



INDIAN RAILWAYS

TRACK MACHINES DIGEST

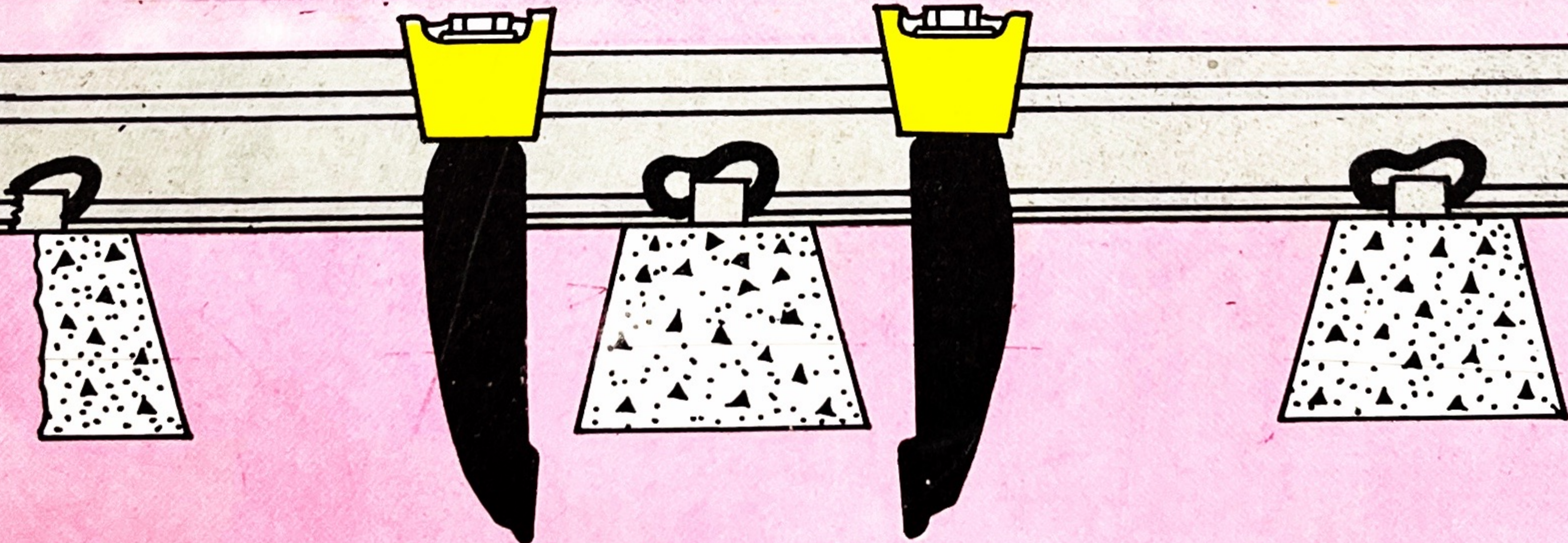
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MESSAGES



CHAIRMAN, RAILWAY BOARD
&
EX-OFFICIO PRINCIPAL SECRETARY
GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

New Delhi - 110001
27th April, 1992

I am very happy to learn that 'Indian Railway Track Machines Training Centre', Allahabad is bringing out the first issue of 'Track Machines Digest'. This publication will fulfil the long-felt need for the dissemination of knowledge and information in this vital field of railway technology. I congratulate the Northern Railway and Principal, IRTMTC, Allahabad for this effort and wish all success to this technical bulletin.

Y.P. Anand
(Y.P. Anand)

CHIEF ENGINEER
NORTHERN RAILWAY,
BARODA HOUSE

New Delhi-110001
4th May, 1992

I am happy to learn that IRTMTC Allahabad is bringing out the 1st issue of quarterly 'TRACK MACHINE DIGEST'.

It has been the privilege of Northern Railway to introduce many FIRSTS on the Indian Railways including setting up of CPOH Workshop at Allahabad, development of concrete turn-out sleepers, level crossing sleepers, track relaying train etc. Northern Railway is also proud to possess the largest capacity of departmental production of concrete sleepers.

It is expected that the Track Machine Digest will prove very useful in dissemination of technical knowledge regarding mechanization aspect of track amongst the staff connected with the track maintenance in general and T.T. Organization in particular.

I extend my best wishes for the successful publication of this valuable magazine.

