

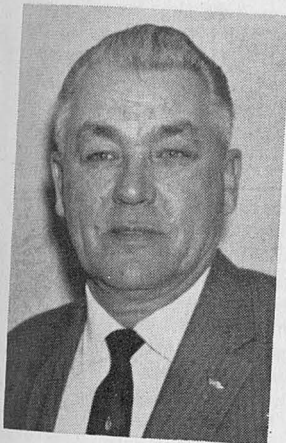
## HIGHWAY MAINTENANCE EQUIPMENT

PAUL E. BOYER

Administrator Bureau of Transportation & Supply

This subject is one that too many times does not get the consideration it should, and consequently when the critical need for good serviceable equipment arrives we are caught short.

I expect that you gentlemen being in public service have at least one



problem that is common among us and that is the shortage of available funds to procure new equipment for replacement and to meet the additional need due to the accelerated highway programs. To bring out my point, I would like to refer you to a condition we have in Ohio and although the figures will not correspond with conditions in your respective cases, they will be indicative. Our fleet of numbered equipment is 14,623 pieces. Evaluation based on 1962 cost prices is \$26,000,000 plus. For procurement, our average per year is \$2,600,000. Average life expectancy of units in the fleet is 6.3 years. With a life expectancy of 10 years, it is obvious that we could keep even, not considering the demand for additional equipment, but with a 6.3 year life expectancy we would need about \$1,500,000 more each year which we do not get, so what do we do now, use baling wire and chewing gum? No, I don't believe this would be the answer, however, we have partly overcome

this condition by getting longer life out of our equipment through improved equipment maintenance and care.

We feel that preventive maintenance performed by the equipment operator and mechanic in repair shops equipped to do minor repairing can do many little jobs that will prevent major and costly break-downs. This is the key to good maintenance and low costs.

I feel that two major points against us in getting longer life are: *abuse* and *neglect*. Abuse of the equipment and neglect of proper maintenance. Under abuse would come that most unnecessary evil,—*overloading*. Maintenance people of course are primarily interested in getting the pavement repaired, the ditches drained, and the weeds cut and too many times they give little consideration to the proper use of the equipment they use to do these things. Overloading or overtaxing is quite damaging to most types of maintenance equipment. I am only going to make reference to dump trucks at this time as they represent the greatest in number.

A truck is engineered and manufactured in most cases with about a 20% safety factor throughout. In other words, axles with tires are used that will carry more than the anticipated load, components that make up the complete unit are all designed and built of materials that will withstand more than the ordinary requirement. Taking this into consideration, we allow our operators to carry a maximum payload that exceeds the truck manufacturer's rating but does not exceed these additional capacities they have allowed for. When trucks are used for hauling materials in the summer time, we find more overload violations than in the winter season. This is due to the heavy types of materials being

hauled, berm materials, aggregates, etc. Also, there is usually a shortage of time to get the work done and most supervisors insist that the truck operators haul larger loads. You may feel that no damage to the vehicle is being done right at the time of the overloading because you are not having mechanical failures and down tires, but the next winter when broken spring and axles occur, or items in the power train, such as bearings, differential ring and pinion gears, transmission gears and shafts, fail, check your weigh tickets of last summer and I feel you will be convinced that the overloads did not pay.

Any metal parts used in the power train or in such a place that they are exposed to heavy strain or load and are fractured, will fail quicker, in lower temperatures than in warmer ones. It is during the winter season that down time of a dump truck is quite a handicap to our snow and ice program, also repairs are expensive and consume funds that could be used for a better purpose. If you are having an epidemic of the disc type wheel failures, which are costly to replace, I would wager that a check of the weight slips would prove overloading. The truck driver would probably tell you that he tightened up the wheel lugs every day, sometimes several times, and he just couldn't keep them tight, no doubt he is telling you the truth. Those wheels are designed and built to carry a maximum load and when they are overloaded the wheel will work the lugs loose and after they have once worn, no one can keep them tight. Correction takes a new wheel.

Now many of you are probably wondering how we control the overloading. Well gentlemen it isn't easy, but what is? when you want to accomplish something. We have tried many procedures and means, over a period of many years to control the overloading and feel that we have obtained the best results in recent years. Our Equipment Superintendents are always conscious and aware of the damage being done but in most cases they cannot handle the problem due to lack of authority to reach the right people, or he doesn't get the support of the person that does have authority to demand corrective measures.

