INSTRUCTION CARD FOR OPERATION.

3 SHEETS, SHEET No. 1	DRAWING No. 10063	MACHINE No. D 11	ORDER No. N 18 24 4 J P	SYMBOL 4 M J 1 P
MATERIAL CAST IRON	CLASS No. 13	PIECES IN LOT	TIME FOR LOT	BONUS

DESCRIPTION OF OPERATION DRILL & TAP.

THIS CARD MARKED FROM

ITEM	DETAILED INSTRUCTIONS	FEED	SPEED	ELEMENT TIME PER PIECE	ELEMENT TIME FOR GROUP	ELEMENT TIME FOR PREPARATION
						2.50
1	Change time card					15.00
2	Study instruction card and drawing					.24
3	Assemble DDTT 15/32 and DSSS 1-4					.24
4	Assemble DDTT 41/64 and DSSS 2-4					.24
5	Assemble DDTT 39/64 and DSSC 1-4					.36
6	Raise or lower arm about 6"					.18
7	Place 1 CBL 5/8x6 in ℄ slot in side of table					.36
8	Place two CBL 5/8x4 in slot in side of table					.56
9	Place TFDJ #2 over CBL 5/8x6 and clamp					19.82
10						.46
11	20% on preparation time					20.28
12						
13						
14						
15	OPERATION A = DRILL FOUR 15/32" EXHAUST HOLES					
16	IN SIDE OF CYLINDER.					
17	B = DRILL 41/64" HOLE FOR ROLLER PIN.					
18	C = DRILL AND TAP 3/8 P.T. HOLE FOR					
19	OILING PISTON.					
20						
21						
22	"A"					
23	Place J1P over TFDJ #2 on side of table			2.00		
24	Clamp J1P to table with two CBL 5/8x4 and two			.48		
25	CCFK 5/8x5 and two CSN 1"			.27		
26	Place DDTT 15/32 in spindle			.70		
27	Change speed to 2B & feed to C			.05		
28	Start machine			.23		
29	Move arm through radius			.13		
30	Move head on arm about 3"	.0015 HF	207 2B	.36		
31	Drill to lip 15/32 hole ¼" run	.014	2B	.18		
32	Drill 15/32 hole ½" run			.05		
33	Stop machine			.29		
34	Loosen two CBL 5/8x4 and remove two CCFK 5/8x5					
35	Reset J1P to drill exhaust hole in side of			.45		
36	cylinder.			.48		
37	Clamp J1P with two CBL 5/8x4 and two CCFK 5/8x5			.05		
38	Start machine					

	MONTH	DAY	YEAR	SIGNED	CHECKED
WHEN MACHINE CANNOT BE RUN AS ORDERED, MACHINE BOSS MUST AT ONCE REPORT TO MAN WHO SIGNED THIS CARD V		3	17	JW	
L	7	18	19		CW

Figure 20
Standard Method Instruction Card.

TOOL LIST FOR MACHINE No. D 11 **DRAW. Nos.** 10063

OPERATION SYMBOL 4 M 18 24 4 J P 1 P

TOOLS CALLED FOR ON THIS TOOL LIST MUST BE ISSUED IN A TOTE BOX. THE LIST SHOULD BE PLACED IN THE TAG POCKET ON THE BOX AND ACCOMPANY THE TOOLS TO AND FROM MACHINE.

No.	SYMBOL	SIZE
2	C B L	5/8x4
1	C B L	5/8x6
2	C C F K	5/8x5
2	C S N	1"
4	D D T T	15/32
4	D D T T	41/64
4	D D T T	39/64
1	D S S S	1-4
1	D S S S	2-4
1	D S T H	#2
1	D T P R	3/8"
1	H H M	1¼
1	H J D	#6
1	M G D P	3/8
1	T D F J	#2
1	W F H H	5/8

THIS LIST MARKED FROM

CHECK No. 1 No. 2 No. 4 No. 6

	MONTH	DAY	19	SIGNED
IN / OUT	L 7	18	19	CW

WHEN THE TOOL LIST IS NOT CORRECT THE GANG BOSS MUST AT ONCE REPORT THE ERROR TO THE MAN WHO SIGNED THIS LIST.

