Referring to the master operation sheet for Type B bevel gears, of cast iron from four to eight inches in diameter, the operation as performed on the Jones and Lamson machine is broken down with its elements, all times for machine manipulation being given, totalling one and one-half minutes. The average depth of cut and the proper speed and feed are also listed and the cutting times computed

machine speed formula, we get 116 revolutions per minute, but by reference to the Jones and Lamson speed chart (Figure 7), it is found that the nearest speed is 111 revolutions per minute. This is then used in Figure 6. The length of cut is the distance this drill must travel, plus the allowance for the drill point length, found in the table, given in Figure 8. Here also are given the speeds and feeds

Figure 5

TITUSTRATION	OF	COMPUTATIONS

	ment - "DRILL"	
NO 2 PIG	Outling speed -57 Pt Atin Feed	- Olà In /Rev
	Outling speed -57 Pt./Min. Feed From Drawing drill selected would	be 1 7/8*.
	Machine Speed Formula.	
	St par Min v 12	57 x 12 = 116 Use 111.
	B.P.M. = Ft. per Min. x 12 =	n x 1.875
	4.004	
	Length of Cut	
	Finished Dimension + Casting All	owance + Drill point length = 2,122*.
	Machine Time	
	Length of Run	2,122
	TIME = Speed x Feed.	2.122 111 x .014 = 1.37 Minutes.
	Deter x rota.	
No 5 *PA	CE END OF HUB*	
	Longth = Pinished Dimension + 1/8"	Fin. Dim.= (Outside Diam.Hub - Bore
	Daugen - trutamen promision + 1/o.	2
	Length = .500 + .125 = .625*	3.00 - 2.00 = .500*
	RPM = 50 x 12 = 63.7 Use 54	Time = $\frac{.625}{54 \times .014}$ = .82 Minutes.
	RPE TX3	34 1.014
No 7 *80	OUGH HUB DIAMETER*	
	L = 5/8* + 1/8* = 3/4*= .75*	Time = 75 x .014 = .993 Use 1.00
	RPH= Same as for Mo.5 = 54.	Time = 54 x .014
100		
No 9 "FA	CE BACK OF GEAR	
	L = 7/16" + 1/16" = 1/2" = .50"	Time = .66 Minutes
	DOM - CC TI CA	

Figure 6

Time = 1.82 Minutes

16" + 1/4" = 1-13/16" = 1.812"

Time same as for "ROUGH BORE" = 1.82 Minutes

from them. The formulas for the computations are listed under No. 3 (Figure 6). The computations are shown here, the first machining time being that for element No. 3 "Drill."

The cutting speed from the master operation chart was fifty-seven feet per minute, and the feed .014 inches per revolution. Substituting in the

Speed and Feed Chart
JONES AND LAMSON
2 Splinds Turnet Lathea
Serial Mos.-1052, 1113, 1114
Machine Class-56
Dept.-80, 11.

FOR USE OF O	PERATO	RS -TA	ABLE O	F SPEE	os for	DOUBL	E-SPIN	DLE FL	AT TUE	RET L	ATHES
Diagrama Showing Ci Level Positions (Speed of Disting Pu 1200 Revolutions p Minute)	iler 0	1	A	1	N			1	1	1	Feet per Minute
Spiedle Speeds-(Ap Revolutions per M	proximate liquie)	321	103	145	101	75.	341	19	127	19	
Screw Thread C	etting	900	::::		::::	11	li	18	136	:12	115
Fig. Speeds for High Speed Steel High Speed Steel			100 x	************	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	141 141 141 141 141 141 141 141 141 141	36 58 58 98 98	5H 5H 7N 9N 12N 14N 17	64 8 103 1334 163	934 10 M 14 M 18 M	50 50 100 113 130 175 175
_	Yests per lock	Time Required to Travel One Inch									
Turning Feeds (For Gear Feed Machine)	30 30 40 40 53 71 81	47 .10 .13 .16 .18 .43	.10 .15 .20 .34 .37 .35	11 15 50 60	18 17 50 43 54 57	4 4 5 4 4 8 <u>-</u>	37 38 24 89 10 13	.51 .77 1.0 1.3 1.4 1.8 2.1	; 11 15 18 10 10 10	1.1 1.6 1.0 1.5 1.9 1.9 3.8 1.43	
Drilling Feeds :	1/13	3	-49 -55	.73	.00 1.0	13	19	2.0	37	83	

Figure 7

FARLS OF BRILL POLYT 1	Specia and Paris for Brilling									
(Basel as 50° estillag	engle)									
er of	of Laugth of		100 ft/kin-		90 Pk/stn.		70 ft/+ta.		40 ft/sin.	
ř		of	trouse i	274.00	Cast	Iren	Fettue	51401	Total 6	****1
r		Detlia	N.P.4.	Post	E.7.4.	Peed	R.P.K.	Post	n.r.a.	P***
		1/6	3100	010	10410	001	#120	.000	Lizzo	,000
		1/4	1550	.010	1/190	.029	1070	.000	603	1000
			3820	.021	1100	.030	500	1010	-625	1007
·	147	3/0	Posto	074	915	010	710	610	367	-657
•			910	811	730	.013	500	.010		1.000
			660	490	420	.025*	478	022	272	.010
-1		33/26	610	530	500	013	250	91	242	-012
					122	.014	200	. 411	\$00	1012
-}*		7/8	170	000	390	015	397 200	014	107	.012
	,,,,,	25/16	100	-020	333	.cia*	170	011	102	
***		1-1/0	340	.000	340	.010*	207	414	312	*615
		1-1/4	340	.000	800	1010	837	914	100	.019
·¥		1:2/5	276		244	.018°	150	.01	110	.019
		1-1/2	220	924	210	010	170	010	100	-018
T				-033	193	1014	165	.010	- 27	1007
-3*		1:7/2	1200			.016	145	.010*	82	.007
¥		#-1/4 #-1/4	175	090	100	.014	180	910	- 24	.007
		1.1/4	100		150	.014	116	-010	- 22	.007
B		2-1/8	100	1060,	143	1014	328	.010*	- 21	-907
•		8-6/6	111	.023	133	ola	100	200		1,007
		2-3/4		.090	123	.014	67	.010*	35	1.007
· F		3-7/8	120	C80	117	014	60	910	- 13	,007
				1092	- 110	4843			_~	
¥	****	1	-				-			-