A representative from our Central Office in his routine rounds throughout the State, we will say, gets the word from the Division Equipment Superintendent of possibly only one County in the Division that is overloading and that he cannot get it stopped. Our Central Office representative goes to the respective County office and lists all the weigh slips for all of that County's trucks for a reasonable period. He makes up a report showing the truck number, number of loads, and the payload weights. He figures out the percentage of violations in respect to the number of loads of each truck. A copy of this report is sent to the Division Engineer, attention the Operations Engineer, for such action as they deem necessary to get the violations stopped, also to reply to our office as to what steps are to be taken so a follow up can be made. We also offer a suggestion that the County Maintenance Superintendent be held responsible to advise their truck drivers properly and that disciplinary action will be taken against the Superintendent if corrections are not made. In a few cases, severe action was taken but the word got around quickly and now such steps seldom are necessary. We also find that it is consistently the truck having a particular driver that will have the most overloads whereas another driver in the same County will not have any violations. This means that driver education is needed.

To help the truck driver, we have designed a plasticated sticker that is placed on the instrument panel in the cab which shows the Gross Vehicle Weight and the Average Permissible Payload in lbs. . . . There is no excuse for him to overload unless he is not hauling weighed materials in which cases judgment will need to be exercised. Over a period of time this policy and procedure, we feel, has corrected almost all of our overloading of trucks. The plasticated sticker which shows the permissible payload also serves another very important purpose in our low cost maintenance program as it contains pertinent information relative to tires, which can be a costly item in the operation of equipment.

We feel that from experience we have developed a tire program that pays

big dividends to the Department. Our tires are procured through competitive bidding on a contract for a given period of time. Tires removed from equipment are centralized, inspected, classified, and sold. Adjustments are segregated. Our Department realizes between \$60,000 and \$70,000 from this phase of the operation as compared to \$10,000 to \$12,000 before this program. The specification used is one that requires a quality product if it is to meet. Specific test requirements are made, such as the 120 mile per hour test. The plasticated sticker which shows the equipment identifying number also shows the size, ply, and type tire to be used on both front and rear wheels, also a very important item and that is the proper inflation pressure, and the pressure to be used when snow plows are mounted. We also use a similar type of sticker on all other pneumatic tire equipped units other than dump trucks. By reason of better specifications, correct applications, overload control, etc., we have lowered our average cost of tires purchased per unit from \$17.50 in 1959 to \$14.40 in 1962. This is a sizeable amount to save in one spot when one considers the number of units involved.

Our Department has 4,739 pieces of equipment that carries 24,169 tires with an average tire value of \$40.08, for a total of \$68,689 which is an investment due attention.

Just a word about retreading. We feel that retreading not capping, pays well in many applications. The only retreads used are mud and snow treads. Retreads are used mostly on dump trucks. In 1959 we retreaded 2,190 units at an average cost of \$13.90 each, whereas in 1962 we retreaded 2,710 units at an average cost of \$13.35 each. We take a contract bid for a given period, on a specification. In analyzing the bid we use a cost formula which, is Tread Width X Tread Depth ÷ into Net Cost. Example 10" x 16/32" equals 5.0. Net cost \$10.00 ÷ 5.0 equals 2.0 Cost Factor.

All trucks are purchased with governors which we feel saves our equipment from damage by excessive speeds.

All trucks are purchased with 2 speed rear axles. This provides the varied speed ranges and when hauling in hilly country or when plowing snow the operator is not as apt to lug his engine down to impractical and uneconomical R.P.M.'s.

### Tail Gate Spreaders

I have been told that a number of your people have expressed the desire to learn more about the B.C.L.M. tail gate chemical and grit ice control spreader and that I better come prepared. I would surmise that your interest in this machine stemmed from the fact that your Kentucky Highway Department procured 100 units for the winter of 61 and 62 and another 100 for this present season. I am greatly pleased with the results they are getting with the spreaders as are several other States. I have some pictures of the hydraulic spreader which I will show you but first I would like to give you the background of this machine.

