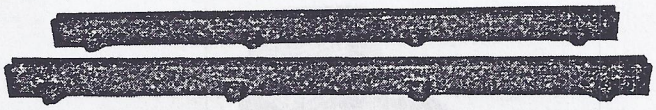
The beam is carried on needle roller bearings which lend themselves ideally to this type of oscillating service. Ample lubrication is provided through a single Alemite grease fitting. These bearings may be easily lubricated by use of ground level lubrication on units E-9SB-40DW through D-24SB-320DW inclusive. Ground level lubrication is optional equipment on the D-29SB-320DW and D-32SB-456DW Units. The bearings are protected from outside elements by oil seals and from over-lubrication by a pressure relief fitting. The hardened and ground alloy steel shaft, which acts as the inner race of the saddle bearing, is clamped securely in the brackets on top of the samson post.



Exploded View Saddle Bearing

STATIONARY RAILS

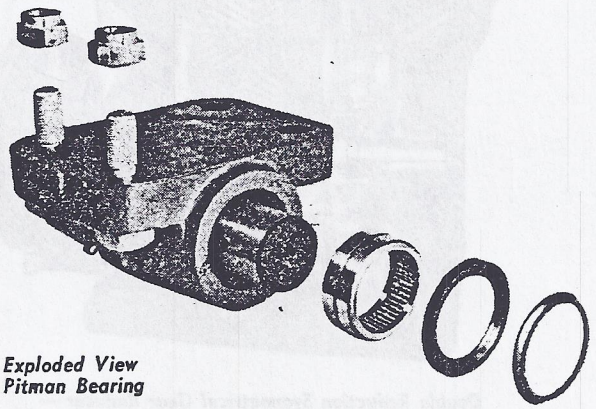
NATIONAL offers a series of stationary rails to accommodate a wide range of prime movers at an economical price. These rails give the prime mover maximum rigidity. They also feature adjustability for tightening V-belts.



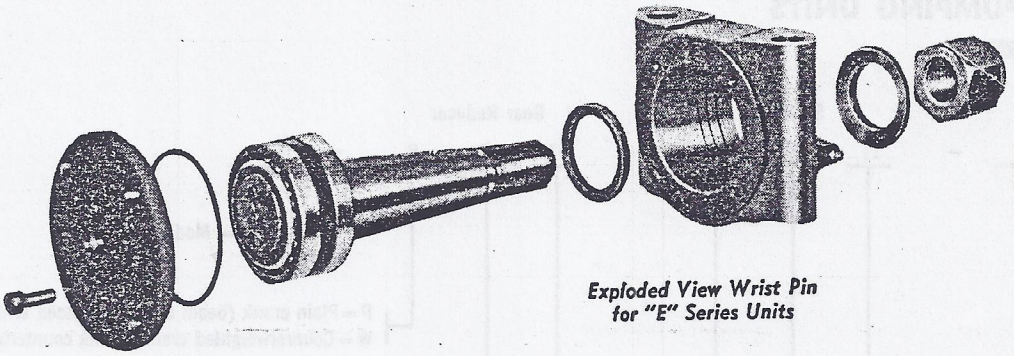
BEAM PITMAN BEARING

The beam load is transmitted to the pitman assembly through needle type anti-friction bearings. These low torque, high efficiency bearings are enclosed in a semi-steel casting and run on a hardened and ground steel shaft. Oil seals protect the bearings from dirt and a pressure relief fitting prevents over-lubrication.

These bearings may be easily lubricated by use of ground level lubrication on units E-9SB-40DW through D-32SB-456DW inclusive. Ground level lubrication is optional equipment on the D-29SB-320DW and D-32SB-456DW units.



Exploded View Pitman Bearing



Exploded View Wrist Pin for "E" Series Units

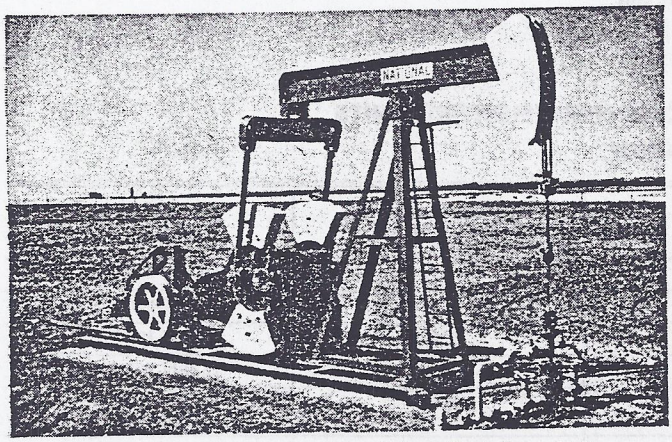
WRIST PINS

On beam counterbalanced pumping units, except the E-11, a wrist pin is pressed into each crank and held securely by a countersunk head set screw. The cranks have split hubs tightened by bolts and are keyed to the shaft.

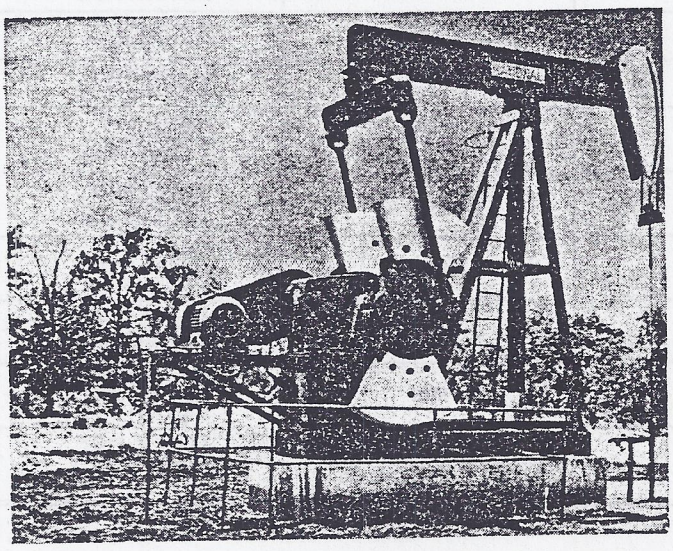
On the crank counterweighted and E-11 beam counterweighted pumping units, the use of a tapered joint between the wrist pins and crank creates a solid but easily removable connection and a locking arrangement is employed to prevent it from becoming loose.

