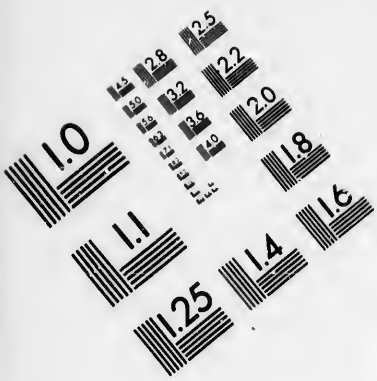

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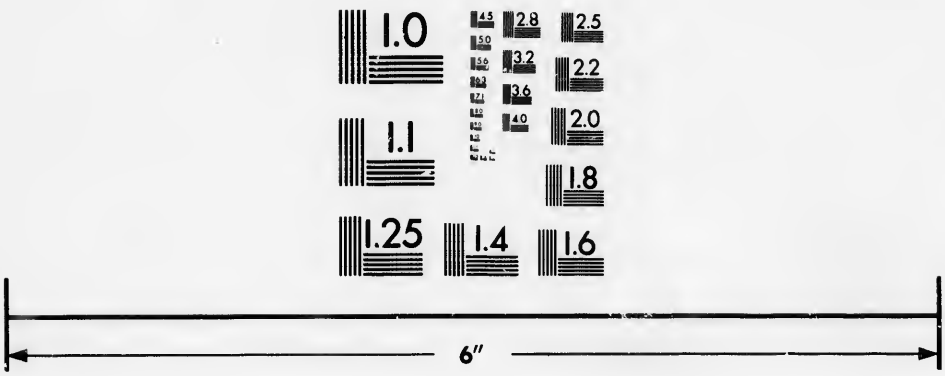
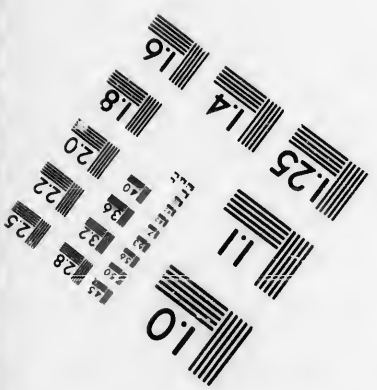
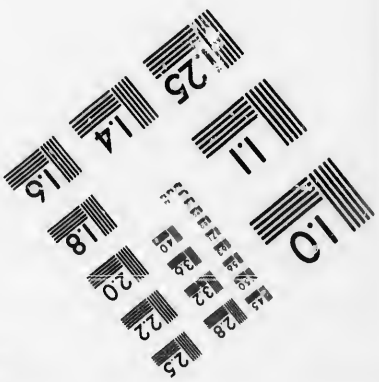
TEST TARGET (MT-3)







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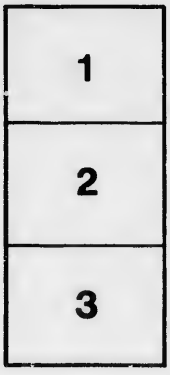


NORTHEY & CO.

PUMPING MACHINERY

TORONTO, ONT.

OFFICE AND WORKS
COR. FRONT AND PARLIAMENT STS.

SEPTEMBER, 1888.

BROUGH & CASWELL, CATALOGUE PRINTERS, TORONTO

AREAS OF CIRCLES

DIAM.	AREA.	DIAM.	AREA.	DIAM.	AREA.	DIAM.	AREA.	DIAM.	AREA.	DIAM.	AREA.
2 in.	3.14	7¾ in.	47.17	13½ in.	143.13	22½ in.	397.60	34 in.	907.92	45½ in.	1626.0
2¼	3.97	8	50.26	13¾	148.48	23	415.47	34½	934.82	46	1661.9
2½	4.90	8¼	53.45	14	153.93	23½	433.73	35	962.11	46½	1698.2
2¾	5.93	8½	6.74	14¼	159.48	24	452.30	35½	989.80	47	1734.9
3	7.06	8¾	60.13	14½	165.13	24½	471.43	36	1017.88	47½	1772.1
3¼	8.29	9	63.61	14¾	170.87	25	490.87	36½	1046.4	48	1809.6
3½	9.62	9¼	67.20	15	176.71	25½	510.70	37	1075.2	48½	1847.5
3¾	11.04	9½	70.88	15¼	182.65	26	530.93	37½	1104.5	49	1885.7
4	12.56	9¾	74.66	15½	188.69	26½	551.54	38	1134.1	49½	1924.4
4¼	14.18	10	78.54	15¾	194.82	27	572.55	38½	1164.2	50	1963.5
4½	15.90	10¼	82.51	16	201.06	27½	593.95	39	1194.6	50½	2003.0
4¾	17.72	10½	86.59	16½	213.82	28	615.75	39½	1225.4	51	2042.8
5	19.63	10¾	90.76	17	226.98	28½	637.94	40	1256.6	51½	2083.1
5¼	21.64	11	95.03	17½	240.52	29	660.52	40½	1288.3	52	2123.7
5½	23.75	11¼	99.40	18	254.46	29½	683.49	41	1320.3	52½	2164.8
5¾	25.96	11½	103.86	18½	268.80	30	706.86	41½	1352.7	53	2206.2
6	28.27	11¾	108.43	19	283.52	30½	730.61	42	1385.4	53½	2248.0
6¼	30.67	12	113.09	19½	298.64	31	754.76	42½	1418.6	54	2290.2
6½	33.18	12¼	117.85	20	314.16	31½	779.31	43	1452.2	54½	2332.8
6¾	35.78	12½	122.72	20½	330.06	32	804.25	43½	1486.2	55	2375.8
7	38.48	12¾	127.67	21	346.36	32½	829.57	44	1520.5	55½	2419.2
7¼	41.28	13	132.73	21½	363.05	33	855.30	44½	1555.3	56	2463.0
7½	44.17	13¼	137.88	22	380.13	33½	881.41	45	1590.4	56½	2507.2

NORTHEY & CO'S PUMPS ◎ Are the simplest, strongest and most durable in the market.

