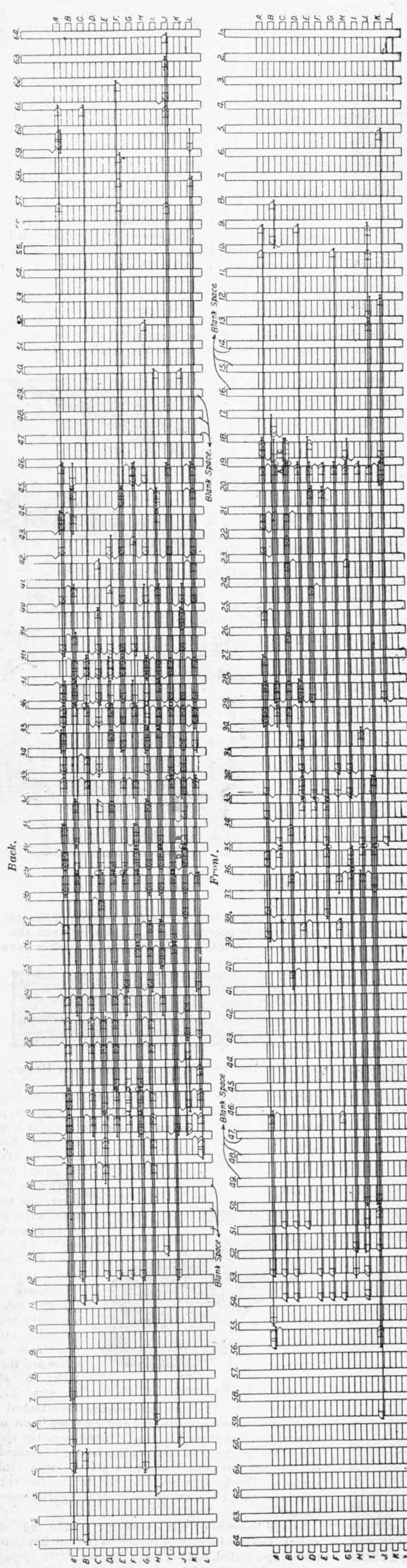

Fig. 3.—Dog Sheet, Hartford Interlocking.
The National Switch and Signal Co., Makers of Machine.

Interlocking at Hartford.

The New York, New Haven & Hartford has just completed the erection of a new interlocking machine of 64 levers at Hartford, Conn., the location being just east of the tunnel, where the two main tracks of the New England Railroad cross the two main tracks of the New York, New Haven & Hartford, and where the Valley Division of the latter diverges to the south. There are also a number of sidetracks at this point, making a busy junction.

This interlocking machine was manufactured by the National Switch & Signal Co., of Easton, Pa., and is the company's '96 model, being the first one built of that pattern. A perspective view of the machine is shown in Fig. 4, and one of a single lever in Fig. 5. Fig. 2 shows the locking sheet, and Fig. 3 the dog sheet, which give an idea of the combinations necessary between the several levers in order to insure safety to all movements. It will be observed that the dog sheet is divided into two equal parts, this being one of the advantages of the multiple machine of the National Company. The upper half of the dog sheet shows the locking on the back of the machine, which is the normal position of locking in simple plants. In this machine both front and rear tappets are balanced, the combinations of locking reduced to a more simple form and the actuation of the locking made more easy.

The details of this machine have been designed with much care. The faces of the hubs of the lever shoes and the spacers on the main shaft are machined so as to fit closely. The main shaft has been increased in diameter and the frames are heavier than before. There are positive stops to determine accurately the stroke of the lever. The rubbing surfaces of the rockers, quadrants and locking bar plates are milled by tools specially designed for the purpose.

The device for special locking shown in Fig. 6 is now a mitered block instead of the small disk heretofore used. This block presents a large surface to the special dog and automatically takes up any slack from wear of the lock.