V.K. Raizada
(V.K. RAIZADA)

HISTORY OF TRACK MACHINES : EDITOR

BRIEF HISTORY OF TRACK MACHINES IN THE WORLD:

World over first mechanical off-track tamper was tried out around 1920.

Matisa of Switzerland was founded in the year 1945, it produced and marketed only one type of tamper, most probably model B-60 which we had on Eastern Railway.

Plasser and Theurer established their works at Linz Austria in the year 1953 and produced their first tamping machine for use on Austrian Federal Railways. They came into regular production line for track machines from 1955 onwards.

With this modest beginning in mid sixties, many firms have come up, and now a days machines are available for any type of track work one can think of. Lot of sophistication has gone into these machines for getting correct geometry and desired out put.

HISTORY OF TRACK MACHINES ON INDIAN RAILWAYS:

Indian Railways started conducting trials with various off-track tampers around 1958-60 on Delhi-Agra route of Central Railway.

Between 1963-66, Indian Railways purchased 4 Nos. on-track tampers Matisa made (B-60 One No. + BN 60 Three Nos.) and later Plasser make VKR-05 (one No.) was also procured. These machines worked on the Eastern Railway for quite long. Above machines were in the series of light on-track tamping machines, and were taken for trial purposes.

In the year 1967-68 Rly. Board entered into a contract with M/S Plasser & Theurer who have established a factory at Faridabad.

Thus mechanisation in track work on IR started in late sixties.

Currently, fleet of track machines

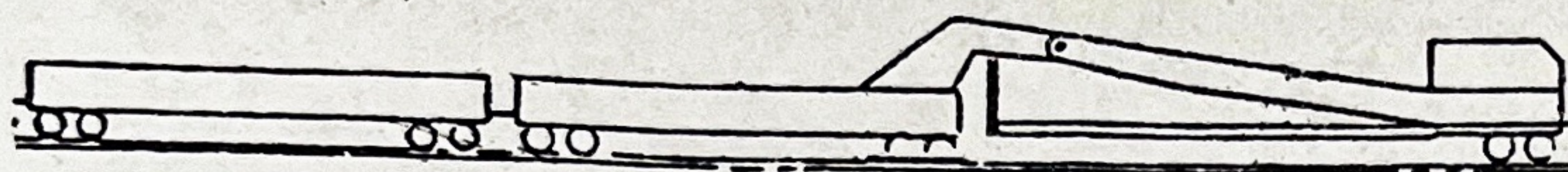
in IR consists of a wide range of machines including latest models.

The present day fleet of track machine is as under

YEAR WISE INDUCTION OF TRACK MACHINES ON I.R.LYs.			
MODEL NO.	NAME OF MACHINE	YEAR OF INDUCTION	TOTAL NO. AVAILABLE
06-16 SLC	SLC TAMPERS	1968-69	12 (Scrapped)
06-16USLC	UNIVERSAL TAMPERS	1972	12
		1974	12
		1976	12
		1978	12
		1980	8
08-16 UNO	UNOMATIC TAMPERS	1985	8
08-32 DUO	DUOMATIC TAMPERS	1985-86	20
09-32 CSM	CONTINUOUS ACTION TAMPING MACHINES	1989-91	30
08-32 DUO (MG)	DUOMATIC (MG) TAMPERS	1989	3
07-275 DS	P&C TAMPER	1984	1
08-275	P&C TAMPERS (UNIMAT)	1989-90	12
K-355 APT	M.F.B.W.P. (MOBILE-FLASH BUTT WELDING PLANT)	1987-88	2
RM-80	B.C.M. (BALLAST-CLEANING MACHINE)	1989-90	7
C-56	B.R.M. (BALLAST-REGULATING MACHINE)	1989-90	7
DGS-62N	DYNAMIC TRACK STABILISER	1990	1
RG	RAIL GRINDING	1990	1
P811S	T.R.T (TRACK-RELAYING TRAIN)	1990	2
PQRS	5 T PORTAL CRANES	1972	24 * Some 5 Tonne BG
PQRS	9 T " "	1982	24 Portals scrapped
PQRS	9 T " "	1987	24

MODEL NO.	NAME OF MACHINE	YEAR OF INDUCTION	TOTAL NO. AVAILABLE
PQRS	9 T PORTAL CRANES	1989-90	55
PQRS	5 T (MG) "	1989-90	16
CHINESE TAMPERS		1987	24
		1991	60