Every Pump fully guaranteed and rigorously tested before leaving the works:

In ordering a Pump, please answer the following questions carefully, as by so doing much correspondence may be saved:

1. What is the maximum quantity required to be pumped per hour?
2. To what height is it to be lifted by suction, and to what height is it to be forced?
3. What is the length and diameter of existing suction and discharge pipes, if any; and the number of elbows or bends?
4. What is the liquid to be pumped, and is it hot or cold, clear or gritty, fresh or salt, alkaline or acidulous?
5. What is the average pressure of steam used?

Directions for Setting Up and Operating Pumps

The most important point in setting up a pump is to provide a full and steady supply of the liquid to be pumped. In order to insure this, carefully observe the following:

The suction pipe must in no case be smaller than sizes given in tables; if long, it must be *larger*, as friction increases very rapidly with length of pipe.

It must be as straight and free as possible; and where turns are necessary, see that round, full sweeps are used in preference to right-angled elbows. Valves and elbows in a pipe cause much more friction than length of pipe.

The utmost care must be taken to guard against leaks in the suction pipe, as a leak infallibly diminishes the quantity of water pumped, according to its size.

A suction air vessel, on suction pipe near the pumps is a great advantage, on long or high suctions, and where high speed is desired it is a necessity, as it prevents pounding when the pump reverses.

A foot valve is also useful on long or high suctions; see that its area more than equals that of pipe.

Water at a high temperature cannot be raised to any height by suction; in pumping very hot water the supply should flow into the pump by gravitation.

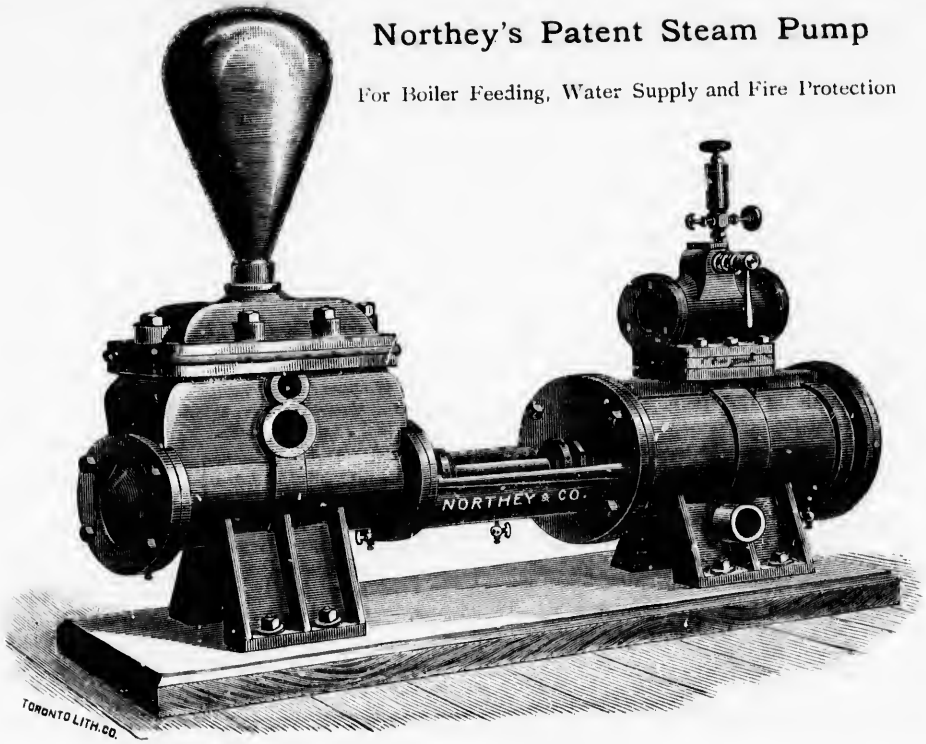
The steam, exhaust, and discharge pipes, should be straight and free as possible, and as large as given in table.

To prevent freezing in cold weather while pump is standing, drain it by opening cocks provided for that purpose.

Use your pump as you do your engine, if you **expect it to always work well,**

Northey's Patent Steam Pump

For Boiler Feeding, Water Supply and Fire Protection



The Northey Pump

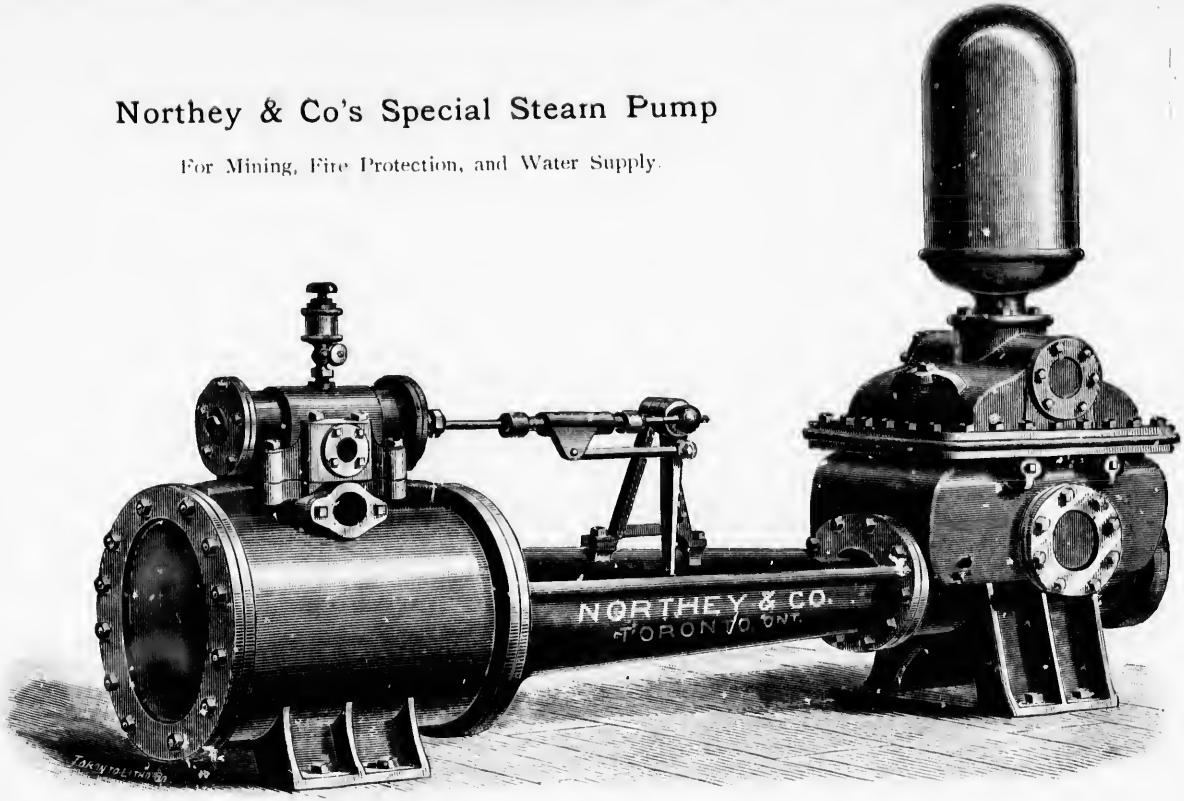
Being positive under any pressure, may be run as slowly as desired: this is an important feature in boiler feeding, as a continuous flow of water is obtained, exactly compensating for amount evaporated, and resulting in economy of fuel, and durability of boilers. The Northey Pumps have suction and delivery openings on both sides of Pump, thereby suiting them to any desired position. They are fitted to pump either hot or cold water.