Fig. 5 shows the design of the lever, with improved connections from the latch handle to the tappet. A case-hardened rolling cylinder is used in place of the sliding block to run in the slot of the rocking link.

The miter locking of the National machine, arranged in vertical planes, is now well known. Tappets being hung from both ends of the rocking link, the whole apparatus can be very compactly arranged.

The construction of this new plant, under the direction of Mr. A. H. Rudd, Signal Engineer of the Hartford Division, was carried out without interruption of trains and without the aid of hand signals; that is to say, the signals operated from the old tower were kept in service in each case until the new signal was ready, so that no train passed except under a semaphore signal, although new double-slip switches were put in at the same time.

The old machine was one of those operated by means of a crank and horizontal screw, which in the rapid progress of signaling have now come to be regarded as an ancient curiosity.

LOCKING SHEET

LEVER No.	LOCKS	LEVER No.	LOCKS
1	(5)	34	(35)
2	(17)-(18)-(19)	35	
3	(17)-(18)-19-(20)-(22)-(23)-32	36	
4	(17)-(18)-19-20-(22)-23-(24)-33-36-(37)-(46)	37	38
5	(17)-(18)-19-20-(22)-23-(24)-33-36-(37)-38-46	38	(20)
6	(26)-(27)	39	(33 or (33))-(36 or (36))-40
7	(27)-(30)-31	40	(33 or (33))-(35 or (35))
8	(10)	41	(37 or (37))-(38 or (38))-42
9	(19)-(22)-(23)-31-(32)-(33)-(34)-(36)-(38)-(39)	42	(36 or (36))-(37 or (37))-(38 or (38))
10	(19)-(22)-(23)-32-(33)-(34)-(36)-(38)-(39)	43	(38)-45
11	((19) w (36))-(20 w (36))-((22) w (38))-(23 w (36)) - ((24) w (36)) - ((24) w 36 37)-((33) w (36))-	44	(43)
	(34)-(38 w (36))-((38) w 36 37)-(39)-((41) w 36)-((44) w 36 37 45)	45	(38)
12	((17) w (29))-(18 w (29))-((19) w 29 (36))-((22) w 19 (29))-((22) w 29 (36))-((23) w 19 (29))-	46	38
	((23) w 29 (36))-((24) w 19 20 (29))-((24) w 20 29 (36))-((24) w 29 36 37)-(28)-(32 w 19 (29))	47	BLANK SPACE
	(32 w 29 (36))-(33 w 19 20 (29))-((33) w (20) 29 (36))-(33 w 29 36)-(35 w 29)-	48	BLANK SPACE
	((38) w 19 20 (29))-(38 w 20 29 (36))-((38) w 29 36 37)-((39) w 29)-((41) w 29 36)-	49	BLANK SPACE
	((44) w 29 36 37 45)	50	(18 w (30))-(19)-((21) w (30))-(22 w 30)-((23) w 30)-(27 w (30))-(28 w (30))-
13	((24) w 37)-(36)-((38) w 37)-(41)-((44) w 37 45)		(28 w 30 35)-((29) w (30))-(29 w 30 35)-(31)-((32) w 30)-((33) w 30)-(34 w 30)-
14	BLANK SPACE		((36) w 30)-((38) w 30)-((40) w 30)
15	BLANK SPACE	51	(18 w 19)-((21) w 19)-22-(23)-(28 w 19)-(28 w (19) 35)-((29) w 19)-(29 w (19) 35)-
16	BLANK SPACE		32-((33) w (19))-(34 w (19))-((36) w (19))-(38)-((40) w (19))
17	(18 or (18))-(19 or (19))-21-(29 or (29))	52	(24)-(28 w 35 36)-(29 w 35 36)-(33 w 35 36)-(34 w 36)-((40) w 36)-
18	(26 w 19)		(42) (45)
19		53	(18 w 19)-20-((21) w 19)-22-(23)-(24)-(28 w 19)-(28 w (19) 35)-((29) w 19)-
20			(29 w (19) 35)-(33 w 19)-((33) w (19) (35))-(34 w (19))-((36) w (19)) - ((40) w (19))-(46)
21	(18 or (18))-(29 or (29))	54	(18 w 19)-20-((21) w 19)-22-(23)-(24)-(28 w 19)-(28 w (19) 35)-((29) w 19)-
22	(20 or (20))-(33 or (33))		(29 w (19) 35)-(33 w 19)-((33) w (19) (35))-(34 w (19))-((36) w (19))-38-((40) w (19))-46
23	(19 or (19))-(32 or (32))-(33 or (33))	55	18-(19)-(21)-(23)-28-(29)-(36)
24	(38 or (38))-(45 or (45))-(46 or (46))	56	(55)
25	(26)-27	57	(24)-28-29-33-35-36-(40)-(42)-(44)
26	30-(51 w 19)-(53 w 19)-(54 w 19)-(57 w 18)-(61 w 18)	58	(24)-34-(35)-36-(40)-(42)-(44)
27	(30 or (30))	59	(24)-(36)-(42)-(44)
28	(29 or (29))	60	(59)
29	18	61	28-29-33-35-36-(37)-(40)-(42)
30	32	62	34-(35)-36-(37)-(40)-(42)
31	(30 or (30))	63	(36)-(37)-(42)
32		64	(61)
33	(19)-(36)		

