

the machine shop. The gates and hydrants are manufactured from special designs, and are not only considerably heavier than regular trade articles, but, much better designed and better suited to the existing conditions in Boston.

The superintendent of the shop was a thorough mechanic, and appeared to be producing as good results as could be obtained under existing conditions. The machinists and other shop laborers were typical of the class of labor which is to be found throughout the city service. Some of them were capable and efficient workmen, but a considerable proportion of them were moderately skilled and had the appearance of depending more upon political influence for retaining their positions than upon their efficiency or zeal for work.

The force in the machine shop was made up as follows:

- 1 superintendent.
- 1 clerk.
- 7 machinists.
- 4 assistant machinists.
- 2 helpers.
- 1 hydrant inspector and repairer (outside).
- 1 elevator man.
- 1 boy.
- 4 helpers assembling gates and hydrants.
- 1 helper acting as oiler and on miscellaneous work.
- 1 stockkeeper.
- 1 driller.
- 1 helper fitting curb cocks.
- 1 general assistant.

27 men

The consulting engineers recognized the necessity of maintaining a departmental machine shop in order to make repairs promptly and efficiently, but believed that the organization of this shop should be limited by these requirements rather than extended to cover the broader field of gate, hydrant and small brass goods manufacture. The establishment of such a shop implies the maintenance of a cer-

tain minimum force, which must, however, be large enough to provide for doing with reasonable promptness all such emergency or repair work; and this may well result in idleness on the part of a portion of the force at certain times, unless some manufacturing work be provided which can then engage their attention.

They estimate the annual loss from the operation of the shops in 1906 and 1907 at from \$8,000 to \$10,000, as compared with the probable cost of similar goods by contract.

The deceptive character of the results shown by the accounting system in use when Metcalf & Eddy began their investigations is shown by their statement that making allowances for holiday and sick leave, and overhead manufacturing charges, "the actual cost of labor (including general expense) in the manufacturing work was really 93 per cent. greater than that shown on the books of the department."

The recorded and the actual costs of gate valves manufactured in the shop are shown in the accompanying table. Various comparative values are indicated in the diagram.

The Boston waterworks valves, which are built upon special designs prepared by the city engineer would be ordinarily classed as extra heavy patterns, although they do not differ materially in weight, especially in the smaller sizes, from the regular extra heavy pattern of one of the well-known valve companies, which are hereinafter referred to in the diagram as "commercial valve A." They are, however, considerably heavier than stock patterns of most makers, and of the more generally used pattern of the maker referred to. The Boston valves also contain a considerably larger percentage of composition metal than any of the commercial valves, and this, consisting in large part of copper, is, of course, much more expensive than an equal weight of cast iron. As a consequence, even if the Boston pattern were adopted by some maker and regularly carried upon the market, it would cost considerably more than any standard heavy commercial valve now obtainable.

The comparison with contract prices paid by the independent Metropolitan waterworks is of especial interest.

COST OF BOSTON WATERWORKS GATE VALVES IN 1907

Size.	Number made.	—Cost of—		Total per	Total for	True	True cost	Total true	Total
		Direct labor.	Stock.	Dep't books.	year per	total	excluding	cost to city	for
					Department	labor	interest	including inter-	year.
					books.	cost	and deprecia-	est and deprecia-	
							tion.	tion.	
3-inch	15	\$ 4.83	\$ 7.87	\$ 12.70	\$190.50	\$ 9.33	\$ 17.20	\$ 18.40	\$ 276.00
4-inch	45	7.74	9.76	17.50	787.50	14.96	24.72	26.40	1,188.00
6-inch	25	10.38	17.32	27.70	692.50	20.00	37.32	39.96	999.00
8-inch	67	11.00	25.26	36.26	2,430.00	21.22	46.48	49.65	3,325.00
10-inch	49	18.75	38.05	56.80	2,785.00	36.18	74.23	70.40	3,890.00
12-inch	39	18.30	47.55	65.85	2,568.00	35.30	82.85	88.50	3,450.00
16-inch	15	36.94	68.04	104.98	1,575.00	69.30	137.34	147.00	2,205.00
20-inch	3	68.72	182.36	251.08	753.00	132.70	315.06	337.00	1,011.00
24-inch	2	86.97	204.37	291.34	582.68	167.80	372.17	398.00	796.00
	260				\$12,364.18				\$17,140.00

INTERESTING STATISTICS.

That Canada made public flotations in London in 1909 of \$200,000,000, that it sold within its borders \$30,000,000 worth of municipal bonds, that its fire lessees were more than a quarter of a million a week, that the dividends paid by Cobalt companies during four years were \$13,000,000, are a few of the facts and figures appearing in the second annual statistical, review and outlook number of the Monetary Times published on January 8th. This issue, which is enlarged to 120 pages, contains a mine of valuable statistical data supplemented by interesting articles. There are specially contributed stories on the trend of Canadian banking, the industrial mergers of 1909, the insurance retrospect and prospect,

the Bank of England rate, and government loans. An especially attractive feature is a long story, entitled "A Trip Through the Provinces," embracing the views of business men throughout the country as to the outlook for the coming year. Those interested in stocks and bonds will find an eight-page stock exchange record, a table of new listings and dividend changes, a summary of municipal bond sales and the views of experts on the industrial and municipal bond market. Crop estimates are dealt with in a well-written story, and an exhaustive review of the wheat and grain markets is given. The issue is the best ever put out by the Monetary Times, which has now completed forty-three years of its existence, and contains something for everybody.