Figure 8

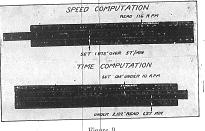
for drilling. Thus the length of cut is determined in Figure 6. The machine time computation is made by substituting in the formula, the result being 1.37 minutes (Figure 6).

These computations may be very greatly simplified by using the Barth slide rules, the settings for the previous computation being shown in Figure 9.

The remainder of the computations are made in the same manner, and the total machine or cutting time adds to 7.49 minutes. This, totalled with 1.50 minutes, handling time, gives the base time, to which the necessary allowance is added, thus giving the standard time.

June, 1928

This is used in making out the cost estimate, and when the order is received, as a basis for sched-



	righte 2
Family (1)	
	Custocorr
STD. INSTRUCTION SHEE	Part No.
Part Name BEYEL GEAR	
Operation Name Bore, rough hub, rough	end of hub & shoulder Oper. Its
Operation Name Bore, Fought But, 100g	
Dapt. 11 Mach. Clars 58	Mach, Name Jones & London
Dapt.	and on the state Cost Tron
Made by LP Approved by LY	Date 10-21-25 - Mart Coat Iron
	Control and the Control of the Contr
TOOL LAYOUT 70	$\varepsilon \rightarrow \Theta$
1,000	- 111
1 100	1 15
v	
£1 La 1 1	
TUR	cor I I I
2 4 1 700	me / C
ù — ,	i I 1' ,
	ا ا ا ا
\$ 100 cm	11 151
64 Cin Card	

€,		U							
be I	Procedure	Tools	-Jan De	Anna .	n Ha	Face.		Beer 1	The state of
	SETUP TIME						_	120	00
1-	Chuck 2 blanks					1			88
2-	Start mach., adv. turret and throw in feed								10
3-	DRILL	A- D-111	.5 ,	111	57	71	.014	1.	37
4-	Back turret, index, change speed, set headstock, adv, turret, look, and throw in feed								10
5-	FACE END OF NUB	B-5/6" :	c li Tools	54	50	71	.014		82
6-	Back turret, set headstock, throw in feed, change speed & look turret								15
7-	ROUGH HUB DIAMETER	B- Same	as #5	54	50	71	.014	1	00
8-	Back turret; set headstock, threw in feed, change speed & look turret.								15
	-				13			l	
				1 .	i	1	I	1	ì

Figure 10

Shee Part I Open	ation Name Bore, rough hub, rou	Type B. ch end of hish & shot Mach Name Jones	lder & Ler	art No Oper. I) Yo			
Mad	by LP Approved by—	The second second second second	7	41.00	Rent I	-	Bee T	
N.		Took-jigs, lise.	- Print	D. W.	L-ne	15/60		_
9		B- Same as #5	55	58	.71	.014		66
10-	headstock, sav. turret, change speed a throw in fe	ed.						18
11	- RCUGH BORE PINISH HUB DIA.	C-3/8" Sq. Tools D-5/8" x 12"	84	44 68	71 71	014 014	1	82
12	- Stop Mach., back turret & index, start mach., adv. turret & throw in feed							.18
13-	- PINISH BORE	E- Kelly Cutter	84	44	71	014	.1.	82
. 14	- Back & Index turret		84					07
15	- CHAMPER BORE	Hand Scraper	184	44	Ha	na n		-10
16	- Stop machine		ı			1		.08
17	- Remove 2 blanks	2017	0.0					10
·	Total Handling Time For 2 Mochine Time Base Time Allowance 23 % 574 Time - 2 fte. Standard Time Each-	Fos.					2.	50 49 99 07 06
	Standard Time Euch	1	1	1	10	F.35	1	1

Figure 11

uling. Standard instruction sheets are available (Figures 10 and 11), in blue print form, so that with the scheduling of the job these can be filled in with the machine times and sent to the respective departments. In this manner, where the method is known in advance, the time study and instruction card have actually been made out before the job is started through the plant.

Obviously, in the second case, where the exact method of procedure is not known in advance, this method could not be used. Here, as Mr. Lowry says, "It is generally necessary to go on the floor and make an analytical motion study in order to determine the elements that are required for the operation." Having the standard data, it is merely necessary to fill in the standard allowed time for each element in the study. 'This, as he points out, results in a great saving of time and increases the uniformity and accuracy of the results.

It is hoped that the possibilities afforded by these applications of time study will be more universally appreciated, whether used for an exact predetermination of time or in the rougher form as a basis for scheduling or cost estimation, and that the predictions made by Frederick W. Taylor will become an accomplished fact. The result should be improved conditions for all concerned in industrial enterprises.