THE FOLLOWING EXTRA LOCKS

35	LOCKS	(50 w (32))-(51 w (19))-(52 w 36)-(53 w (19))-(54 w (19)) TO PREVENT REVERSE RUNNING ON TRACK 3 THROUGH TUNNEL
53	"	19 TO BE USED TEMPORARILY WHILE SINGLE TRACKING DURING CHANGES OF TRACK WORK

ALL THE FOLLOWING LOCKS TO BE USED WHILE NEW ENGLAND SLIPS ARE SPIKED

19	RELEASES	13-52-59	12	LOCKS	(20 w 19)-(29)
30	"	50	35	"	5
36	"	52	37	"	9-10-13-50-55

Fig. 2.—Locking Sheet—Hartford Interlocking.

The Jacques Carbon Battery.

The results of three series of experiments made by Chas. J. Reed, of Philadelphia, which were recently published, seem to indicate that the electric energy derived from the Jacques battery is produced by thermo-electric junction instead of being evolved directly from the carbon. In other words, the electricity is generated through the agency of heat and not by a chemical action, as Dr. Jacques' experiments seem to indicate. The apparatus in the first series of experiments consisted of a sheet-iron cup having a long iron handle to which was soldered a wire, connected to one terminal of a Weston voltmeter. The other terminal of the voltmeter was connected by a flexible wire successively to conducting rods of carbon, nickel, copper, iron, German silver, lead and cadmium, which were inserted into the fused soda at frequent intervals. Readings were taken every minute from the time the alkali fused to the time it attained the highest temperature, also from the highest temperature

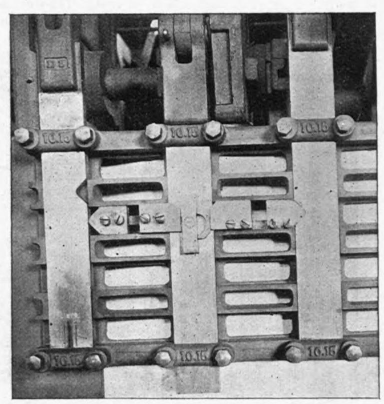

Fig. 6.—Device for Special Locking.

until it was cooled to the point of solidification. In each case there was a change from positive to negative electricity a little below the red heat of the metal, and the rate of change of the electromotive force about this time was very rapid, the greatest electromotive force being when the rods were cold. Mr. Reed said that this is in accordance with the thermo-electric behavior of all substances, but cannot be reconciled to any rational theory of galvanic or chemical action. A careful examination of the arc light carbon rod made before and after the experiment did not show the slightest indication of a change such as would be produced by combustion. The results of the experiments with the iron rod indicate that the rod and cup, both of iron, do not constitute the elemente of the thermo-electric junction, but Mr. Reed gives a reasonable theory for this exception. The two other series of experiments made under slightly different conditions confirmed the results which were obtained by the first series.

