Class E—Field guns (3-in. and 4.5-in. howitzers), and all horse-drawn vehicles.
" F—Infantry in file, pack mules.
" G—Cavalry, dismounted, single file.
" H—Single file infantry.

[NOTE.—Ordinary pontoons were of Class E only. All guns would go on Class B, except a 6-in. British long (naval). The Inglis bridge was rarely used for over a Class C. load.]

Tanks, of course, were in a class by themselves, but a "heavy" bridge was usually of at least B class and thus could carry all other highway traffic loads such as steam rollers and dismantled heavy howitzers, the tractors of which imposed an axle load up to about 13 tons.

The tank was regarded as having its load of 30 tons distributed over a length of 4 ft. and its "sponsons" for its 6-pounders, or machine guns, projected to a total width of 12 ft. 9 ins., which was much in excess of the standard clearance width of 11 ft. 6 ins. It was, therefore, frequently necessary for a tank to draw in its sponsons in order to cross a bridge, and so be delayed for several hours. The standard height clearance was 12 ft. 6 ins., which was close enough to compel passengers to descend from the second story of the London busses so often seen at the front.

Foundations

All spans were of steel, with close fitting bolt connections. These bolts were 1¼ ins. or 1 5/16-in. diameter of shaft, with a threaded end of 1⅛ ins. or 1 3/16 ins. respectively, which both ensured tightness and also minimized danger of stripping bolt threads.

The foundations normally were simply timber mudsills and one to three 12 by 12-in. timber bridge seats for abutments on dry firm soil. For piers it was often necessary to construct pile trestles. The loading on mudsills was kept down to about ¾ ton per sq. ft., and care was taken to keep the toe of the mudsill at crest within a 1 to 1 slope to water level.

The bridge rollers on the larger spans were about 3 by 4 ft. on their base, giving a good bearing area on bridge seats, and the latter were figured as beams with trusses causing two downward concentrated loads, and mudsills causing a distributed upward reaction. Each 12 by 12-in. bridge seat was continuous under both trusses in order to avoid unequal settlement.

In certain cases such as when a canal with a tow path was being bridged, cribs were built of steel cubes, with 4-ft. face, of light angles. These cribs were not allowed to exceed 12 ft. in height and could not be used to advantage in midstream.

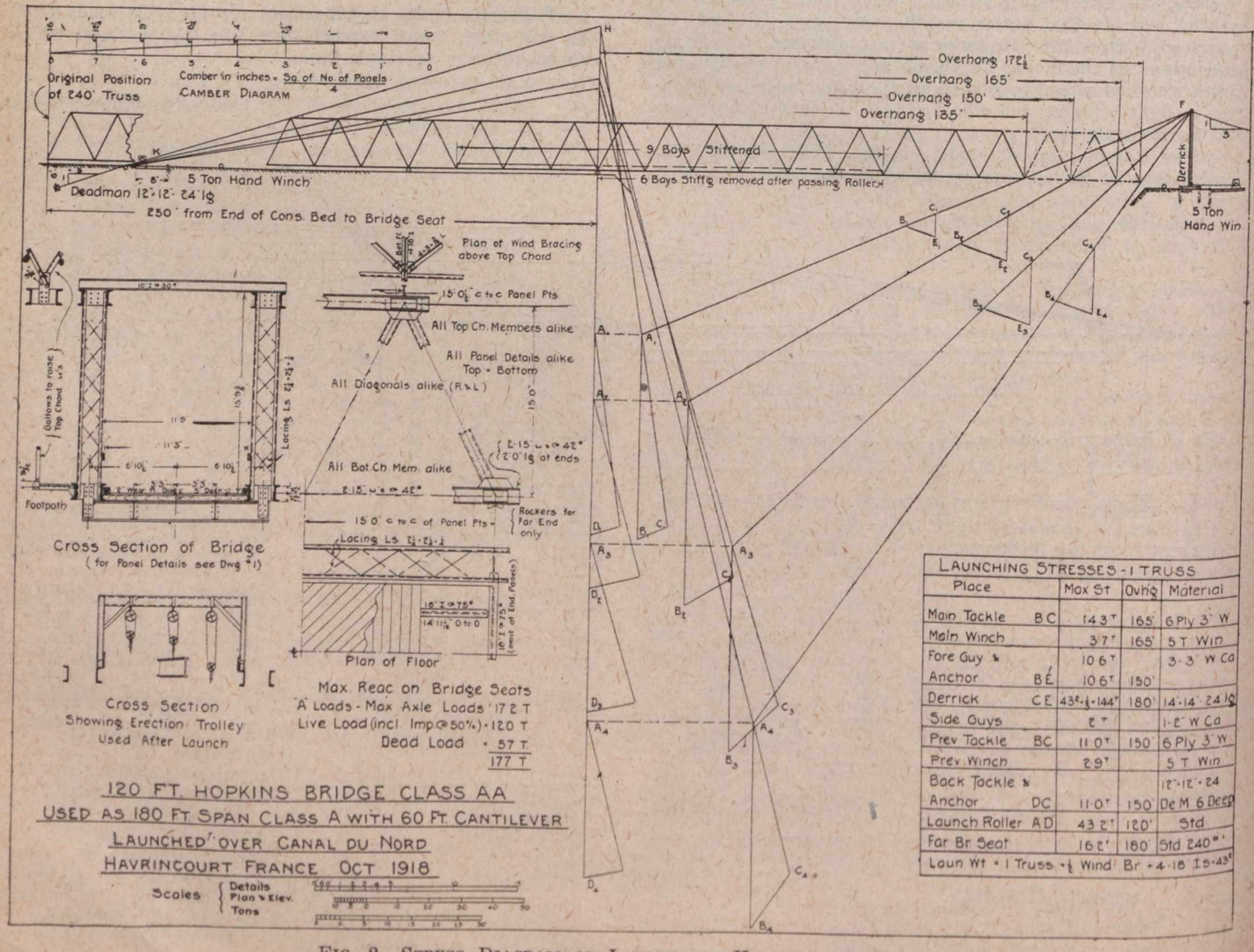
Piling was often done with man or horse power lifting a 1,500-lb. monkey on the formula:—

Bearing strength of pile = [(Fall of M, in ft.)$^{1/3}$ × (Wt. of M, in cwt.) × ½] ÷ [1 + (set of last blow, in ins.)]

It was found that working outwards from the shore was very slow, and it was often possible to use the bridging pontoons as rafts and to drive from them. For a pile-bent trestle it was then possible to construct the whole bridge of pontoons and to drive a bent between each pair of close-lashed pontoons.

Four Types of Bridges

Four general types of bridges were used for spans of over 30 ft. (Below this size merely enough rolled steel



LAUNCHING STRESSES - 1 TRUSS				
Place		Max St	Ovhg	Material
Main Tackle	BC	143 T	165'	6 Ply 3" W
Main Winch		37 T	165'	5 T Win
Fore Guy & Anchor	BE	106 T 106 T	150'	3-3" W Co
Derrick	CE	43²·½·144"	180'	14·14·24 lg
Side Guys		2 T		1-2" W Co
Prev Tackle	BC	11·0 T	150	6 Ply 3" W
Prev Winch		2·9 T		5 T Win
Back Tackle & Anchor	DC	11·0 T	150	12·12·24 De M 6 Deep
Launch Roller	AD	43·2 T	120'	Std
Far Br Seat		16·2 T	180	Std 240"#
Loun Wt + 1 Truss + ½ Wind Br + 4·18 15·43				

FIG. 2—STRESS DIAGRAM OF LAUNCH OF HOPKINS 180-FT. SPAN