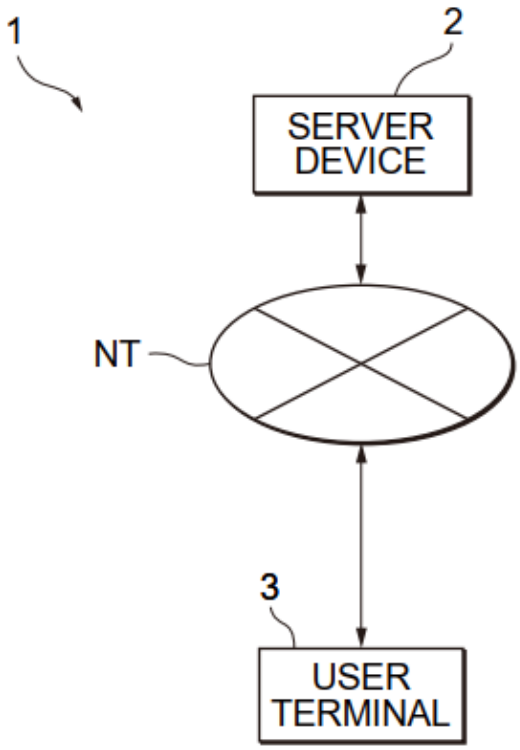


Fig. 1

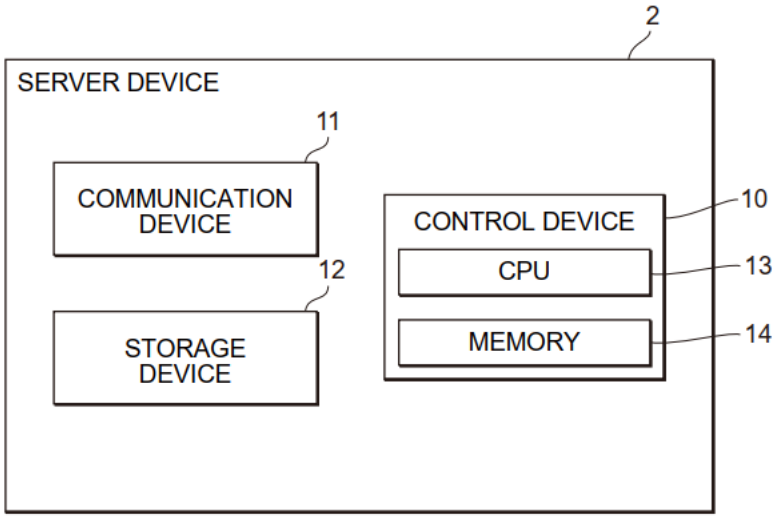

2
SERVER DEVICE
11
COMMUNICATION DEVICE
12
STORAGE DEVICE
CONTROL DEVICE
10
CPU
13
MEMORY
14

Fig. 2

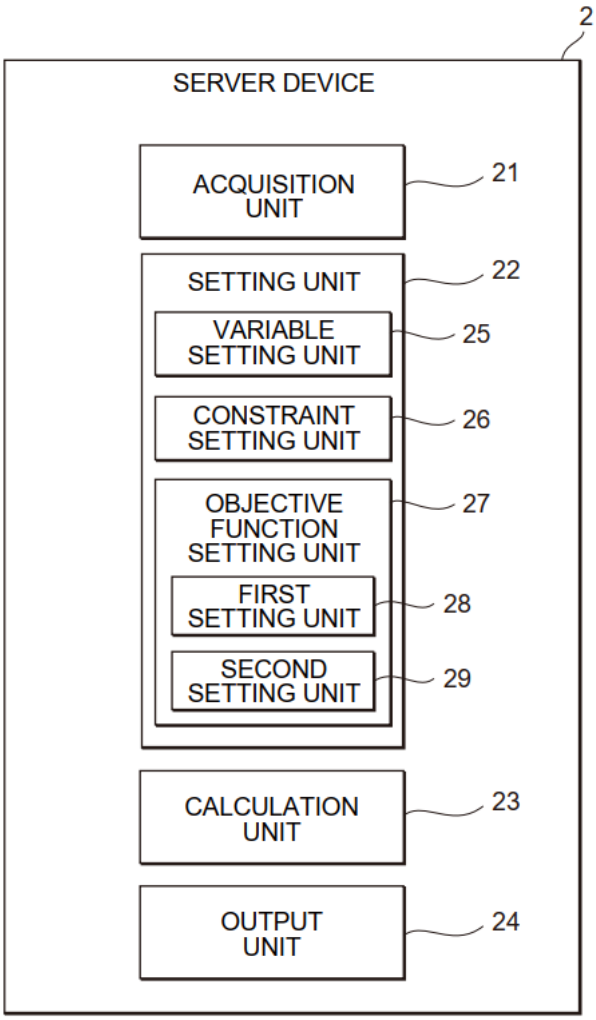

2
SERVER DEVICE
ACQUISITION UNIT
21
SETTING UNIT
22
VARIABLE SETTING UNIT
25
CONSTRAINT SETTING UNIT
26
OBJECTIVE FUNCTION SETTING UNIT
27
FIRST SETTING UNIT
28
SECOND SETTING UNIT
29
CALCULATION UNIT
23
OUTPUT UNIT
24

Fig. 3

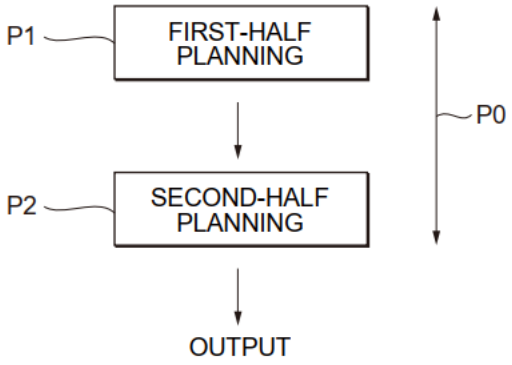
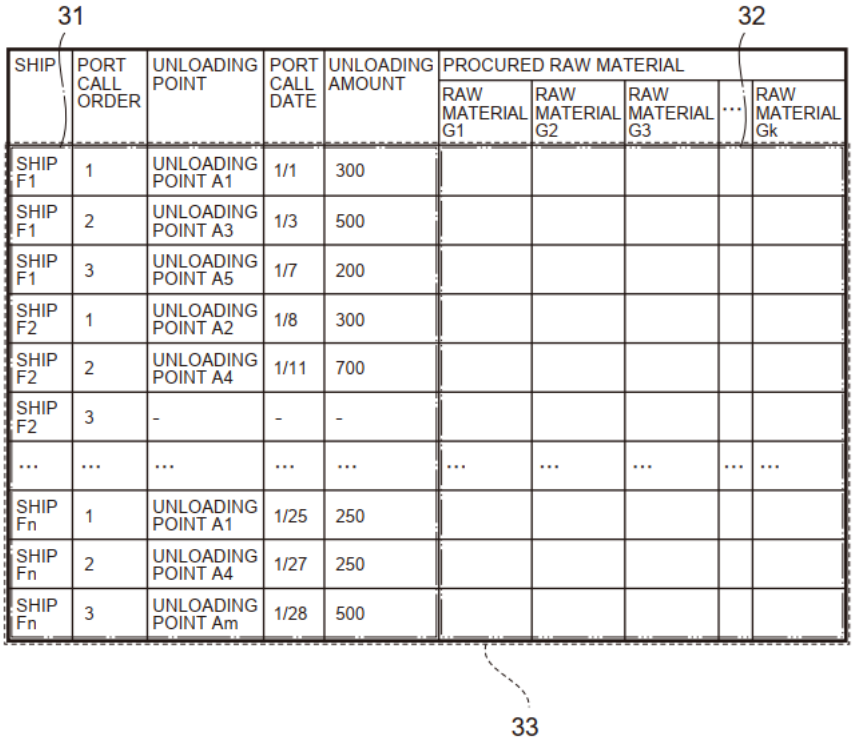


Fig. 4



SHIP	PORT CALL ORDER	UNLOADING POINT	PORT CALL DATE	UNLOADING AMOUNT	PROCURED RAW MATERIAL				
					RAW MATERIAL G1	RAW MATERIAL G2	RAW MATERIAL G3	...	RAW MATERIAL Gk
SHIP F1	1	UNLOADING POINT A1	1/1	300					
SHIP F1	2	UNLOADING POINT A3	1/3	500					
SHIP F1	3	UNLOADING POINT A5	1/7	200					
SHIP F2	1	UNLOADING POINT A2	1/8	300					
SHIP F2	2	UNLOADING POINT A4	1/11	700					
SHIP F2	3	-	-	-					
...	...	...	...	...	...	...	...	...	...
SHIP Fn	1	UNLOADING POINT A1	1/25	250					
SHIP Fn	2	UNLOADING POINT A4	1/27	250					
SHIP Fn	3	UNLOADING POINT Am	1/28	500					