Self-aligning wrist pin roller bearings, protected by an oil seal and pressure relief fitting, are securely clamped to the wrist pin. A dirt excluder protects the oil seal from dirt and weather. This arrangement prevents endwise movement.

NATIONAL "EP," "EX," "EH" AND "EL" SERIES PUMPING UNITS



Above: Portable Base Unit; Below: High Drive Unit



This EP-13SB-80DW Pumping Unit is typical of NATIONAL's line of *portable* base units. It has a wide four-runner base with the outside beams extended toward the well. The ruggedness and stability of construction eliminates necessity for a concrete foundation. These units can be easily skidded from one location to another without being dismantled. These are available in all sizes up to and including the EP-24SB-228DW unit. They can be furnished to be driven by a wide variety of prime movers. The larger units have a pipe on the back end that is plumbed for use as a volume tank.

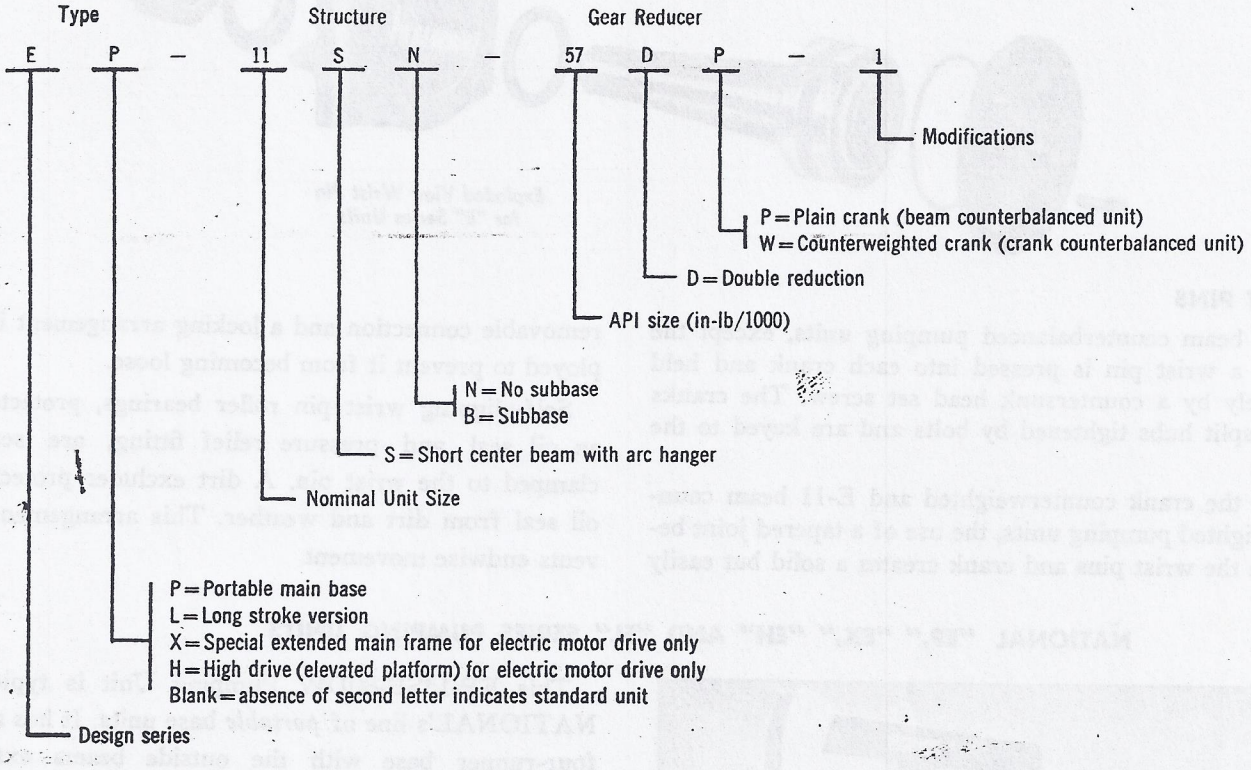
NATIONAL "EX" Units have extended main bases to accommodate Electric Motor drives only, providing the economy minded customers with an inexpensive, compact drive arrangement. Extension bases are eliminated, and V-belts and V-belt guards are shorter.

NATIONAL "EL" Unit is especially applicable for water flood and larger volume pumping. The "EL" Units have a longer stroke, obtained by increasing the front working center. No sacrifice is made in the geometry of the unit, thus maintaining desirable torque factors.

NATIONAL "EH" High Drive Units have an elevated platform for electric motor drive only. The electric motor is elevated above high water and sand. Also, the V-belts and guards are shorter.

NATIONAL® PUMPING UNITS

NOMENCLATURE



NATIONAL PUMPING UNIT SELECTION CHART—BEAM COUNTERWEIGHTED UNITS

SEE SPECIFICATIONS—PAGES 3926-3927

API Gear Size in Thousands of Inch-Pounds	Maximum Stroke Inches	Structure Rating, Lb.	*Maximum Counterweight Effect, Lb.	National Pumping Unit
6.4	16	3200	2276	D-3SN-6DP
	24	2065	1296	D-3SN-6DP-1
10	20	4100	3194	D-4SN-10DP
	30	2733	2445	D-4SN-10DP-2
16	24	4710	3581	E-5SN-16DP EP-5SN-16DP
	36	3000	2153	EL-5SN-16DP EPL-5SN-16DP
25	28	7240	5732	E-7SN-25DP EP-7SN-25DP
	42	4545	3558	EL-7SN-25DP EPL-7SN-25DP
40	34	8820	6364	E-9SN-40DP EP-9SN-40DP EX-9SN-40DP
	42	6930	4933	EL-9SN-40DP EPL-9SN-40DP EXL-9SN-40DP
57	34	8820	6364	E-9SN-57DP EP-9SN-57DP EX-9SN-57DP
	42	6930	4933	EL-9SN-57DP EXL-9SN-57DP EPL-9SN-57DP
		11,000	8707	E-11SN-57DP EP-11SN-57DP EX-11SN-57DP
	48	9625	7385	EL-11SN-57DP EPL-11SN-57DP EXL-11SN-57DP

*Includes Pitman and Extended Beam Effect.