Sizes and Prices

Steam Cylinder, in inches	Water Cylinder, in inches	Stroke, in inches	Capacity per minute at fair speed, gallons	Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe	PRICE
4	2½	4	20	¾	¾	1¼	1	$130 00
5	3	5	30	¾	1	1½	1½	170 00
6	3½	6	40	¾	1	2	1½	200 00
7	4½	7	60	1	1½	2½	2	275 00
8	5	8	100	1¼	2	3	2½	330 00
10	6	10	150	1½	2	4	3	400 00
12	7	12	200	2	2½	5	4	475 00
14	8	12	300	2	2½	5	4	575 00

Northey & Co's Special Steam Pump

For Mining, Fire Protection, and Water Supply.



Northey & Co's Special Steam Pump

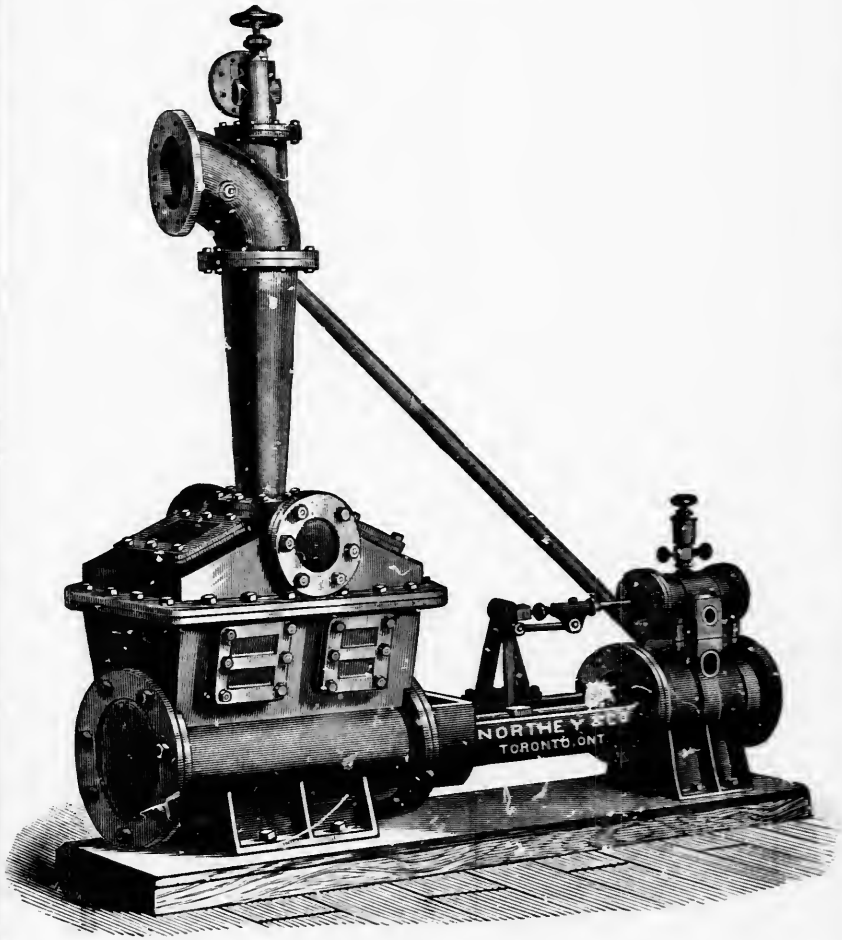
Is of strong and massive design, suited for the heaviest kind of service; very reliable and powerful

Sizes and Prices.

Size Steam Cylinder in inches.	Size Water Cylinder in inches.	Length of Stroke. Inches.	Capacity per minute, at ordinary speed. Gallons.	Steam Pipe.	Exhaust Pipe. Inches.	Suction Pipe. Inches.	Discharge Pipe. Inches.	PRICES.
16	8	18	400		3	6	5	PRICES ON APPLICATION.
18	10	18	600	$2_{\frac{1}{2}}$	3	8	8	
20	12	24	800	3	4	10	10	

