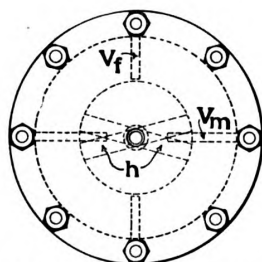
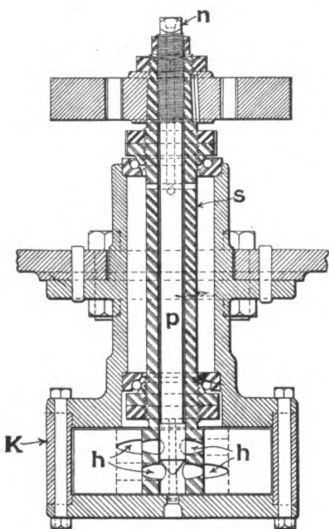
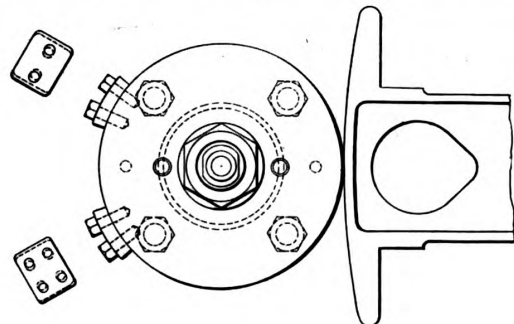


the plan view it will be noticed that the disk is drilled with ports which connect the opposite compartments in the cylinder and the communication between these compartments through the ports is controlled by a bar similar to that in a needle cup. The principal resistances in the dynamometer are flat springs placed under the second levers and deflected by the motion of these levers. There are three sets of these springs varying in resistance, so that a travel of 8 inches



THE RAILWAY AGE
LOCOMOTIVE TESTING PLANT SELLERS' TRACTION DYNAMOMETER—PLAN AND SECTION OF DASH POT FOR CONTROLLING OSCILLATIONS OF RECORDING PEN.

of the recording pen corresponds to a drawbar pull of 80,000 pounds, 40,000 pounds or 16,000 pounds. The drawbar pull is traced upon a strip of paper 18 inches wide made to travel at a known rate for each mile run by the locomotive. The yoke and drawbar of the dynamometer can be adjusted vertically through a range of 12 inches by means of a 24-inch hand wheel, in order that the different heights of locomotive drawbars can be accommodated.

(To be continued.)

Conductors' National Convention.—Grand Chief Conductor Clark announces arrangements for the annual convention of the Order of Railway Conductors, to be held at Portland, Ore., from May 9 to 20.

BLOCK SIGNALING ON THE NORTHERN PACIFIC.

President Howard Elliott has authorized important improvements tending to increase public safety which will place the Northern Pacific system second on the list of American railways in the installation of block system for the current year.

The new improvements will afford continuous signal protection over all the principal districts of heavy traffic from the eastern terminus at Saint Paul through to the Pacific Coast. Construction has already commenced and will be rushed forward to completion. The districts over which new block signal protection will be afforded are as follows:

	Miles.
Minneapolis to Staples, Minn.	131.1
Livingston to Logan, Mont.	50
Garrison, Mont., to Dixon, Mont.	118
Spokane, Wash., to Pasco, Wash.	145.7
Pasco, Wash., to Ellensburg, Wash.	126.8
Seattle, Wash., to Tacoma, Wash.	42

Total 613.5

The total of 613.5 miles of new block signal will be exceeded only by the Pennsylvania lines west of Pittsburg this year. Following the Northern Pacific in order of amount of new block signal improvements for the year are the Great Western, with 434 miles, and the Southern Pacific, with 333 miles.

The improvements planned by the Northern Pacific between Minneapolis and Staples, Minn., will supplement the existing signal protection between Staples and Jamestown, N. D., giving continuous protection over 343 miles of the eastern end of the main line, a district over which traffic is especially heavy. The improvements on the Montana division will give protection between Livingston, at which point branch connection with the entrance to the Yellowstone Park at Gardiner is made, and Logan, where the main line splits, one branch running west via Butte and the other running west via Helena, both lines joining again at Garrison. This is a district of mountain grades over which there is a continuous movement of "helper" engines returning light and a very heavy volume of traffic. This district carries the coast traffic of the Burlington-Northern Pacific route.

From Garrison to Dixon, Mont., similar protection will be afforded, covering the trackage in the narrow and tortuous Hell Gate Canyon, and on the mountain grades just west of Missoula, where the main line crosses the Coracian defile. There is much heavy construction in this district, and in addition to the immense through and local traffic there is an additional movement of "helper" engines, as on the mountain grades between Livingston and Logan. On this district are located the immense O'Keefe and Marent viaducts.

The improvements between Spokane and Ellensburg, Wash., will give protection to a stretch of main line on which is centered the through traffic of the entire system and of the Burlington-Northern Pacific route, the heavy tonnage of commercial and fuel coal from the Roslyn and Clealum mines, the eastbound lumber and mill products from the Pacific coast and a very heavy and rapidly increasing local traffic from the movement of agricultural products. The improvements on this 272.5 miles of main line supplement existing block signal between Ellensburg and Seattle, Wash., and with the improvements between Seattle and Tacoma afford continuous protection from Spokane through to Tacoma.

The work authorized provides efficient and reliable protection to the main line over all the districts where there is a heavy train movement or where there are unusual operating difficulties to contend with. Three years ago the Northern Pacific had no block signal protection except between Saint Paul and Minneapolis. All its more important main line mileage is now covered or to be immediately supplied with efficient safeguards to traffic and travel.

The block system being installed is the telegraph block, operated pursuant to the rules of the American Railway Association, already found satisfactory on other long stretches of Northern Pacific main line. The usual double-arm semaphore is utilized, the signals being operated from block signal stations in charge of operators. The adoption of the system requires the employment of additional telegraph operators and the stringing of special telegraph wires connecting the block signal stations.

The construction of the new signal system is being pushed under the direction of Chief Engineer E. J. Pearson, who has supervised the location of sidings, the building of block stations and the installation of signals.