66 E

THE NATIONAL SUPPLY COMPANY

Pumping Units

NATIONAL PUMPING UNIT SELECTION CHART—CRANK COUNTERWEIGHTED UNITS

SEE SPECIFICATIONS—PAGES 3926-3927

API Gear Size	Maximum Stroke, In.	Structure Rating, Lb.	*Maximum ctwt. Effect, Lb.	Unit Nomenclature	
25	30	6700	6000	F-25-67C-30** FP-25-26C-30**	
	36	6700	4930	F-25-67C-36** FP-25-67C-36**	
40	30	6700	6000	F-40-67C-30** FP-40-67C-30**	
	36	6700	4930	F-40-67C-36** F-40-67C-36**	
	34	8900	5510	E-9SB-40DW EP-9SB-40DW	EX-9SB-40DW EH-9SB-40DW
	42	7040	4345	EL-9SB-40DW EPL-9SB-40DW	EXL-9SB-40DW EHL-9SB-40DW
57	34	8900	5510	E-9SB-57DW EP-9SB-57DW	EX-9SB-57DW EH-9SB-57DW
	42	7040	4345	EL-9SB-57DW EPL-9SB-57DW	EXL-9SB-57DW EHL-9SB-57DW
		11,000	7465	E-11SB-57DW EP-11SB-57DW	EX-11SB-57DW EH-11SB-57DW
	48	9700	6370	EL-11SB-57DW EPL-11SB-57DW	EXL-11SB-57DW EHL-11SB-57DW
80	42	11,000	7515	E-11SB-80DW EP-11SB-80DW	EX-11SB-80DW EH-11SB-80DW
	48	9700	6370	EL-11SB-80DW EPL-11SB-80DW	EXL-11SB-80DW EHL-11SB-80DW
		12,700	8340	E-13SB-80DW EP-13SB-80DW	EX-13SB-80DW EH-13SB-80DW
	54	11,600	7285	EL-13SB-80DW EPL-13SB-80DW	EXL-13SB-80DW EHL-13SB-80DW
114	48	12,700	8340	E-13SB-114DW EP-13SB-114DW	EX-13SB-114DW EH-13SB-114DW
	54	11,600	7285	EL-13SB-114DW EPL-13SB-114DW	EXL-13SB-114DW EHL-13SB-114DW
		15,000	10,810	E-15SB-114DW EP-15SB-114DW	EX-15SB-114DW EH-15SB-114DW
	64	12,700	8815	EL-15SB-114DW EPL-15SB-114DW	EXL-15SB-114DW EHL-15SB-114DW
160	54	15,000	11,788	E-15SB-160DW EP-15SB-160DW	EX-15SB-160DW EH-15SB-160DW
		18,000	14,615	E-18SB-160DW EP-18SB-160DW	EX-18SB-160DW EH-18SB-160DW
	64	12,700	9650	EL-15SB-160DW EPL-15SB-160DW	EXL-15SB-160DW EHL-15SB-160DW
		15,200	11,915	EL-18SB-160DW EPL-18SB-160DW	EXL-18SB-160DW EHL-18SB-160DW
		21,000	15,740	E-21SB-160DW EP-21SB-160DW	EX-21SB-160DW EH-21SB-160DW
	74	18,200	13,315	EL-21SB-160DW EPL-21SB-160DW	EXL-21SB-160DW EHL-21SB-160DW
228	54	18,000	14,615	E-18SB-228DW EP-18SB-228DW	EX-18SB-228DW EH-18SB-228DW
	64	15,200	11,915	EL-18SB-228DW EPL-18SB-228DW	EXL-18SB-228DW EHL-18SB-228DW
		21,000	15,740	E-21SB-228DW EP-21SB-228DW	EX-21SB-228DW EH-21SB-228DW
	74	18,200	13,315	EL-21SB-228DW EPL-21SB-228DW	EXL-21SB-228DW EHL-21SB-228DW
		24,000	18,600	E-24SB-228DW EP-24SB-228DW	EX-24SB-228DW EH-24SB-228DW
	86	19,000	15,640	EL-24SB-228DW EPL-24SB-228DW	EXL-24SB-228DW EHL-24SB-228DW
320	74	24,000	19,100	D-24SB-320DW	
	86	19,730	16,175	D-24SB-320DW-4	
		29,800	23,430	D-29SB-320DW	
456	86	29,800	23,430	D-29SB-456DW	
	100	24,830	20,180	D-29SB-456DW-1	
	120	32,400	27,500	D-32SB-456DW	

**The "F" series is completely new and different from the "E" series. For details of construction contact your National Supply repre

Pumping UNITS

THE NATIONAL SUPPLY COMPANY

NATIONAL PUMPING UNIT SPECIFICATIONS

BEAM COUNTERWEIGHTED PUMPING UNITS

	D-3SN-6DP	D-3SN-6DP-1	D-4SN-10DP	D-4SN-10DP-2	E -5SN-16DP EP-5SN-16DP	EL -5SN-16DP EPL-5SN-16DP
*Structural Rating, Lb.	3,200	2,065	4,100	2,733	4,710	3,000
Beam Size, Inches x Weight, per Foot	6″x4″–12 lb.	6″x4″–12 lb.	8″x5¼″–17 lb.	8″x5¼″–17 lb.	8″x5¼″–20 lb.	8″x5¼″–20 lb.
***Wellhead Clearance	21¾″	14¼″	36″	19″	31½″	19¾″
Polished Rod Strokes, inches	12½, 14, 16	18, 21, 24	15, 17½, 20	20, 24, 30	17, 18½, 21, 24	25½, 28, 31½, 36
Working Center, Well End	24″	36″	30″	45″	36″	4′–6″
Working Center, Pitman End	16¾, 20, 23¼	16¾, 20, 24½	23⅜, 27⅝, 33⅞	23⅜, 30⅞, 39⅜	29, 34, 39, 44	29, 34, 39, 44
Gear Reducer, Type	Double	Double	Double	Double	Double	Double
API Peak Torque at 20 spm in-lbs.	6,400	6,400	10,000	10,000	16,000	16,000
Overall Gear Ratio	26.0	26.0	29.5	29.5	31.85	31.85
Weight of Each Counterweight and	225	225	310	310	100	100
**Max. Counterweight Effects, lb.	2,276	1,296	3,194	2,445	3,581	2,153
Available Sheaves—Pitch Diameter	12″x2-B	12″x2-B	12½″x3-A	12½″x3-A	16½″x3-B	16½″x3-B
Inches x Number and Belt Section	12″x2-A	12″x2-A	12½″x2-B	12½″x2-B		
Weight, Complete, Less Ctwts., lb.	661	696	1277	1314	E-1716 EP-2139	EL-1760 EPL-2183