NORTHEY & CO'S

Independent



Air Pump and Condenser

NORTHEY & CO'S

Independent Air Pump and Condenser

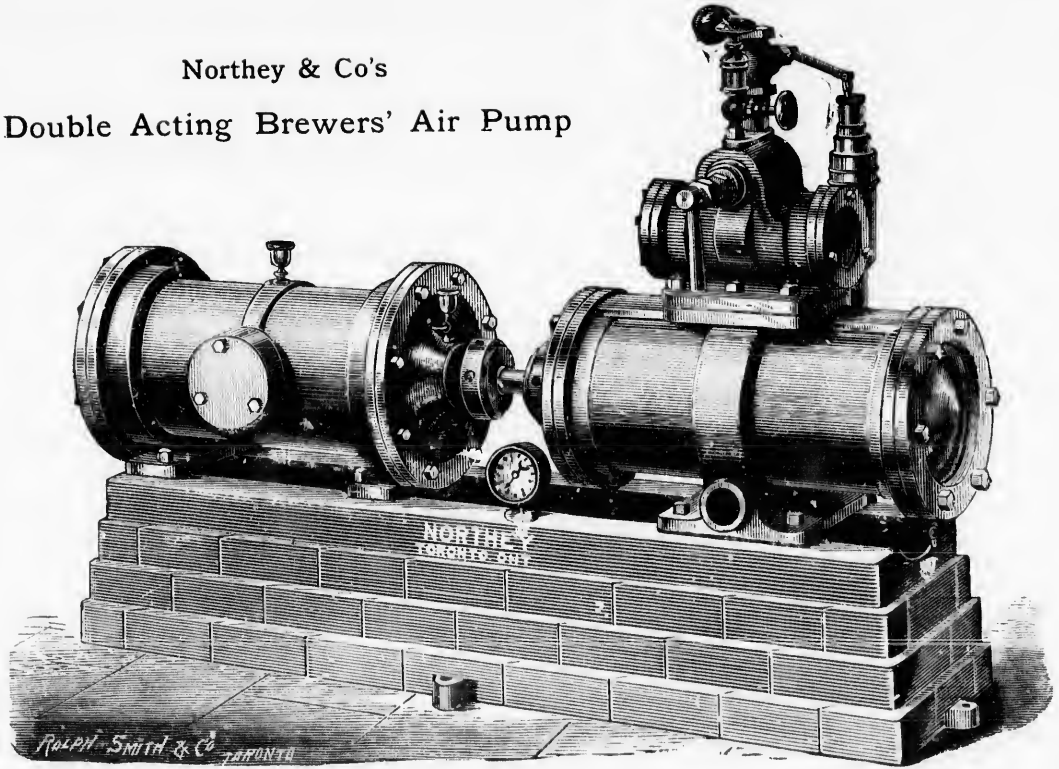
s easily attached to any high pressure Steam Engine, Stationary or Marine. Will so economise in fuel as to pay for itself the first year. Simple in operation, and lifts its own injection water twenty feet, if necessary. Cannot possibly flood the engine.

Sizes and Prices

Steam Cylinder.	Air Cylinder.	Stroke.	Horse Power of Engine.	Steam Pipe	Injection Pipe.	PRICES.
4½	6	6	35	½	2½	
6	9	9	80	¾	3	
8	12	12	150	1¼	4	PRICES ON APPLICATION.
10	15	15	250	1½	5	
12	18	18	350	1½	6	
14	20	24	450	2	7	

Northey & Co's

Double Acting Brewers' Air Pump



NORTHEY & CO'S

Double Acting Brewers' Air Pump.

—THESE MACHINES—

COMBINE SIMPLICITY AND COMPACTNESS, ARE PERFECTLY GOVERNED

—AND—

WILL DELIVER AIR AT A UNIFORM PRESSURE
UNDER ALL CIRCUMSTANCES

DETAILS, SIZES AND PRICES ON APPLICATION

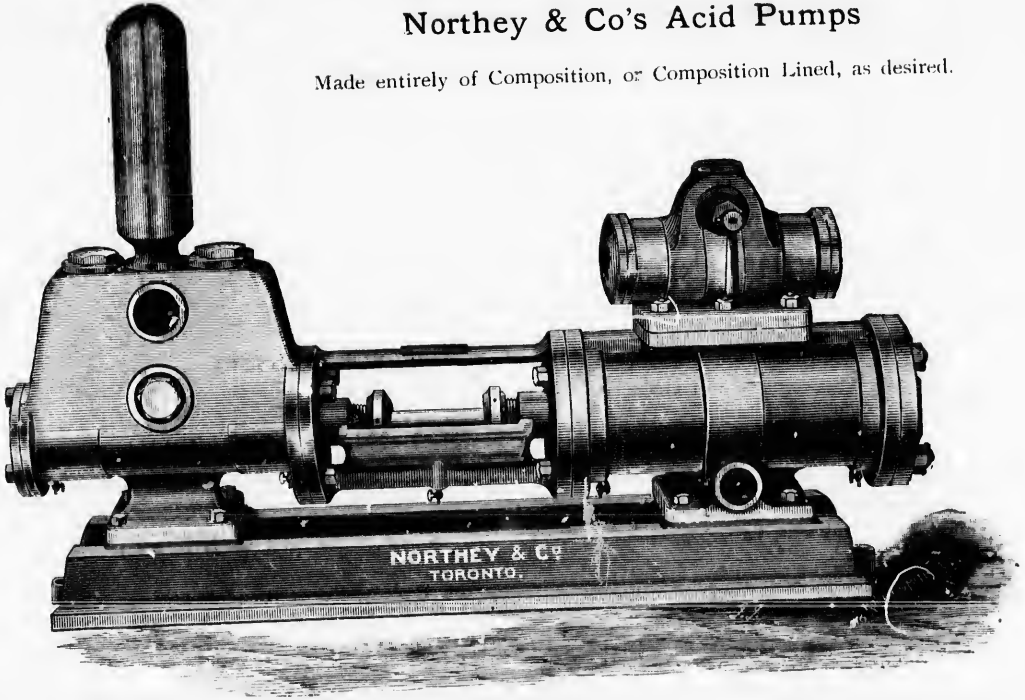
Our Air Pumps are built from entirely new designs, and are a specialty with us. They are used in Breweries and Distilleries; also in Chemical Works, for moving acids and all dangerous and combustible fluids by air pressure; and for many other duties.

We have many Testimonials proving the Excellence of these Machines

PUMPS ARE ALL TESTED THOROUGHLY

Northey & Co's Acid Pumps

Made entirely of Composition, or Composition Lined, as desired.



Northey & Co's Acid Pumps

These pumps are designed to pump acids and corrosive liquids of all descriptions, hot or cold.

They have extra large ways, special valve arrangement, cannot possibly clog, and are as simple and compact as it is possible to make them.

For pumping vinegar, spirits, tan liquor, etc., they cannot be excelled, and we confidently offer them as the best made for these purposes.

Details, Sizes and Prices.