SOME OF IMPORTANT TRACK MACHIES INDUCTED IN INDIA:



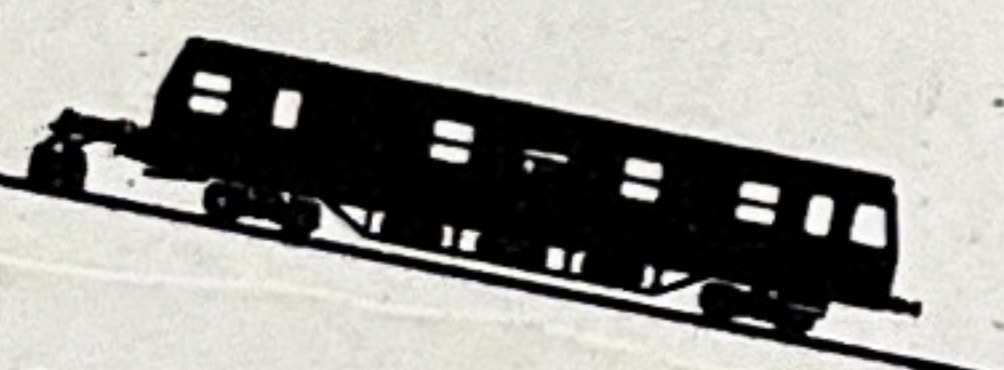
T.R.T. P811S



08-32
Levelling, lining
and tamping machine



UNIMAT 08-275
Levelling, lining and tamping machine
for switches, crossings and plain track



K-355 APT
Electric flash-butt
welding machine



C-56 KERSHAW
Continuous high output
ballast distributing and profiling machine



09-32 CSM
Continuous action levelling
lining and tamping machine



DGS 62 N
Continuous action
Dynamic Track Stabilizer



RM-80
Ballast cleaning machine
for Plain track

: EDITORIAL :

I send accross to you 1st issue of quarterly Bulletin. This has been started as per Board's letter No.91/Track-III-TK./13 Dt.2.7.91. I hope this buletin will definitely help in informing the people in general and those engaged on track machines, about the machines & developments that are taking place in this field and problems faced in day to day working.

All are requested to contribute their articles in not more than 3 to 4 pages.

Your comments are invited for any improvement in the bulletin.

K.P. MATHUR

LATEST ON INDIGENISATION

(By Sh. C.P. Tayal)
Jt. Director/TM/RDSO-LKO.

A comprehensive and systematic review of the imported components used in recently procured track machines was undertaken by a team of expert officials from Zonal Railways in association with RDSO. Starting in April 1991, three types of machines with largest holding viz. 09 Continuous tampers, BCM (RM-80) & UNIMAT P & C Tamper were taken up first as these form the thrust area for indigenisation. Complete set of spare part catalogues were critically reviewed assembly by-assembly and component-by-component, considering:

- i) Essentiality of components for machine working.
- ii) Its availability.
- iii) Annual requirement at the rated output.

Later, the raw data was fed by RDSO into a database on the 'datatrieve' package of the VAX mainframe computer. This database has since been expanded to cover 14 field names such as group of the component, its name, part no., essentiality code, availability code, approximate cost, annual requirement and stock position.

Information on the database has been processed into 4 groups and 21-subgroups for the purpose of indigenisation and transfer of information. The package with slight modifications can be used for inventory control purposes as well.

ACTION PLAN:

Various groups/Subgroups of items have been allotted to the Zonal Railways for concentrating their efforts on indigenisation. Prior to this the Zonal Railways frittered away their energies in trying to develop indigenous substitutes for all types of components. Instead, they now interact with a select group of manufacturers having capability in their respec-

tive allotted areas. Zonal Rlys. will also conduct field trials with the indigenous substitutes for purposes of development. RDSO is rendering help in finalisation of specifications, inspections, quality control and product improvement.

The efforts on indigenisation are being co-ordinated by RDSO which has started functioning as a nodal point for various developments/improvements. Progress made by the Zonal Railways is monitored by a Task Force consisting of officers from RDSO & the Railway Board. The Task Force is also interacting with the established manufacturers for items that are comparatively difficult to indigenise.