*Within API Rating for Walking Beam.
**Includes Pitman Effect, and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

CRANK COUNTERWEIGHTED PUMPING UNITS

	F -25-67C-30 FP-25-67C-30	F -25-67C-36 FP-25-67C-36	F -40-67C-30 FP-40-67C-30	F -40-67C-36 FP-40-67C-36	E -9SB-40DW EP-9SB-40DW EX-9SB-40DW EH-9SB-40DW	EL -9SB-40DW EPL-9SB-40DW EXL-9SB-40DW EHL-9SB-40DW
*Structural Rating, lb.	6,700	6,700	6,700	6,700	8,900	7,040
Beam Size, Inches x Weight, per Foot	12″x6½″–27 lb.	12″x6½″–27 lb.	12″x6½″–27 lb.	12″x6½″–27 lb.	12″x6½″–36 lb.	12″x6½″–36 lb.
***Wellhead Clearance	46½″	40¼″	46½″	40¼″	47″	39″
Polished Rod Strokes, inches	24, 30	29, 36	24, 30	29, 36	22, 28, 34	27, 34½, 42
Working Center, Well End	40½″	48⅝″	40½″	48⅝″	4′–3″	5′–3″
Working Center, Pitman End	40½″	40½″	40½″	40½″	4′–3″	4′–3″
Gear Reducer, Type	Double	Double	Double	Double	Double	Double
API Peak Torque at 20 spm in-lbs.	25,000	25,000	40,000	40,000	40,000	40,000
Overall Gear Ratio	29.2	29.2	31.482	31.482	31.482	31.482
Weight of Each Counterweight and	6,249	5,167	6,249	5,167	770	770
**Max. Counterweight Effects, lb.					5,510	4,456
Available Sheaves—Pitch Diameter	18″x3-B	18″x3-B	19½″x4-B	19½″x4-B	19½″x4-B	19½″x4-B
Inches x Number and Belt Section			19½″x3-C	19½″x3-C	19½″x3-C	19½″x3-C
Weight, Complete, Less Ctwts, lb.	F-2667 FP-3367	F-2797 FP-3497	F-3217 FP-3917	F-3347 FP-4047	E-4681 EP-5653 EX-4773 EH-4467	EL-4790 EPL-5760 EXL-4875 EHL-4576

*Within API Rating for Walking Beam.
**Includes Pitman Effect, and Extended Beam Effect.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

CRANK COUNTERWEIGHTED PUMPING UNITS

	EL -13SB-114DW EPL-13SB-114DW EXL-13SB-114DW EHL-13SB-114DW	E -15SB-114DW EP-15SB-114DW EX-15SB-114DW EH-15SB-114DW	EL -15SB-114DW EPL-15SB-114DW EXL-15SB-114DW EHL-15SB-114DW	E -15SB-160DW EP-15SB-160DW EX-15SB-160DW EH-15SB-160DW	EL -15SB-160DW EPL-15SB-160DW EXL-15SB-160DW EHL-15SB-160DW	E -18SB-160DW EP-18SB-160DW EX-18SB-160DW EH-18SB-160DW
*Structural Rating, lb.	11,600	15,000	12,700	15,000	12,700	18,000
Beam Size, Inches x Weight, per Foot	18″x8¾″–70 lb.	18″x8¾″–70 lb.	21″x9″–82 lb.	18″x8¾″–70 lb.	21″x9″–82 lb.	18″x11¾″–96 lb.
***Wellhead Clearance	61½″	67½″	59¼″	81½″	63¼″	84″
Polished Rod Strokes, inches	37, 45½, 54	34, 44, 54	40, 52, 64	34, 44, 54	40, 52, 64	34, 44, 54
Working Center, Well End	6′–9″	6′–9″	8′–0″	6′–9″	8′–0″	6′–9″
Working Center, Pitman End	6′–0″	6′–9″	6′–9″	6′–9″	6′–9″	6′–9″
Gear Reducer, Type	Double	Double	Double	Double	Double	Double
API Peak Torque at 20 spm in-lbs.	114,000	114,000	114,000	160,000	160,000	160,000
Overall Gear Ratio	31.141	31.141	31.141	31.297	31.297	31.297
Weight of Each Counterweight and	1,240	1,600	1,600	1,750–11,788	1,750–9,650	1,600, 11,060
**Max. Counterweight Effects, lb.	7,285	10,810	8,815	1,600–10,810	1,600–8,830	1,750, 12,038 2,120, 14,615
Available Sheaves—Pitch Diameter	18″x3-D	18″x3-D	18″x3-D	18″x4-D	18″x4-D	18″x4-D
Inches x Number and Belt Section	18″x4-C	18″x4-C	18″x4-C	26″x5-C	26″x5-C	26″x5-C
	24″x4-C	24″x4-C	24″x4-C	31″x5-C	31″x5-C	31″x5-C
Weight, Complete, Less Ctwts., lb.	EL-9090 EPL-11,528 EXL-9238 EHL-8930	E-9983 EP-13,103 EX-10,139 EH-9793	EL-10,453 EPL-13,573 EXL-10,609 EHL-10,263	E-11,932 EP-14,307 EX-12,204 EH-11,742	EL-12,402 EPL-14,777 EXL-12,674 EHL-12,212	E-13,243 EP-16,587 EX-13,515 EH-13,053