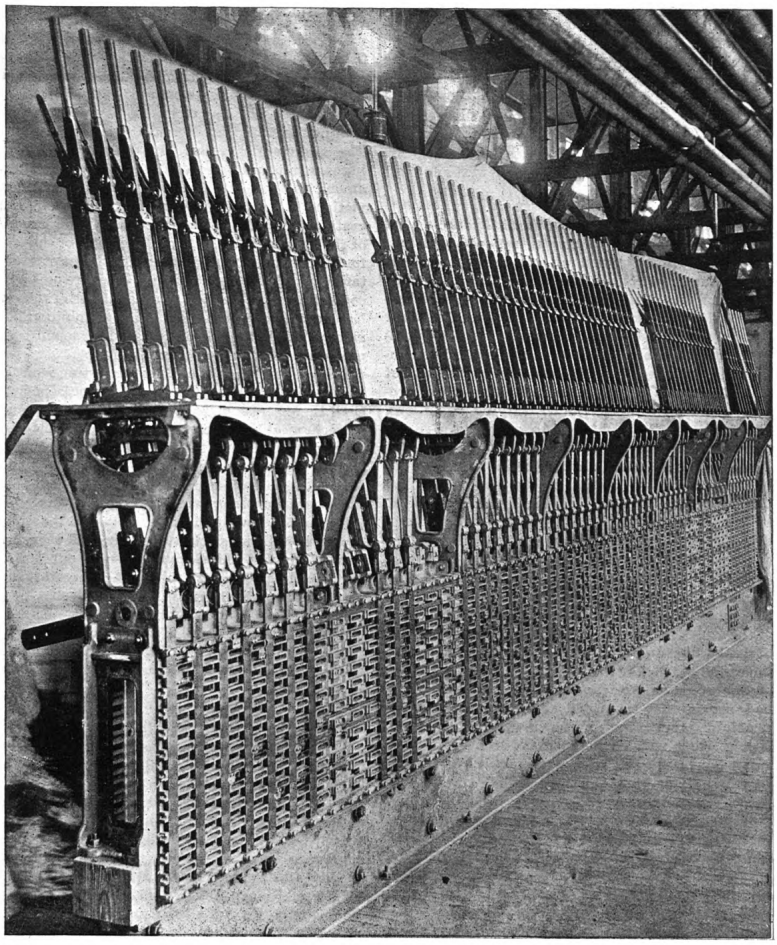

Fig. 4.—Sixty-four-Lever Interlocking Machine.

Made by THE NATIONAL SWITCH AND SIGNAL CO., *Easton, Pa.*

Fire-Retarding Qualities of Wired Glass.

Some engineers have recently given their attention to the subject of the fire-retarding qualities of wired glass. A series of tests made by William McDevitt and Charles A. Hexamer, C. E., of Philadelphia, were recently given in a report made to the committee of the Philadelphia Underwriters' Association, from which the following abstract has been made: A brick test house, about 3 × 4 ft. inside measurement and 9 ft. high, was built, in one side of which a wired glass window was fastened in a wooden frame covered with lock-jointed tin. In another side a standard fire door was hung. The upper part of this door had a pane of wired glass, 18 × 24 in., set into a wooden metal-covered frame. The entire roof of the test house was replaced by a skylight, the sash being constructed of wood, metal covered; one side of this skylight being provided with three lights of ¼-in. ordinary rough glass, the other side with three lights of wired glass of the same thickness. The tests were made as severe as possible, the glasses being raised to a red heat, at which time cold water was thrown upon them. The conclusions to be drawn from the tests appeared to be as follows: First, wired glass can safely be used in skylights, and in such situations will withstand a severe fire and will not give way when water is thrown upon it. Second, wired glass in wooden sash covered with tin can safely be used for windows toward an external exposure. Third, wired glass can safely be used in fire doors to elevator shafts and stairway towers, where it is necessary to light the shaft.