A Technology Development Group (TDG) has been formed in RDSO for boosting up indigenisation efforts in synergy with the industry and technical institutions. Confederation of Engg. Industry (CEI) and Director General Technical Development (DGTD) have also been approached in this regard.

RESULTS THUS FAR:

The efforts made over the last have yielded undernoted results:

- i) With the comprehensive analysis of thousands of components used on the machines, it has been possible to identify priority areas for indigenisation.
- ii) Variety of components has been reduced by usage of the same item at places where characteristics closely match.
- iii) Indigenous substitutes of a large number of items have been identified/developed. Components covering 70% of the annual cost of spares for 09-CSM are now indigenously available.

- iv) Certain groups/sub groups of components such as filters, coolers, cylinders, tools, wear plates/strips, screens, shafts and pneumatic items shall be fully indigenised in near future.
- v) A significant break through is the indigenously developed tamping bank by CPOH Workshop/ALD.

CPOH is now engaged in further improvements in association with RDSO and in development of tamping unit for 09-CSM.

FUTURE PLANNING:

Comprehensive review of the requirements of ballast regulator, Dynamic Track Stabilizer, Ballast Cleaner for P & C, Track Relaying Train (TRT) etc. have also been under taken. Following goals have been set as short-term (within next 2 years) and long-term (next 5 years).

SHORT-TERM GOALS:

- i) 90% indigenisation of all tampers (barring few items where manufacturing range does not exist in India)
- ii) 60% indigenisation of Ballast cleaners (i.e. plain line, P&C and shoulder cleaners.)

LONG-TERM GOALS:

- i) To get Ballast regulator, Stabiliser & TRT manufactured in India.
- ii) To get Duomatic tamping machine manufactured within the country followed by manufacture of continuous tamper
- iii) To get first Ballast cleaner manufactured in India.

WHAT IS NEW WITH THE TAMPERS?

(By Shri N. Arvindan) Sr. Professor/IRICEN.

1. 'Tampers get on board computers and Laser guidance.'

Track defects can typically be categorised by 'Wave lengths' 'Short wave length' defects of 5m and less are generally associated with rail straightness, corrugation etc. These are rectified by rail grinding and straightening operations and not by tamping. 'Medium wave length' track defects, typically from 5 to 30M, are normally associated with degradation of ballast bed which are tackled by tie-tampers generally working in the Smoothening mode. Chord measuring systems are used in the 'Smoothening' mode of work, defects of only certain wave lengths corrected depending upon the 'transfer function' characteristics of chord measuring system. Longer wave length track defects in excess of 30M are seldom corrected while working in this mode. Higher speed of operations necessitate elimination of long wave length track defects. These can only be corrected by 'design mode of work,' which, in normal cases involve pre-survey and operators intervention while working resulting in slow rate of progress. Optimising maintenance input requires minimum track attention to eliminate defects of appropriate wave lengths to contain the ride behaviour of rolling stock within the acceptable limits. Tie-tampers now a days are therefore equipped with 'laser-guided measuring system and computer control' to perform the dual function of measuring the track defects and later guiding the tamper to correct track defects within the wave bands of criticality.

A laser beam projector which is fixed in track at sufficiently long distance, with a laser tracking system mounted on the front of tie tamper, forms the reference plane for correction. Using the laser-computer system, measurement and analysis of existing track profile can be done before the work begins and decision regarding appropriate wave lengths of track defects which need to be rectified can be taken. The computer which now has information of desired track profile (including vertical curves), is able to give the

exact lifts required at the front measuring points of the machine. Such 'Laser guided-computer assistance' eliminates the necessity of manual pre-survey, slow progress and additional manual intervention associated with design tamping, it has also been possible to work with this system to give an initial 'overlift' such that during initial phase of passage of traffic track settles by this overlift, thereby increasing retentivity of track geometry.

Thus providing "laser and computer" in the tie-tampers enables precise analysis of track geometry just before attention and choice of rectification method to suit specific requirements rather than working on smoothening mode as a matter of routine. The laser projector can now be mounted on a trolley and can be 'Remote Controlled' from the front tower of the tie tamper.