In 1951 our Highway Department used various types of spreaders for ice control, most of them requiring two men to ride the spreader which in most cases was towed behind the dump truck. This presented a very hazardous condition for the persons involved as they had no protection from the vehicle approaching from the rear. In all the years that I can remember that these types of spreaders were used, and it is many, as I have been with the department for almost 35 years, we had from 1 to 3 fatal accidents, never less than 1 per year, caused by the use of these man killers. One year the department had \$130,000 in personal injury claims, some men were disabled for life in this operation. It was decided that something had to be done so several employees were given the job of developing a tailgate spreader that would eliminate the need for men to ride either the rear of the truck or the spreader.

After considerable effort and ingenuity was applied, the pilot was ready and demonstrated, the result being what we had set out to accomplish. With the expected improvements in design and construction, the B.C.L.M. is the end result

and with almost 1,000 units, of the various improved models, in our department, in service, there has never been any fatalities or any personal injury claims where this particular type spreader was used for snow and ice control. Also the truck driver can operate the complete unit which eliminates 2 to 3 men.

This spreader, as you can see, replaces the original dump body gate using the standard gate mounting hardware. It is fully hydraulically powered. A three stage screw flight conveyor, by speed independently regulated, feeds the materials, in quantities desired, either chemical or grits, onto a spinner type applicator at the left rear corner of the body which spreads at a desired width by independent speed regulation. The brain of this machine is a valve assembly mounted on the floor boards, near the center of the truck cab. The longer lever at the left of the valve assembly is merely a by-pass control which either activates or deactivates the hydraulic system. The one control knob with detents and markings, independently controls the spinner applicator and the other knob with similar detents and markings, controls the screw flight conveyor to give the desired amounts of materials. The hydraulic lines are fitted with quick couplers and the installation can be made in five minutes once the truck is plumbed for this type machine.

The system can be powered by transmission power take-off driven pump or flywheel power take-off driven pump or by front engine driven pump, depending on the application. The power pump is gear type and produces one gallon per minute per 100 R.P.M.'s at 1500 Lb. P.S.I.

The spread width is adaptable to all road and street widths, independently controlled. The amount of materials desired is also metered by independent control. These features make this machine quite adaptable for treating bleeding bituminous surfaces.

A plasticized chart showing the operating characteristics of the spreader is provided in each truck equipped with a spreader. This chart shows the control setting to get a certain screw R.P.M. which will discharge a desired cubic footage of material. Also it shows the lbs. of chemicals and the cu. yds. of grits the operator will apply at a given M.P.H. speed of the truck at these various settings. This spreader is the only one manufactured today that accurately meters the materials and doesn't apply the amounts by inaccurate methods.

I would like to go a couple of steps farther now in explanation of the valve assembly. The lever on the left side of the valve assembly and just outside the By Pass Control, controls a hydraulic circuit that powers the snow plow lift if desired. The taller lever at the right controls the hydraulic circuit that powers the dump body hoist. This means that dump bodies can be procured less the transmission power take-off, the hoist pump, the hydraulic valve, and the controls, all of which adds up to a considerable saving, however we feel the biggest saving is in maintenance and down time of the conventional hoist pump which is built for intermittent use, as a contractor hauling materials would use it, and not for continuous operation as required when ice control materials are being applied.

You no doubt have noticed that when the ice control trucks are spreading chemicals or grits there are times that they have deposited, in one spot, several cu. ft. of materials. This happens usually at night when the truck operator couldn't see how high he was raising the dump body and raised it too high, dumping excessive materials over the tail gate. By means of a mercury switch mounted on the sill of the dump body and a bank of four (4) small lights mounted on the instrument panel, marked 20-30-40-50 degrees, we show the operator, at all times, the angle of the body which makes it easy for him to prevent spillage.

I would like to call attention to the elimination in the cab of all the control levers needed for a conventional dump body hoist and snow plow lift. With the truck cabs seemingly getting narrower and the passenger space less, this elimination is important and makes it easier for the person sitting in the center of the seat.

I would also like to mention another feature of the BCLM spreader, and that is when weather conditions are such that your structures ice up or you just have slippery spots on the highway, you can treat them in a minimum of time by pre-

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setting the width of spread, the amount of material desired, and by driving at any speed that is safe, the operator can simply push the by pass lever forward, which instantly gives him the preset width and amount and when he is over the slippery spot he simply pulls the lever back which instantly stops the application.

Gentlemen, I want to leave some time for any questions relative to equipment that you may have. Not just what I have referred to here, but any questions about any types of maintenance equipment. I am sure that many of you have questions about mowing equipment, snow plows, and possibly shop procedures and equipment, so now I will entertain any such questions.