Diameter Steam Cylinder.	Diameter Water Cylinder.	Stroke.	Capacity per Minute.	Suction Pipe.	Discharge Pipe.	Steam Pipe.	Exhaust Pipe.	PRICES.
4	3	4	25	$1\frac{1}{2}$	$1\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$150 00
5	4	5	50	2	$1\frac{1}{2}$	$\frac{3}{4}$	1	225 00
6	5	6	80	3	$2\frac{1}{2}$	$\frac{3}{4}$	1	275 00
8	6	8	100	4	3	$1\frac{1}{4}$	2	350 00

Other Sizes to Order at Short Notice.

All Pumps Thoroughly Tested.

Northey & Co's Tank or Low Pressure Pumps.

These Pumps are intended to raise water to limited elevations. They have large water pistons in proportion to their steam pistons, and consequently very great pumping capacity in proportion to the steam they use.

They are specially useful for Tanneries, Refineries, Breweries, Chemical Works, Quarries, Glue Works, Distilleries, Sewage Works, Irrigation, and wherever a large quantity of water is to be elevated to a moderate height.

Details, Sizes and Prices

Diameter Steam Cylinder.	Diameter Water Cylinder.	Length of Stroke.	Strokes per Minute.	Capacity at Ordinary Speed per Minute.	Size Steam Pipe.	Size Exhaust Pipe.	Size Suction Pipe.	Size Discharge Pipe.	PRICE.
4	3	4	1 to 300	20	½	¾	2	1½	$150 00
4	3½	4	1 to 300	30	½	¾	2	1½	160 00
5	4	5	1 to 300	50	¾	1	2½	2	190 00
6	5	6	1 to 300	66	¾	1	3	2½	240 00
7	6	7	1 to 250	144	1	1½	4	4	300 00
8	6	8	1 to 250	150	1¼	2	4	4	330 00
8	7	8	1 to 250	203	1¼	2	5	4	360 00
10	8	10	1 to 250	265	1½	2	5	4	425 00
10	10	10	1 to 250	410	1½	2	7	6	475 00
12	10	12	1 to 200	410	2	2½	7	6	525 00
12	12	12	1 to 200	590	2	2½	8	7	Prices on application.
14	10	12	1 to 200	410	2	2½	7	6	
14	12	12	1 to 200	590	2	2½	8	7	

Larger Sizes or other combinations to order.

All Pumps guaranteed satisfactory.

THE NORTHEY

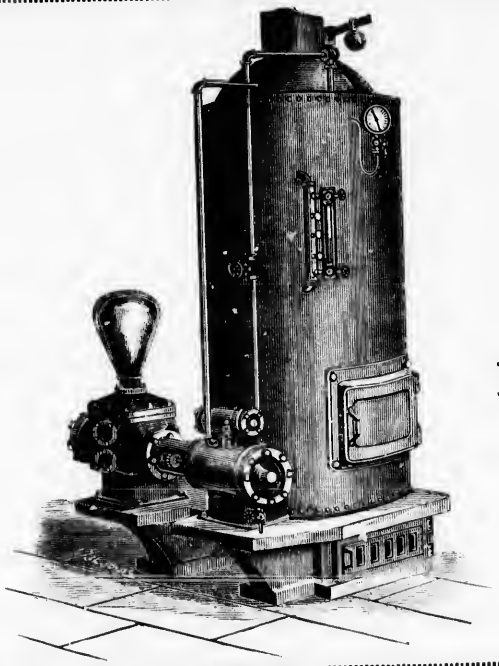
Special Mash Pump, for Brewers' Use

These Pumps are specially adapted to their work, and will pump thick beer mash, clear beer, or water, hot or cold, with equal facility.

They never clog; are simple, strong and compact; work for years without repairs, and are guaranteed in every respect.

Details, Sizes, and Prices, on application.

Northey & Co's



COMBINED

Pump and Boiler

Northey & Co's Combined Pump and Boiler

With fixtures complete, ready for use.

This combination of steam pump and boiler complete is an excellent one for many purposes; it is light, strong and portable, and can be placed at the point of supply, spring, well, or river, and the water forced to any required distance.

The whole machine is easily managed and understood, and does not require specially skilled labor to set it up and run it, as a person of ordinary intelligence can acquire a perfect knowledge of it in a few hours.

We offer this pump and boiler, as most simple, compact and durable, and specially suited for forcing water from springs or rivers, to residences, hotels, railway stations, breweries, brick yards, public and private institutions, etc.