Figure 21
Tool List for Instruction Card.

occur. This would obviously be too high in the majority of cases. We therefore provided a small printed form for each job on which the operator made a mark each time a break occurred. This slip was turned in by the operator with her time card, and extra time added to each job in accordance with the actual number of breaks.

An interesting commentary on the relations existing between the employes and employers in this plant, and upon the accuracy of the time studies and fairness of the task based thereon, lies in the fact that no evidence was found of any effort on the part of the operators to report more breaks than were actually encountered. Incidentally, I should add that, pending

relief from efforts to standardize the wire, the time required to repair breaks was reduced through standardization of tools and machines and improvement of methods.

In machine shop practice the feed, speed and number of cuts are predetermined for each job, and on this basis the cutting time and the time for changing tools is computed. Whether the time set is right or not depends upon the material being standard with respect to hardness and the amount of metal to be removed. If there is any appreciable variation from standard the tool will become dull and have to be replaced before completing the work it should have done; and the speed, feed, or both, will have to be reduced or extra cuts taken, and one or more tools may have to be procured from the tool room. The result is that the job cannot be done in the time set, through no fault of the workman, and extra time must be allowed.

Standards of materials and standards of quality of work done are, after the performance of the first operation, in a sequence almost inseparable. Frequently unless one operation is correctly performed the succeeding ones may not be done in the time allowed or in accordance with the standard method; accurate information as to the quality requiréd, the tolerances or degree of accuracy, the kind of finish, etc., must be supplied in the form of samples, specifications or drawings. Such information is required not only by those who plan the work but also by the operator, the inspector and other functional foremen in the shop. In a machine shop run under the Taylor System not only are detail drawings furnished for each piece and assembled unit, but they contain information, more explicitly and clearly given than is ordinary practice, which by answering all questions in advance, avoids errors or misunderstandings, and saves the time of foremen and workmen seeking information from the draughting room or other sources, etc. The character of this information is shown by Figures 18 and 19.

Standard Processes or Methods

Standard conditions with respect to machinery, tools, other equipment and materials are prerequisite to standard processes or methods, and as a matter of fact, once they have been established in a large measure *standard methods result as a natural consequence.*

There are often several ways of doing a job—but usually only one best way. It is mainly for the purpose of insuring the one best way, making the fullest use of and adherence to the standard conditions established, that work is carefully planned in advance, that route charts and route sheets are prepared, and that detailed instruction cards and tool lists are provided for each operation. In this way we largely overcome the inequalities of experience in various workers who may be called upon at different times to do the same job, and insure that successive operations shall be performed in the most economical sequence. Under the old system of management, John Smith, for example, is an old hand who knows the product and the shop's equipment; he has always done a certain job and has evolved what under the circumstances is the best way—or at least a very good way—of doing it; owing to some circumstance, the next time that the job has to be done John Smith is absent, and it is given to a new man, with the result that he starts in about where John Smith did when he first tackled the job.

In a foundry doing a large variety of work certain large and expensive castings had to be made. It was a rather difficult job, and at first a number of castings were lost while it was being found out how to overcome the difficulties. No record was made, however, of the method developed. Several months later the same job had to be repeated and as both the molder who made it and the foreman had to contend with many other problems in the interval, their recollection of the method arrived at the first time was hazy; the result was that they had to again go over the same ground with its attendant losses.

Standard methods clearly defined by instruction cards based upon the composite best experience of the shop or the industry plus the results of scientific investigation and experiment, not only are a safeguard against such conditions as those cited in the foregoing typical instances, but they serve another equally important end; that of a check against any failure to maintain the standards of equipment, materials or conditions upon which the accomplishment of the job in the standard time, in accordance with the standard methods, is dependent.

In scientific management shops, failure to accomplish a job in the time set indicates in a great majority of cases—except where green operators are concerned—that one or more of the conditions is not up to standard. Sometimes the trouble is so obvious as to make