2. INDIVIDUAL MAINTENANCE MACHINES INTEGRATE INTO A TAMPER:

machines of 09 series are now taking different shape to integrate logically related track maintenance operations. The 09-90 series of machine is equipped with ballast grading and profiling equipments. Shoulder and Center ploughs fitted in the front portion of the machine help bring in additional ballast available on shoulders to tamping zone where ballast is required. In the middle portion of the machine track defect rectification takes place as in any tamper. In the rear part of the machine. Sweepers and graders are fitted such that profiling and cleaning of excess ballast from track is done. all these operations are carried out simultaneously as the machine moves forward in the working mode. There are plans to incorporate Dynamic Track stabilisation also as a part of a tamper's work in continuation to ballast profiling. The concept is to integrate individual machines (used in Mechanised Maintenance Train-MDZ) into a single machine.

Continuous action tamping



09 - 32CSM USING LASER BEAM FOR LINING

THE WONDERFUL LITTLE TRACK MASTER (CHINESE TAMPER)

(By Sh. K.P. Mathur
Principal/IRTMTC/ALD.

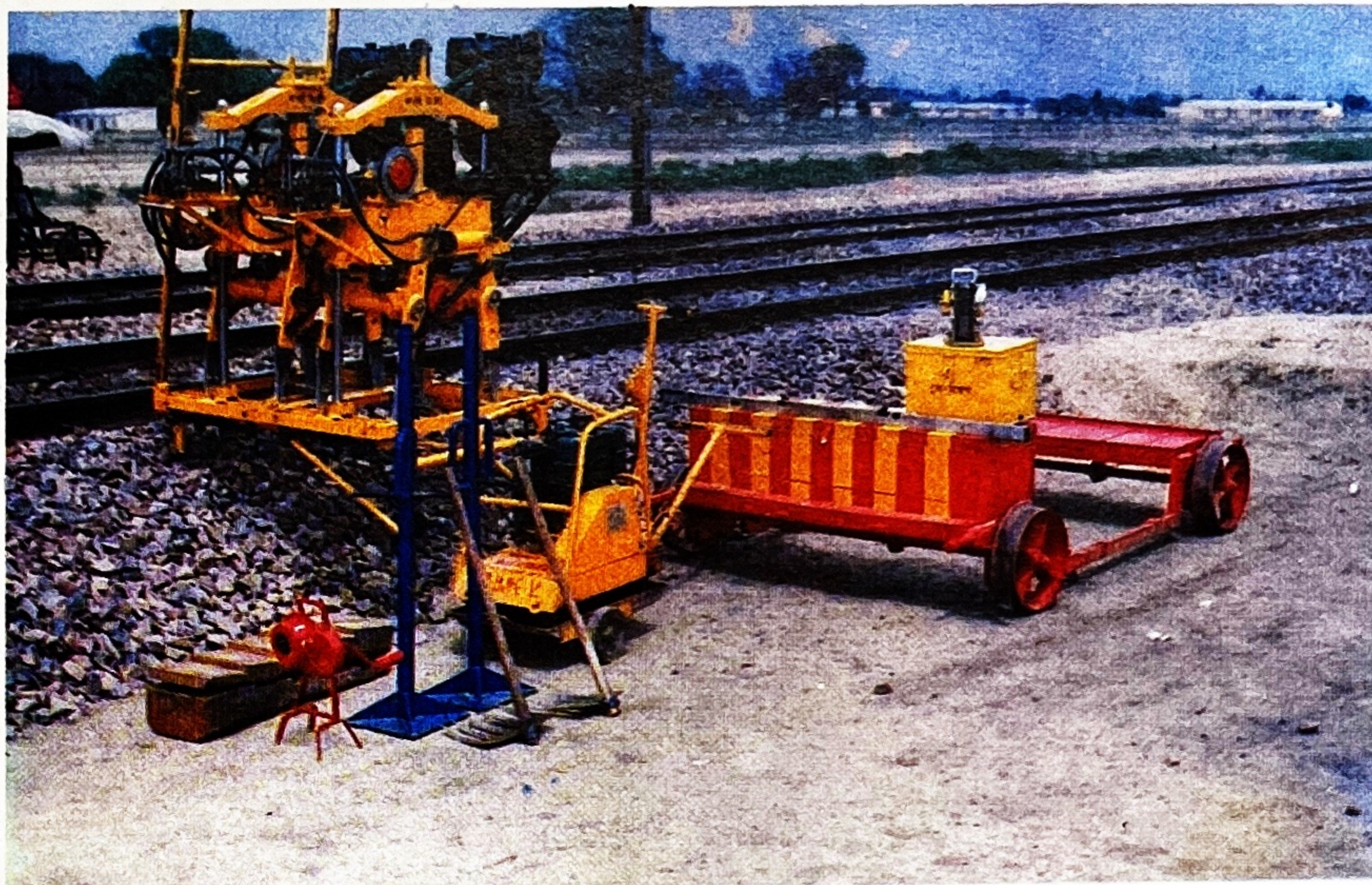
This small hydraulically operated tamper is intended for maintenance and repairs of track and for tamping of new lines under construction.