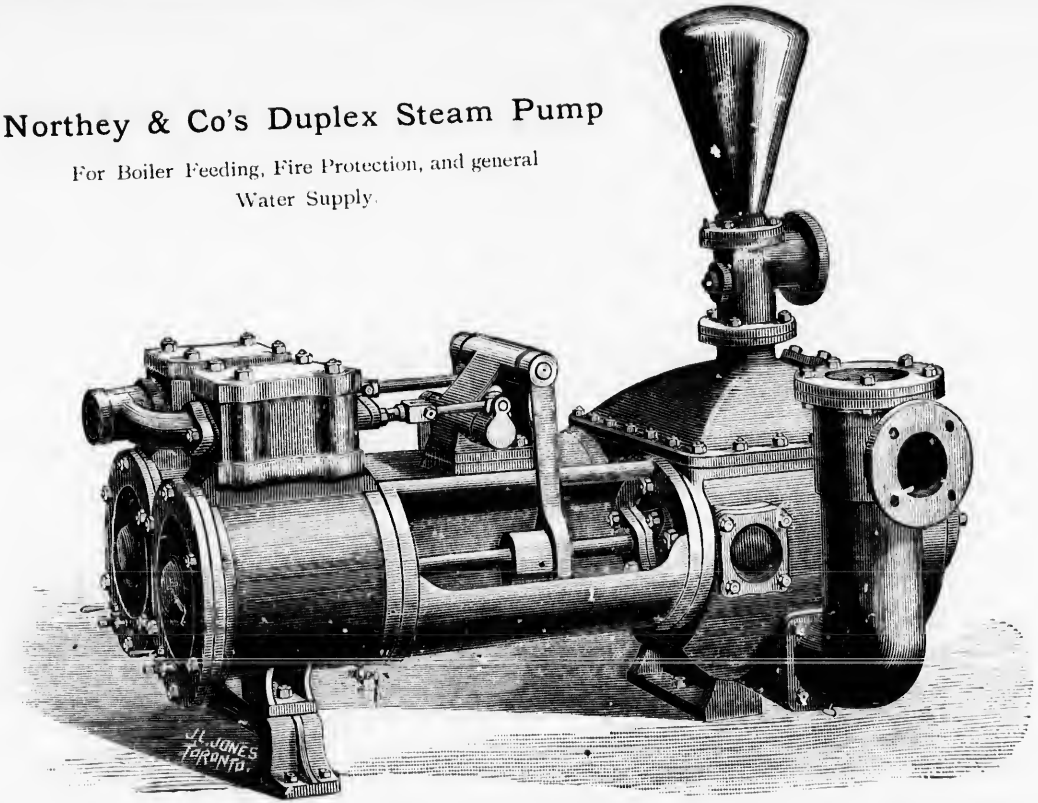
Details, Sizes, and Prices

Diameter Steam Cylinder	Diameter Water Cylinder	Length of Stroke	Capacity in Gallons per hour	Size Suction Pipe	Size Discharge Pipe	Price, with Boiler complete
4	2½	4	850	1¼	1	$350 00
5	3	5	1200	1½	1¼	425 00
6	3½	6	1800	2	1½	475 00
7	4	7	2500	2½	2	550 00
8	5	8	3000	3	2½	650 00
10	6	10	5000	4	3	Prices on application.
12	7	12	8000	5	4	

Prices of Larger Sizes, and other Combinations, given on application. A rigorous Test is applied to all our Machines.

Northey & Co's Duplex Steam Pump

For Boiler Feeding, Fire Protection, and general Water Supply.



Northey & Co's Duplex Steam Pump

(Improved Worthington type) for general Water Supply and Fire Protection.

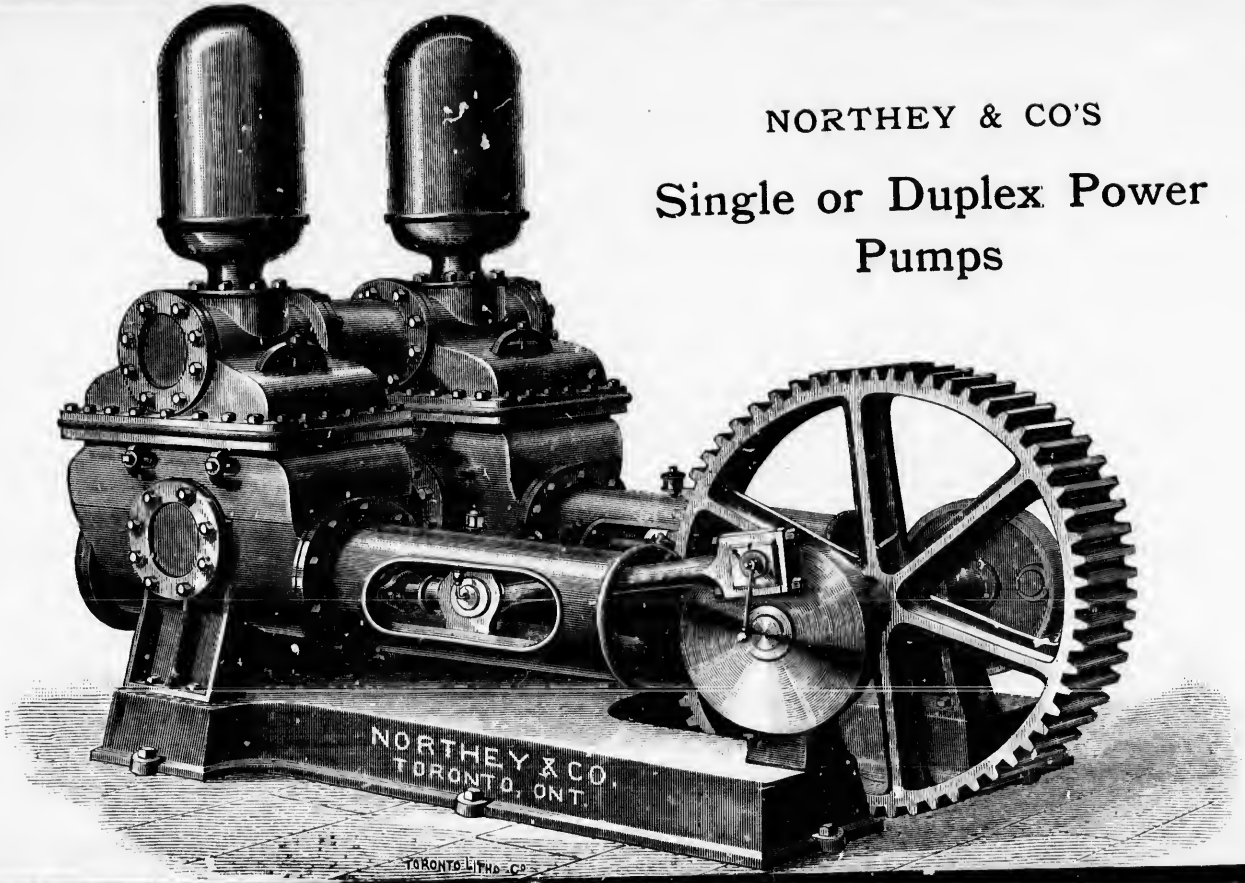
Sizes and Prices

Diameter of Steam Cylinders	Diameter of Water Plungers	Length of Stroke	Displacem't in gallons per stroke of *one* plunger	Proper Strokes per minute of *one* Plunger.	Gallons deliver'd per minute by *both* Plungers at stated number of Strokes.	Size of Pipes for short lengths, to be increased as length increases.				PRICE.
						Steam Pipe.	Exhaust Pipe.	Suction Pipe.	Discharge Pipe.	
6	4	6	.33	75 to 125	50 to 80	1	1¼	3	2	
8	5	10	.85	60 to 120	85 to 170	1½	2	4	4	
10	6	12	1.22	50 to 100	125 to 255	2	2½	5	4	
12	7	12	2.00	50 to 100	200 to 400	2	2½	6	5	
14	8½	12	3.00	50 to 100	300 to 600	2½	3	7	6	
16	10½	12	4.50	50 to 100	450 to 900	2½	3	8	7	
18½	10½	12	4.50	50 to 100	450 to 900	3	4	8	7	

These Pumps are fitted with our Patent Removable Brass Sleeve, which can be replaced in a few minutes.