The Steel Industry in Great Britain.

An article in a recent issue of the *American Manufacturer* treats of the Bessemer and open-hearth steel production in Great Britain. A table, giving the total output of Bessemer steel for the last four years shows, as was recently stated in the *Railroad Gazette*, that England has lately been practically standing still in that production, the total output, 1,535,225 tons, in 1895 being an increase of only 34,415 tons over that in 1892. England made 604,338 tons of rails in 1895, as against 598,530 tons in the previous year, and 579,386 in 1893. In 1889 the total production reached 943,048 tons. The production of finished steel, including rails, was 1,284,765 tons in 1895 and 1,339,824 tons in 1894.

A decided increase is shown in the production of open-hearth steel, the total output of steel ingots being 1,724,737 tons in 1895, as against 1,575,318 tons in 1894. The Cleveland district, on the northeast coast, leads, with Scotland second, and by far the greater part of the total output comes from these two districts. There are 324 acid and 42 basic open-hearth furnaces in Great Britain, of which number 304½ acid and 29 basic furnaces were employed during 1896.

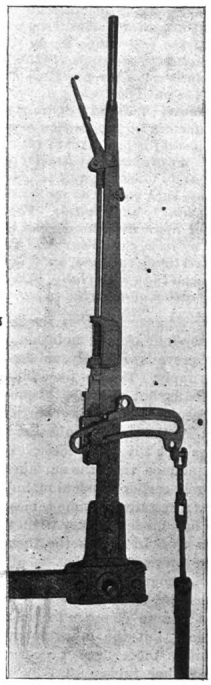

Fig 5.—Lever and Connections of the National "'96 Model" Interlocking Machine.

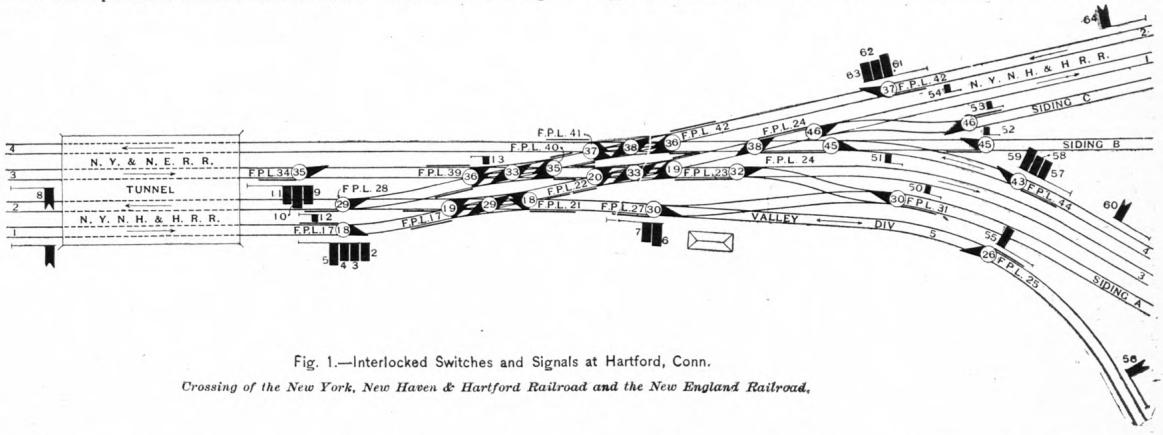

Fig. 1.—Interlocked Switches and Signals at Hartford, Conn.

Crossing of the New York, New Haven & Hartford Railroad and the New England Railroad.