*Within API Rating for Walking Beam.
**Includes Pitman Effect, Counterweight Effect is for Longest Stroke, includes 2 Cranks and 4 Counterweights. Additional Effect is Available by using 5 or 6 Counterweights.
***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

THE NATIONAL SUPPLY COMPANY

Pumping Units

NATIONAL PUMPING UNIT SPECIFICATIONS

BEAM COUNTERWEIGHTED PUMPING UNITS

E -7SN-25DP EP-7SN-25DP	EL -7SN-25DP EPL-7SN-25DP	E -9SN-40DP EP-9SN-40DP EX-9SN-40DP	EL -9SN-40DP EPL-9SN-40DP EXL-9SN-40DP	E -9SN-57DP EP-9SN-57DP EX-9SN-57DP	EL -9SN-57DP EPL-9SN-57DP EXL-9SN-57DP	E -11SN-57DP EP-11SN-57DP EX-11SN-57DP	EL -11SN-57DP EPL-11SN-57DP EXL-11SN-57DP
7,240	4,545	8,900	6,940	8,900	6,940	11,000	9,700
10″x5¾″–29 lb.	10″x5¾″–29 lb.	12″x6½″–36 lb.	12″x6½″–36 lb.	12″x6½″–36 lb.	12″x6½″–36 lb.	14″x8″–48 lb.	14″x8″–53 lb.
37″	23″	38½″	30″	38½″	30″	49″	41″
20½, 22½, 25, 28	31, 34, 37, 42	26, 28½, 34	32, 35, 42	26, 28½, 34	32, 35, 42	27, 34½, 42	31, 39½, 48
42″	5′–3″	4′–3″	5′–3″	4′–3″	5′–3″	5′–3″	6′–0″
34, 39, 44, 49	34, 39, 44, 49	40½, 50, 56½	40½, 50, 56½	40½, 50, 56½	40½, 50, 56½	5′–0½″	5′–0½″
Double	Double	Double	Double	Double	Double	Double	Double
25,000	25,000	40,000	40,000	57,000	57,000	57,000	57,000
29.2	29.2	31.482	31.482	31.186	31.186	31.186	31.186
125	125	400	400	400	400	500	500
5,732	3,558	6,364	5,150	6,364	5,150	8,707	7.625
18″x3-B	18″x3-B	19½″x4-B 19½″x3-C 18″x3-C	19½″x4-B 19½″x3-C 18″x3-C	18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B
E-2243 EP-2707	EL-2375 EPL-2839	E-3773 EP-4723 EX-3850	EL-3880 EP-4830 EX-3957	E-4073 EP-5023 EX-4150	EL-4180 EP-5130 EX-4257	E-5192 EP-6835 EX-5265	EL-5312 EPL-6955 EXL-5385

CRANK COUNTERWEIGHTED PUMPING UNITS

E -9SB-57DW EP-9SB-57DW EX-9SB-57DW EH-9SB-57DW	EL -9SB-57DW EPL-9SB-57DW EXL-9SB-57DW EHL-9SB-57DW	E -11SB-57DW EP-11SB-57DW EX-11SB-57DW EH-11SB-57DW	EL -11SB-57DW EPL-11SB-57DW EXL-11SB-57DW EHL-11SB-57DW	E -11SB-80DW EP-11SB-80DW EX-11SB-80DW EH-11SB-80DW	EL -11SB-80DW EPL-11SB-80DW EXL-11SB-80DW EHL-11SB-80DW	E -13SB-80DW EP-13SB-80DW EX-13SB-80DW EH-13SB-80DW	EL -13SB-80DW EPL-13SB-80DW EXL-13SB-80DW EHL-13SB-80DW	E- 13SB-114DW EP-13SB-114DW EX-13SB-114DW EH-13SB-114DW
8,900	7,040	11,000	9,700	11,000	9,700	12,700	11,600	12,700
12″x6½″–36 lb.	12″x6½″–36 lb.	14″x8″–48 lb.	14″x8″–53 lb.	14″x8″–48 lb.	14″x8″–53 lb.	16″x8½″–58 lb.	18″x8¾″–70 lb.	16″x8½″–58 lb.
47″	39″	60″	52″	60″	52″	67½″	61½″	67½″
22, 28, 34	27, 34½, 42	27, 34½, 42	31, 39½, 48	27, 34½, 42	31, 39½, 48	33, 40½, 48	37, 45½, 54	33, 40½, 48
4′–3″	5′–3″	5′–3″	6′–0″	5′–3″	6′–0″	6′–0″	6′–9″	6′–0″
4′–3″	4′–3″	5′–3″	5′–3″	5′–3″	5′–3″	6′–0″	6′–0″	6′–0″
Double	Double	Double	Double	Double	Double	Double	Double	Double
57,000	57,000	57,000	57,000	80,000	80,000	80,000	80,000	114,000
31.186	31.186	31.186	31.186	31.11	31.11	31.11	31.11	31.141
770	770	1,080	1,080	1,080	1,080	1,240	1,240	1,240
5,510	4,456	7,465	6,370	7,515	6,420	8,340	7,285	8,340
18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B	18″x3-D 18″x4-C 24″x4-C	18″x3-D 18″x4-C 24″x4-C	18″x3-D 18″x4-C 24″x4-C	18″x3-D 18″x4-C 24″x4-C	18″x3-D 18″x4-C 24″x4-C
E-4962 EP-5932 EX-5069 EH-4748	EL-5071 EPL-6041 EXL-5176 EHL-4857	E-6084 EP-7557 EX-6176 EH-5949	EL-6204 EPL-7677 EXL-6296 EHL-6069	E-6969 EP-8442 EX-7065 EH-6819	EL-7089 EPL-8562 EXL-7185 EHL-6939	E-8263 EP-10,695 EX-8411 EH-8103	EL-8591 EPL-11,025 EXL-8743 EHL-8431	E-8760 EP-11,295 EX-8908 EH-8600