NORTHEY & CO'S

Single or Duplex Power Pumps



Are do

NORTHEY & CO'S

Single or Duplex Power Pumps

Are double acting, of strong construction, specially designed to be driven by Water Wheels, and suited for Fire and Domestic Service of Towns and Cities.

Single Power Pumps			Duplex Power Pumps		
Water Cylinder	Stroke	Capacity per minute	Water Cylinder	Stroke	Capacity per minute
6	10	150 gals	8	12	600 gals
8	12	300 "	10	13	1000 "
10	13	500 "	12	15	1300 "
Prices on application			Prices on application		

USEFUL INFORMATION—STEAM

A cubic inch of water evaporated under ordinary atmospheric pressure is converted into 1 cubic *foot* of steam (approximately).

Steam at atmospheric pressure flows into a *Vacuum* at the rate of about 1550 feet per second, and into the *Atmosphere* at the rate of 650 feet per second.

The specific gravity of steam (at atmospheric pressure) is .411 that of air at 34° Fahrenheit, and .0006 that of water at same temperature.

27,222 Cubic feet of steam weigh 1 pound; 13,817 cubic feet of air weigh 1 pound.

Locomotives average a consumption of 3,000 gallons of water per 100 miles run.

The best designed boilers, well set, with good draft and skilful firing, will evaporate from 7 to 10 lbs. of water per pound of first-class coal. The average result is from 25 to 60 per cent. below this.

In calculating horse-power of Tubular or Flue boilers, consider 15 square feet of heating surface equivalent to one *nominal* horse-power.

One square foot of grate will consume on an average 12 lbs. of coal per hour.

Steam engines, in economy, vary from 20 to 60 lbs. of feed water and from 2 to 7 lbs. of coal per hour per indicated H.P. See table below for duty of high grade engines.

Condensing engines require from 20 to 30 gallons of water to condense the steam represented by every gallon of water evaporated—approximately for most engines, we say, from 1 to 1½ gallons per minute per I. H. P. Jet condensers do not require quite as much water for condensing as Surface condensers.

Surface Condensers should have about 2 square feet of tube (cooling) surface per horse-power of steam engine. It is absolutely necessary to place air-pumps below condensers to get satisfactory results.

DUTY OF STEAM ENGINES. A well-known engineer of high authority gives the following comparative figures showing the economy of high grade steam engines in actual practice:

Type of Engine.	Temperature of Feed Water.	Lbs. of water Evaporated per lb. of Cumberland Coal.	Pounds of Steam per I. H. P. used per hour.	Pounds of Cumberland Coal used per I. H.P. per hour.	Cost of I. H. P. per hour supposing Coal at $6.00 per ton
Non-Condensing	210°	10.5	29.	2.75	$0.0073
Condensing	100°	9.4	20.	2.12	0.0056
Compound Jacketed	100°	9.4	17	1.81	0.0045

Weight and Capacity of Different Standard Gallons of Water

	Cubic Inches in a Gallon	Weight of a Gallon in pounds	Gallons in a Cubic Foot	Weight of a cubic foot of water, English standard, 62.321 lbs. Avoirdupois.
Imperial or English	277.274	10.00	6.232102	
United States	231.	8.33111	7.480519	

Weight of Crude Petroleum, 6¼ lbs. per U. S. gallon } 42 gallons to the barrel
Weight of Refined " 6½ lbs. per U. S. gallon }

A "miner's inch" of water is approximately equal to a supply of 12 U. S. gallons per minute

Fire Streams

Pressures required at nozzle and at pump, with quantity and pressure of water necessary to throw water various distances through different sized nozzles—using 2½ inch rubber hose and smooth nozzle.

SIZE OF NOZZLES.	1 INCH.				1¼ INCH.				1½ INCH.				1⅝ INCH.			
Pressure at Nozzle	40	60	80	100	40	60	80	100	40	60	80	100	40	60	80	100
*Pressure at Pump or Hydrant with 100 ft. 2½ in. rubber hose	48	73	97	121	51	81	108	135	61	92	123	154	71	107	144	180
Gallons per minute	155	189	219	245	196	240	277	310	242	297	342	383	293	358	41[illegible]	462
Horizontal distance thrown	109	112	168	186	113	148	175	193	118	156	186	207	124	166	200	224
Vertical distance thrown	79	108	131	148	81	112	137	157	82	115	142	164	85	118	146	169

* For greater lengths of 2½ hose the increased friction can readily be obtained by noting the differences between the above given "pressure at nozzle" and "pressure at pump or hydrant with 100 *feet* of hose." For instance, if it requires at hydrant or pump 8 lbs. more pressure than it does at nozzle to overcome the friction when pumping through 100 feet of 2½ inch hose (using 1 inch nozzle with 40 lb. pressure at said nozzle), then it requires 16 lbs. pressure to overcome the friction in forcing through 200 feet of same size hose.

Mean Effective and Terminal Pressures

Initial Pressures.	POINTS OF CUT-OFF.												Initial Pressures
			1/4		3/10		35/100		4/10		1/2		
	M.E.P.	TER.	M.E.P.	TER.	M.E.P.	TER.	M.E.P.	TER.	M.E.P.	TER.	M.E.P.	TER.	
40	13.46	11.79	17.34	14.49	20.75	17.11	23.70	19.80	26.22	22.44	0.50	27.78	40
45	16.15	12.87	20.39	15.81	24.13	18.67	27.32	21.61	30.08	24.49	34.75	30.33	45
50	18.85	13.94	23.45	17.13	27.50	20.24	30.94	23.42	33.95	26.55	39.00	32.88	50
55	21.54	15.00	26.50	18.45	30.87	21.80	34.56	25.25	37.81	28.60	43.25	35.43	55
60	24.24	16.08	29.56	19.77	34.24	23.37	38.18	27.04	41.68	30.66	47.50	37.98	60
65	26.93	17.15	32.61	21.09	37.61	24.94	41.80	28.85	45.54	32.71	51.75	40.52	65
70	29.63	18.23	35.67	22.41	40.98	26.51	45.42	30.66	49.41	34.77	56.00	43.07	70
75	32.32	19.31	38.72	23.73	44.35	28.07	49.05	32.47	53.27	36.82	60.25	45.61	75
80	35.02	20.39	41.78	25.05	47.72	29.64	52.68	34.28	57.14	38.88	64.50	48.16	80
85	37.71	21.46	44.83	26.37	51.09	31.20	56.31	36.09	61.00	40.93	68.75	50.70	85
90	40.41	22.54	47.89	27.67	54.46	32.77	59.94	37.90	64.87	42.99	73.00	53.25	90
95	43.10	23.62	50.94	29.01	57.83	34.33	63.57	39.71	68.73	45.04	77.25	55.79	95
100	45.80	24.70	54.04	30.33	61.20	35.96	67.20	41.52	72.60	47.10	81.50	58.34	100

