

An Original Design for a Traveling Crane
with Pneumatic Hoist
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Outline
Specifications.
Drawings.

The following drawings, formulae, figures and specifications are for a Traveling Crane designed especially for the foundry in the K. D. A. C. It is to raise the load six ft. and the maximum load is to be two tons.

It is to travel on a bridge made of two channel beams; these beams will be specified in a later drawing. This is a special design because it is designed to secure the most possible head room where but very little was available, and at the same time as little length-wise space as possible was to be used.

The Differential Chain Hoist is to be attached to lift small loads that would be cumbersome to handle from the ground and are too small to use the pneumatic hoist.

There is no hard and fast rule that the specifications must be adhered to, because many of the rules and formulae by which they were obtained were only close approximations. It not being possible to secure exact data.

First will be the Cylinder. This is to be 40" long inside to inside of heads. The thickness of the cylinder walls is taken from Thurston's "Locomotive Cylinder".

Formula $T = D \div a + b.$

$T = \text{thickness}$

$D = \text{dia of piston} = 12"$

$a = .0004 \text{ to } .0005$

$b = 0 \text{ to } \frac{1}{2}"$

Cylinder head and all parts of cylinder are taken from formulae used in locomotive engine building

Cylinder Heads

$1\frac{1}{4} \times \text{thickness of cylinder walls}$

$1\frac{1}{4} \times \frac{7}{8}" = \text{approx. } \frac{3}{4}"$

The Piston Head

Formula

Seaton says $1.4x$ in which $x = 3"$ this is $\frac{1}{2}$ high because there is no rapid reciprocation in this case so that $3"$ is thick enough. The piston is to be fastened to the rod by a nut on the piston rod.

Piston Rings Common practice.

Thickness = $\frac{3}{32}$ dia. of cyl. + $\frac{1}{8}"$

Width = thickness of ring + $\frac{1}{8}"$

Piston Rod

From formula for stress in materials. The rod is to be of machinery steel $1"$ in dia.

The Cylinder Head Bolts

According to Whitlam the bolts must not be more than $6"$ apart. The length of circle

will make a little more than seven bolts but since the pressure on them is fairly even, seven bolts will be sufficient. These bolts are to be $\frac{7}{8}$ " in diameter.

Packing in Cylinder Head.

This packing is to be of hard rubber. To this will be attached an oil check. This check will be made from a 3" steam pipe connected directly to the main cylinder heads which are cast to fit. The steam pipe is connected between ends by a small inch pipe through which runs the oil used for the check. The straightway valve in the inch pipe regulates the flow of oil and by so doing serves as a guard against accidents.

The whole cylinder and check is fastened to two small 10" channel beams. These channel beams are on wheels that allow it to run lengthwise of the bridge. The cylinder is fastened to the two smaller channels by means of four lugs two on a side that go on the bottom of the channel so that all the head room required is the depth of the bridge channels.

The piston travels 36" and lifts the load 72". The chain for this according to Jones and Laughlin $\frac{7}{16}$ " thickness of link. This will lift 4800# which is 800# more than the specifications require.

The differential chain hoist will be of $\frac{1}{4}$ " link. They will lift 1200#. The smaller channels use small 6" flanged wheels as travelers while the bridge will run on 8" flanged wheels.

The lift end of the hoist will come up flush with the west wall of the foundry and so lift the ladle and be carried to any part of the west half of the foundry.