CRANK COUNTERWEIGHTED PUMPING UNITS

EL -18SB-160DW EPL-18SB-160DW EXL-18SB-160DW EHL-18SB-160DW	E -18SB-228DW EP-18SB-228DW EX-18SB-228DW EH-18SB-228DW	EL -18SB-228DW EPL-18SB-228DW EXL-18SB-228DW EHL-18SB-228DW	E -21SB-160DW EP-21SB-160DW EX-21SB-160DW EH-21SB-160DW	EL -21SB-160DW EPL-21SB-160DW EXL-21SB-160DW EHL-21SB-160DW	E -21SB-228DW EP-21SB-228DW EX-21SB-228DW EH-21SB-228DW	EL -21SB-228DW EPL-21SB-228DW EXL-21SB-228DW EHL-21SB-228DW	E -24SB-228DW EP-24SB-228DW EX-24SB-228DW EH-24SB-228DW	EL -24SB-228DW EPL-24SB-228DW EXL-24SB-228DW EHL-24SB-228DW
15,200	18,000	15,200	21,000	18,200	21,000	18,200	24,000	19,600
18″x11¾″–96 lb.	18″x11¾″–96 lb.	18″x11¾″–96 lb.	24″x12″–100 lb.	24″x12″–100 lb.	24″x12″–100 lb.	24″x12″–100 lb.	24″x12″–110 lb.	24″x12″–110 lb.
68″	7′–0″	5′–8″	88½″	73½″	88½″	73½″	8′–3½″	6′–8″
40½, 52, 64	34, 44, 54	40½, 52, 64	34, 44, 54, 64	39½, 51, 62½, 74	34, 44, 54, 64	39½, 51, 62½, 74	44, 54, 64, 74	51, 63, 74½, 86
8′–0″	6′–9″	8′–0″	8′–0″	9′–3″	8′–0″	9′–3″	9′–3″	10′–6″
6′–9″	6′–9″	6′–9″	8′–0″	8′–0″	8′–0″	8′–0″	9′–3″	9′–3″
Double	Double	Double	Double	Double	Double	Double	Double	Double
160,000	228,000	228,000	160,000	160,000	228,000	228,000	228,000	228,000
31.297	31.297	31.297	31.297	31.297	31.297	31.297	31.297	31.297
1,000, 6,920 1,750, 9,740 2,120, 11,915	1,600, 11,060 1,750, 12,038 2,120, 14,615	1,600, 8,920 1,750, 9,740 2,120, 11,915	1,910, 12,550 2,340, 15,740	1,910, 10,555 2,340, 13,315	1,910, 12,550 2,340, 15,740	1,910, 10,555 2,340, 13,315	2,030, 13,550 2,760, 18,600	2,030, 13,320 2,760, 18,640
18″x4-D 26″x5-C 31″x5-C	18″x4-D 26″x6-C 34″x6-C	18″x4-D 26″x6-C 34″x6-C	18″x4-D 26″x5-C 31″x5-C	18″x4-D 26″x5-C 31″x5-C	18″x4-D 26″x6-C 34″x6-C	18″x4-D 26″x6-C 34″x6-C	18″x4-D 26″x6-C 34″x6-C	18″x4-D 26″x6-C 34″x6-C
EL-13,723 EPL-17,067 EXL-13,995 EHL-13,533	E-14,513 EP-17,857 EX-14,785 EH-14,323	EL-14,993 EPL-18,337 EXL-15,265 EHL-14,803	E-15,377 EP-18,662 EX-15,717 EH-15,167	EL-15,725 EPL-19,010 EXL-16,065 EHL-15,515	E-16,827 EP-20,134 EX-17,167 EH-16,617	EL-17,175 EPL-20,382 EXL-17,515 EHL-16,965	E-19,171 EP-22,713 EX-19,579 EH-18,911	EL-19,621 EPL-22,263 EXL-20,029 EHL-18,361

Pumping UNITS

THE NATIONAL SUPPLY COMPANY

NATIONAL PUMPING UNIT SPECIFICATIONS

CRANK COUNTERWEIGHTED PUMPING UNITS

	D-24SB-320DW	D-24SB-320DW-4	D-29SB-320DW	D-29SB-456DW	D-29SB-456DW-1	D-32SB-456DW
*Structural Rating, lb.	24,000	19,730	29,800	29,800	24,830	32,400
Beam Size, Inches x Weight, per Foot	24″x12″–110 lb.	24″x12″–110 lb.	27″x14″–145 lb.	27″x14″–145 lb.	27″x14″–145 lb.	33″x15¾″–200 lb.
***Wellhead Clearance	7′–0⅝″	5′–5″	7′–11″	7′–11″	5′–11⅜″	9′–9¼″
Polished Rod Strokes, inches	44, 54, 64, 74	51, 63, 74, 86	56, 66, 76, 86	56, 66, 76, 86	65, 77, 88, 100	72, 84, 96, 108, 120
Working Center, Well End	9′–3″	10′–9″	10′–9″	10′–9″	12′–6″	15′–0″
Working Center, Pitman End	8′–10″	8′–10″	10′–6″	10′–9″	10′–6″	14′–10″
Gear Reducer Type	Double	Double	Double	Double	Double	Double
API Peak Torque at 20 spm in-lbs.	320,000	320,000	320,000	456,000	456,000	456,000
Overall Gear Ratio	30.0	30.0	30.0	30.3	30.3	30.3
Weight of Each Counterweight and **Max. Counterweight Effects, lb.	1,620, 11,650 2,000, 13,800 2,700, 19,100	1,620, 9,650 2,000, 11,500 2,700, 16,100	3,330 23,430	3,330 23,430	3,330 20,180	4,510 27,500
Available Sheaves—Pitch Diameter Inches x Number and Belt Section	34″x8-C 18″x6-D 26″x6-D 48″x8-C	34″x8-C 26″x6-D 18″x6-D 48″x8-C	34″x8-C 26″x6-D 18″x6-D 48″x8-C	48″x8-C 36″x5-D	48″x8-C 36″x5-D	48″x8-C 36″x5-D
Weight, Complete, Less Ctwts., lb.	24,070	24,505	28,984	31,309	32,374	43,914

*Within API Rating for Walking Beam.

**Includes Pitman Effect, Counterweight Effect is for Longest Stroke, includes 2 Cranks and 4 Counterweights. Additional Effect is Available by using 5 or 6 Counterweights.