The Initial and M. E. P. in above table are pressures above atmosphere and for non condensing engines: the terminal pressures are *absolute, i.e.*, reckoned from perfect vacuum (14.7 lbs. below atmospheric pressure).

USEFUL INFORMATION

WATER

Doubling the diameter of a pipe increases its capacity four times. Friction of liquids in pipes increases as the square of the velocity. See table of "Friction of Water in Pipes."

The mean pressure of the atmosphere is usually estimated at 14.7 lbs. per square inch, so that with a perfect vacuum it will sustain a column of mercury 29.9 inches or a column of water 33.9 feet high.

To find the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434. Approximately, we say that every foot elevation is equal to a ½lb. pressure per square inch; this allows for ordinary friction.

To find the diameter of a pump cylinder to move a given quantity of water per minute (100 feet of piston being the standard of speed), divide the number of gallons by 4, then extract the square root, and the product will be the diameter in inches of the pump cylinder.

To find the quantity of water elevated in one minute running at 100 feet of piston speed per minute. Square the diameter of the water cylinder in inches and multiply by 4. Example: Capacity of a 5-inch cylinder is desired. The square of the diameter (5 inches) is 25, which, multiplied by 4, gives 100, the number of gallons per minute (approximately).

To find the horse power necessary to elevate water to a given height, multiply the total weight of the water in lbs. by the height in feet, and divide the product by 33,000 (an allowance of 25 per cent. should be added for water friction, and a further allowance of 25 per cent. for loss in steam cylinder).

The area of the steam piston multiplied by the steam pressure, gives the total amount of pressure that can be exerted. The area of the water piston, multiplied by the pressure of water per square inch, gives the resistance. A margin must be made between the power and the resistance to move the pistons at the required speed—say from 20 to 40 per cent., according to speed and other conditions,

To find the capacity of a cylinder in gallons, Multiplying the area in inches by the length of stroke in inches will give the total number of cubic inches; divide this amount by 231 (which is the cubical contents of a U. S. gallon in inches), and product is the capacity in gallons.

FRICTION OF WATER IN PIPES.

Friction-loss in Pounds Pressure per square inch, for each 100 feet of length in different sizes clean iron pipes discharging given quantities of water per minute.

Gals. per minute	Sizes of Pipes—Inside Diameter.														
	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.	4 in.	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.
5	3.3	0.84	0.31	0.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	13.0	3.16	1.05	0.47	0.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	28.7	6.98	2.38	0.97	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	50.4	12.3	4.07	1.66	0.42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	78.0	19.0	6.40	2.62	.....	0.21	0.10	.....	.....	.....	.....	.....	.....	.....	.....
30	.....	27.5	9.15	3.75	0.91	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
35	.....	37.0	12.4	5.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
40	.....	48.0	16.1	6.52	1.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
45	.....	.....	20.2	8.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
50	.....	.....	24.9	10.0	2.44	0.81	0.35	0.09	.....	.....	.....	.....	.....	.....	.....
75	.....	.....	56.1	22.4	5.32	1.80	0.74	.....	.....	.....	.....	.....	.....	.....	.....
100	.....	.....	.....	39.0	9.46	3.20	1.31	0.33	0.05	.....	.....	.....	.....	.....	.....
125	.....	.....	.....	.....	14.9	4.89	1.99	.....	.....	.....	.....	.....	.....	.....	.....
150	.....	.....	.....	.....	21.2	7.0	2.85	0.69	0.10	.....	.....	.....	.....	.....	.....
175	.....	.....	.....	.....	28.1	9.46	3.85	.....	.....	.....	.....	.....	.....	.....	.....
200	.....	.....	.....	.....	37.5	12.47	5.02	1.22	0.17	.....	.....	.....	.....	.....	.....
250	.....	.....	.....	.....	.....	19.66	7.76	1.89	0.26	0.07	0.03	0.01	.....	.....	.....
300	.....	.....	.....	.....	.....	28.06	11.2	2.66	0.37	0.09	0.04	.....	.....	.....	.....
350	.....	.....	.....	.....	.....	.....	15.2	3.65	0.50	0.12	0.05	0.02	.....	.....	.....
400	.....	.....	.....	.....	.....	.....	19.5	4.73	0.65	0 16	0.06	.....	.....	.....	.....
450	.....	.....	.....	.....	.....	.....	25.0	6.01	0.81	0.20	0.07	0.03	.....	.....	.....
500	.....	.....	.....	.....	.....	.....	30.8	7.43	0.96	0.25	0.09	0.04	0.017	0.009	0.005
750	.....	.....	.....	.....	.....	.....	.....	.....	2.21	0.53	0.18	0.08	.....	.....	.....
1000	.....	.....	.....	.....	.....	.....	.....	.....	3.88	0.94	0.32	0.13	0.062	0.036	0.020
1250	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.46	0.49	0.20	.....	.....	.....
1500	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.09	0.70	0.29	0.135	0.071	0.040
1750	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.95	0.38	.....	.....	.....
2000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.23	0.49	0.234	0.123	0.071
2250	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.63	.....	.....	.....
2500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.77	0.362	0.188	0.107
3000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.11	0.515	0.267	0.150
3500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.697	0.365	0.204
4000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.910	0.472	0.263
4500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.593	0.333
5000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.730	0.408