

extent, in the same way that heavy stamps have a high crushing power per machine unit, but no greater product per H.P. than lighter stamps.

It was very obvious on watching the fall of the pebbles, that greater loads required higher speeds to develop full power consumption, the effect of the greater speed being to provide adequate paths of free fall for the greater load of pebbles. If the speed was too low or the tube too crowded at the speed used, the inner layers of pebbles had no space for free fall and were merely carried round and round with slight relative movement, which in most cases would mean wasted power. The low power shown with excessive loads is due to the further effect of the pebbles, after filling up this inner cavity, heaping up at the bottom of the tube and thus lessening the fall of the other pebbles present until the speed was great enough to carry up the excess pebbles on to the rim. A free fall was thus again secured, but of course the effective tube diameter was reduced by the pebbles adhering to the lining.

It was observed in practicable cases that the angle of departure corresponding with the inner layer cannot be much less than 30 deg. if free fall is secured, and this is the limit of loading at any speed beyond which there is a loss of efficiency. If more pebbles are added there is no free space between the rising layer and the falling pebbles.

It has not been found possible to devise any means of gauging this free space in a working tube, as it always contains a few jumping pebbles, though observations with a small model show it to be free from sand. At present there is no means of determining from power readings upon which side of the maximum loading effect a given tube is working.

An interesting visual observation was that at very low speeds the smaller pebbles gathered towards the centre of the tube, at practicable speeds no segregation was noticeable, and at speeds beyond the critical the smaller pebbles worked out to the periphery. This is also observable with sand and glass beads in miniature model.

The noticeable points in the following table are the increased speed (necessary for maximum power) required for increased load: the slow rise in power up to the maximum and the quicker fall thereafter; especially from the point at which pebbles are picked up on the lining.

Further observations on the effect of speed variation will be found under the next heading, where they can be more suitably discussed.

Table II.—Variation in Power with Load Constant at Various Speeds.

- I.—Diameter inside concrete lining beginning 58 in., end 59 in.
Pebble load 2 in. above centre level—weight 1,400 lb.
- II.—Diameter inside concrete lining beginning 61 in., end 62 in.
Pebble load 12½ in. above centre level—weight 2,520 lb.
- III.—Diameter inside concrete lining beginning 62 in., end 62.6 in.
Pebble load 7 in. below centre level—weight 1,300 lb.

I.		II.		III.	
R.P.M.	Net H.P.	R.P.M.	Net H.P.	R.P.M.	Net H.P.
24.0	3.79	24.6	2.57	23.2	4.51
				24.6	4.67
25.0	4.23	25.7	2.67	26.0	4.78
26.0	4.24				
26.5	4.40	26.5	2.83	27.4	4.93
27.0	4.46	27.4	3.10		
27.7	4.56			28.0	5.04
28.2	4.51	28.0	3.32	29.0	5.04
29.0	4.46	29.2	3.64		
29.5	4.66				
30.0	4.66	30.0	3.80		
30.5	4.66				
31.2	4.98	31.2	3.97	31.0	4.55
32.0	4.98	32.2	3.59		
32.4	4.64				
33.7	4.41	33.0	3.32		
34.7	4.22	34.5	3.03	35.0	2.71
		35.5	2.63		
37.7	2.51	37.0	2.44	37.0	2.67
		38.2	2.23		
39.4	1.91	39.2	1.93	39.0	2.03
				39.7	0.58
40.5	1.56	41.0	1.81		
42.6	1.23	43.7	1.37	42.5	0.29
46.2	0.58	46.2	0.67	47.2	0.19
		47.2	0.39	49.2	0.09

The above are selected from the very numerous experiments in order to show the various effects at different speeds with normal, under, and overloading of tube.

BETHLEHEM STEEL.

The New York Times declares there is not the least danger of German interests getting control of Bethlehem Steel. Majority control of stock is not on market. Charles M. Schwab still owns a majority of stock and has no intention of selling it. It is declared that Mr. Schwab could get \$100,000,000 for his stock if he so elected. It is stated that English interests learned last fall that Mr. Schwab had been offered fabulous figures for his majority ownership, but was promptly guaranteed orders by British war office big enough to keep Bethlehem going for 18 months. Mr. Schwab says: "My interest in the Bethlehem Co. is not for sale. I have contracts that I cannot break."

GRANBY.

In connection with recently published reports to the effect that now that the Granby Consolidated Company has arranged for paying off its floating debt by the sale of six per cent. convertible bonds the payment of dividends will soon be resumed, the statement is made that the directors cannot yet be influenced to declare a dividend; on the contrary, action in this direction will not be taken until they shall think fit. The fact that some of the mines of the company were closed for several months following the declaration of war last August seems to have been forgotten by many. There were overhead charges which had to be met from surplus, so the company is now renewing the strength of its financial position.