***Distance between bottom of polished rod clamp support and bottom of main base with arc in lowest position.

CRANK COUNTERWEIGHTS

NATIONAL Eccentric Disc Cranks are of two types, A and E.

Pumping Units of the series D-24—through D-32—inclusive, are equipped with Type A Crank. On the Type A Crank, counterweights are made in two halves which are securely clamped in position on the outside rim of the crank by three separate bolts. These bolts do not support the counterweight load but only serve to clamp the halves together. When loosened the weights slide freely around the crank rims.

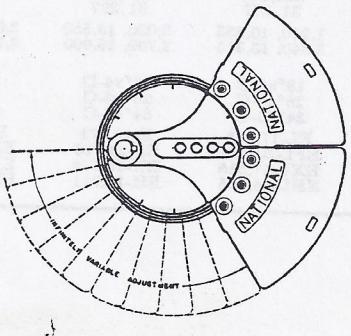
The "E" Series Pumping Units are equipped with Type E Cranks. On Type E Cranks, counterweights are one-piece construction, securely locked to both faces of the crank rim by three separate self-aligning clamp arrangements. These clamps do not support the counterweight load but serve to lock the weight in position.

The prime mover is used to turn the cranks to the desired position with relation to the weights, and the service brake to hold the cranks in this position. The bolts are then tightened, reclamping the weights.

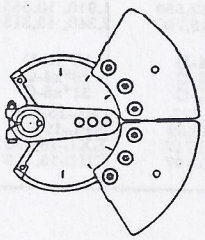
The infinitely variable adjustability of NATIONAL Eccentric Disc Cranks and Counterweights will be apparent from the illustrations. The weights slide around the track to any position desired, allowing the very maximum in accuracy of counterweight effect and degree of lag and lead.

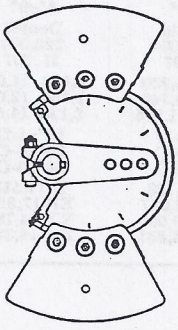
Many pumping units operate under conditions whereby the maximum torque loads occur ahead of, or behind the midstroke position of the cranks. NATIONAL's Type "E" eccentric disc crank enables the user to set the counterweights in the proper lag or lead position whereby the maximum counterweight effect can be made to coincide with the maximum torque requirement of the well. This permits more even loading, and reduction of the peak torque loading on the gear reducer and prime mover. This prolongs the life of the equipment and reduces the power consumption.

TYPE "A" CRANK COUNTERWEIGHT . . .



TYPE "E" CRANK COUNTERWEIGHT





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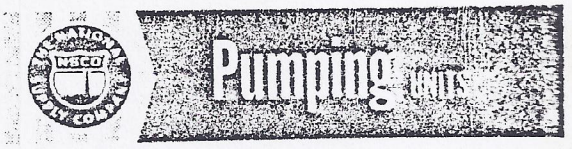

NATIONAL PUMPING UNIT SPECIFICATIONS

BEAM COUNTERWEIGHTED PUMPING UNITS

E -7SN-25DP EP-7SN-25DP	EL -7SN-25DP EPL-7SN-25DP	E -9SN-40DP EP-9SN-40DP EX-9SN-40DP	EL -9SN-40DP EPL-9SN-40DP EXL-9SN-40DP	E -9SN-57DP EP-9SN-57DP EX-9SN-57DP	EL -9SN-57DP EPL-9SN-57DP EXL-9SN-57DP	E -11SN-57DP EP-11SN-57DP EX-11SN-57DP	EL -11SN-57DP EPL-11SN-57DP EXL-11SN-57DP
7,240	4,545	8,900	6,940	8,900	6,940	11,000	9,700
10″x5¾″–29 lb.	10″x5¾″–29 lb.	12″x6½″–36 lb.	12″x6½″–36 lb.	12″x6½″–36 lb.	12″x6½″–36 lb.	14″x8″–48 lb.	14″x8″–53 lb.
37″	23″	38½″	30″	38½″	30″	49″	41″
20½, 22½, 25, 28	31, 34, 37, 42	26, 28½, 34	32, 35, 42	26, 28½, 34	32, 35, 42	27, 34½, 42	31, 39½, 48
42″	5′–3″	4′–3″	5′–3″	4′–3″	5′–3″	5′–3″	6′–0″
34, 39, 44, 49	34, 39, 44, 49	40½, 50, 56½	40½, 50, 56½	40½, 50, 56½	40½, 50, 56½	5′–0½″	5′–0½″
Double	Double	Double	Double	Double	Double	Double	Double
25,000	25,000	40,000	40,000	57,000	57,000	57,000	57,000
29.2	29.2	31.482	31.482	31.186	31.186	31.186	31.186
125	125	400	400	400	400	500	500
5,732	3,558	6,364	5,150	6,364	5,150	8,707	7,625
18″x3-B	18″x3-B	19½″x4-B 19½″x3-C 18″x3-C	19½″x4-B 19½″x3-C 18″x3-C	18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B
E-2243 EP-2707	EL-2375 EPL-2839	E-3773 EP-4723 EX-3850	EL-3880 EP-4830 EX-3957	E-4073 EP-5023 EX-4150	EL-4180 EP-5130 EX-4257	E-5192 EP-6835 EX-5265	EL-5312 EPL-6955 EXL-5385