This has been provided with portable off-tracking device, thus the small tamper is able to operate during train intervals without taking any line block.

Since it adopts single cylinder for up and down movement of tamping unit on two guide columns, making it stable, the tamper is characterised with compact construction, small volume, light weight and good quality tamping at very low cost. The machine adopts simple construction as such it is easy to maintain.

Apart from above, the machines are equipped with emergency device for lifting tamping unit with the help of hand pump thus fear of detaining trains in case of break down is not there.

In areas (A&B routes) where 08/09 series tampers are utilised for tamping giving per effective hour progress of 1500/2200 sleepers, loose packing, pumping joints etc. develop due to various reasons, like bad formation patches, areas of less ballast or bad drainage, for such small jobs these big & high capacity machines can not be brought as these will remain under-utilised, for such locations small tampers are ideally suited as they can be operated by the gang itself. Also due to socio economic development of the country and better education, the workmen avoid "Back breaking", beater packing (also this is not permitted on concrete sleepers) as such this small tamper has become more important in the changed environment. In fact these are so useful that each PWI on Indian Railways should have a set of small tampers. With this, on one hand, PWI will become independent in attending bad spots, on the other hand he will be able to attend longer stretches in emergent necessities and he will not be com-



CHINESE TAMPER WITH EQUIPMENT

plied to use beater packing on concrete sleepers.

These tampers are very much superior to the hand held tampers in which operator used to get tired with in half an hour of its working and quality of packing was subject to the skill of the operator, even with best operators uniform packing was not possible.

Small tampers have all the qualities of off track tampers at the same time they are able to give uniform packing with much better progress though there is not much difference in cost of tamper and cost of operation as the number of persons required for off track and small tampers is also the same.

A set of small tamper consists of two machines having their own diesel engine as the source of power. With this engine one shaft with eccentric weight is

rotated which imparts vibration to tools, and operates one hydraulic pump to accomplish up and down movement of tools and squeezing, the machines are mounted on one foldable frame with wheels to move the set, on track. The tampers can be moved to site of work on a well-type trolley specially designed.

Same tamper is utilised for BG and MG. Frame is different for BG and MG and stroke of lifting lowering cylinder has to be adjusted.

This tamper is pushed by the operators by hand, when ever a train is approaching, the machines are slid out and the frame is folded at an angle of about 120° to pass the train. While working, lifting lining is done using small jacks etc. These tamper should be virtually treated as modern tools given to gangs which are able to pack modern track with better output and at the same time saves man

from strenuous labour.

Since these machines can be slid out in less than one minute on seeing/getting signal of approaching train, no block is required, how ever caution order, for look out of Engg. signals and stop if required has to be imposed.

To safeguard men and machine further, a portable automatic wheel actuated warning system has been developed. These tampers are being procured in big Nos. for distribution to Railways. If these tampers are worked honestly, a big improvement in maintenance is bound to come.



CHINESE TAMPER IN ACTION

DO YOU KNOW ?

- i) 800 PRC sleepers after replacement at an accident site were tamped by Chinese Tamper in 4 cycles to normal speed in the section of CPWI Hathras (N. Rly.)
- ii) Chinese Tamper should be implemented as a complete system with AWS, Jacks, ballast compactor and mobility arrangement.
- iii) Important documents regarding Chinese Tamping System :

Item	Letter by which circulated
Specs of AWS & ballast compactor	Rly. Board's No. 88/Track III/Tk/2 (Vol.III) dt. 20.12.91.
Approved list of firms	RDSO's no. CT/SM/Track dt.21.1.92.
Safety Precautions	RDSO's No. CT/TM/Chinese dt.7.2.92.

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