CRANK COUNTERWEIGHTED PUMPING UNITS

E -9SB-57DW EP-9SB-57DW EX-9SB-57DW EH-9SB-57DW	EL -9SB-57DW EPL-9SB-57DW EXL-9SB-57DW EHL-9SB-57DW	E -11SB-57DW EP-11SB-57DW EX-11SB-57DW EH-11SB-57DW	EL -11SB-57DW EPL-11SB-57DW EXL-11SB-57DW EHL-11SB-57DW	E -11SB-80DW EP-11SB-80DW EX-11SB-80DW EH-11SB-80DW	EL -11SB-80DW EPL-11SB-80DW EXL-11SB-80DW EHL-11SB-80DW	E -13SB-80DW EP-13SB-80DW EX-13SB-80DW EH-13SB-80DW	EL -13SB-80DW EPL-13SB-80DW EXL-13SB-80DW EHL-13SB-80DW	E- 13SB-114DW EP-13SB-114DW EX-13SB-114DW EH-13SB-114DW
8,900	7,040	11,000	9,700	11,000	9,700	12,700	11,600	12,700
12″x6½″–36 lb.	12″x6½″–36 lb.	14″x8″–48 lb.	14″x8″–53 lb.	14″x8″–48 lb.	14″x8″–53 lb.	16″x8½″–58 lb.	18″x8¾″–70 lb.	16″x8½″–5[illegible]
47″	39″	60″	52″	60″	52″	67½″	61½″	67½″
22, 28, 34	27, 34½, 42	27, 34½, 42	31, 39½, 48	27, 34½, 42	31, 39½, 48	33, 40½, 48	37, 45½, 54	33, 40½, 48
4′–3″	5′–3″	5′–3″	6′–0″	5′–3″	6′–0″	6′–0″	6′–9″	6′–0″
4′–3″	4′–3″	5′–3″	5′–3″	5′–3″	5′–3″	6′–0″	6′–0″	6′–0″
Double	Double	Double	Double	Double	Double	Double	Double	Double
57,000	57,000	57,000	57,000	80,000	80,000	80,000	80,000	114,000
31.186	31.186	31.186	31.186	31.11	31.11	31.11	31.11	31.141
770	770	1,080	1,080	1,080	1,080	1,240	1,240	1,240
5,510	4,456	7,465	6,370	7,515	6,420	8,340	7,285	8,340
18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B	18″x3-C 23″x3-C 23″x4-B	18″x3-D 18″x4-C 24″x4-C	18″x3-D 18″x4-C 24″x4-C	18″x3-D 18″x4-C 24″x4-C	18″x3-D 18″x4-C 24″x4-C	18″x3-D 18″x4-C 24″x4-C
E-4962 EP-5932 EX-5069 EH-4748	EL-5071 EPL-6041 EXL-5176 EHL-4857	E-6084 EP-7557 EX-6176 EH-5949	EL-6204 EPL-7677 EXL-6296 EHL-6069	E-6969 EP-8442 EX-7065 EH-6819	EL-7089 EPL-8562 EXL-7185 EHL-6939	E-8263 EP-10,695 EX-8411 EH-8103	EL-8591 EPL-11,025 EXL-8743 EHL-8431	E-8760 EP-11,198 EX-8908 EH-8600

CRANK COUNTERWEIGHTED PUMPING UNITS

EL -18SB-160DW EPL-18SB-160DW EXL-18SB-160DW EHL-18SB-160DW	E -18SB-228DW EP-18SB-228DW EX-18SB-228DW EH-18SB-228DW	EL -18SB-228DW EPL-18SB-228DW EXL-18SB-228DW EHL-18SB-228DW	E -21SB-160DW EP-21SB-160DW EX-21SB-160DW EH-21SB-160DW	EL -21SB-160DW EPL-21SB-160DW EXL-21SB-160DW EHL-21SB-160DW	E -21SB-228DW EP-21SB-228DW EX-21SB-228DW EH-21SB-228DW	EL -21SB-228DW EPL-21SB-228DW EXL-21SB-228DW EHL-21SB-228DW	E -24SB-228DW EP-24SB-228DW EX-24SB-228DW EH-24SB-228DW	EL -24SB-228DW EPL-24SB-228DW EXL-24SB-228DW EHL-24SB-228DW
15,200	18,000	15,200	21,000	18,200	21,000	18,200	24,000	19,600
18″x11¾″–96 lb.	18″x11¾″–96 lb.	18″x11¾″–96 lb.	24″x12″–100 lb.	24″x12″–100 lb.	24″x12″–100 lb.	24″x12″–100 lb.	24″x12″–110 lb.	24″x12″–110 lb.
68″	7′–0″	5′–8″	88½″	73½″	88½″	73½″	8′–3½″	6′–8″
40½, 52, 64	34, 44, 54	40½, 52, 64	34, 44, 54, 64	39½, 51, 62½, 74	34, 44, 54, 64	39½, 51, 62½, 74	44, 54, 64, 74	51, 63, 74½, 86
8′–0″	6′–9″	8′–0″	8′–0″	9′–3″	8′–0″	9′–3″	9′–3″	10′–9″
6′–9″	6′–9″	6′–9″	8′–0″	8′–0″	8′–0″	8′–0″	9′–3″	9′–3″
Double	Double	Double	Double	Double	Double	Double	Double	Double
160,000	228,000	228,000	160,000	160,000	228,000	228,000	228,000	228,000
31.297	31.297	31.297	31.297	31.297	31.297	31.297	31.297	31.297
1,600, 8,920 1,750, 9,740 2,120, 11,915	1,600, 11,060 1,750, 12,038 2,120, 14,615	1,600, 8,920 1,750, 9,740 2,120, 11,915	1,910, 12,550 2,340, 15,740	1,910, 10,555 2,340, 13,315	1,910, 12,550 2,340, 15,740	1,910, 10,555 2,340, 13,315	2,030, 13,550 2,760, 18,600	2,030, 11,290 2,760, 15,640
18″x4-D 26″x5-C 31″x5-C	18″x4-D 26″x6-C 34″x6-C	18″x4-D 26″x6-C 34″x6-C	18″x4-D 26″x5-C 31″x5-C	18″x4-D 26″x5-C 31″x5-C	18″x4-D 26″x6-C 34″x6-C	18″x4-D 26″x6-C 34″x6-C	18″x4-D 26″x6-C 34″x6-C	18″x4-D 26″x6-C 34″x6-C
EL-13,723 EPL-17,067 EXL-13,995 EHL-13,533	E-14,513 EP-17,857 EX-14,785 EH-14,323	EL-14,993 EPL-18,337 EXL-15,265 EHL-14,803	E-15,377 EP-18,662 EX-15,717 EH-15,167	EL-15,725 EPL-19,010 EXL-16,065 EHL-15,515	E-16,827 EP-20,134 EX-17,167 EH-16,617	EL-17,175 EPL-20,382 EXL-17,515 EHL-16,965	E-19,171 EP-22,713 EX-19,579 EH-18,911	EL-19,621 EPL-23,165 EXL-20,029 EHL-19,361