Fig. 5

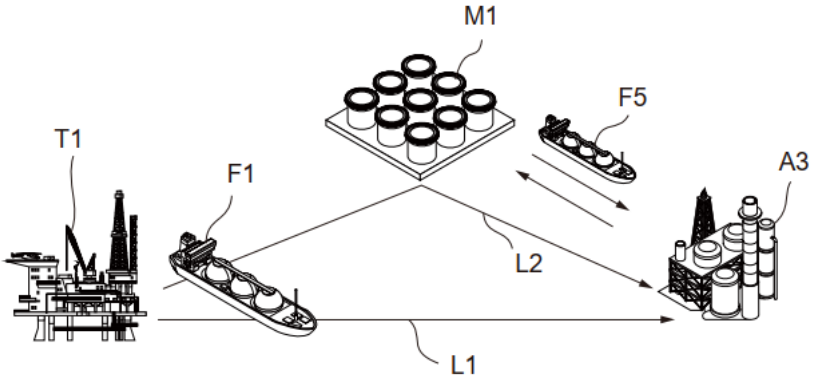


Fig. 6

ITEM NO.	CONSTRAINT CONDITION
CONSTRAINT S1	CONSTRAINT ON TOTAL LOADING AMOUNT OF OCEAN-GOING VESSEL
CONSTRAINT S2	CONSTRAINT ON DRAFT AT UNLOADING POINT
CONSTRAINT S3	CONSTRAINT ON LOWER LIMIT OF RAW MATERIAL LOADING AMOUNT AT LOADING POINT
CONSTRAINT S4	CONSTRAINT ON LOWER LIMIT OF RAW MATERIAL UNLOADING AMOUNT AT UNLOADING POINT
CONSTRAINT S5	CONSTRAINT ON LOWER LIMIT OF RAW MATERIAL LOADING AMOUNT
CONSTRAINT S6	CONSTRAINT ON UPPER LIMIT OF NUMBER OF TYPES OF RAW MATERIAL LOADABLE ON ONE OCEAN-GOING VESSEL
CONSTRAINT S7	CONSTRAINT ON UPPER AND LOWER LIMITS OF DIFFERENCE BETWEEN UNLOADING AMOUNT AND DEMANDED AMOUNT AT EACH UNLOADING POINT
CONSTRAINT S8	CONSTRAINT ON LEVELED CARRY-IN OF UNLOADING AMOUNT
CONSTRAINT S9	CONSTRAINT ON TOTAL LOADING AMOUNT ON COASTAL VESSEL
CONSTRAINT S10	CONSTRAINT ON UPPER LIMIT OF RAW MATERIAL CARRY-IN AMOUNT TO EACH UNLOADING POINT
CONSTRAINT S11	CONSTRAINT ON UPPER LIMIT OF RAW MATERIAL GROUP CARRY-IN AMOUNT TO EACH UNLOADING POINT
CONSTRAINT S12	CONSTRAINT ON INITIAL VALUE OF RAW MATERIAL GROUP TANK INVENTORY AT TRANSSHIPMENT POINT
CONSTRAINT S13	CONSTRAINT ON UPPER AND LOWER LIMITS OF RAW MATERIAL GROUP TANK INVENTORY AT TRANSSHIPMENT POINT
CONSTRAINT S14	CONSTRAINT ON LOWER LIMIT OF MONTHLY RAW MATERIAL MATCH RATE
CONSTRAINT S15	CONSTRAINT ON LOWER LIMIT OF MONTHLY RAW MATERIAL GROUP MATCH RATE
CONSTRAINT S16	CONSTRAINT ON UPPER LIMIT OF NUMBER OF LOADING POINT PORT CALLS OF EACH OCEAN-GOING VESSEL
CONSTRAINT S17	CONSTRAINT ON LOWER LIMIT OF RAW MATERIAL GROUP LOADING AMOUNT ON COASTAL VESSEL

Fig. 7

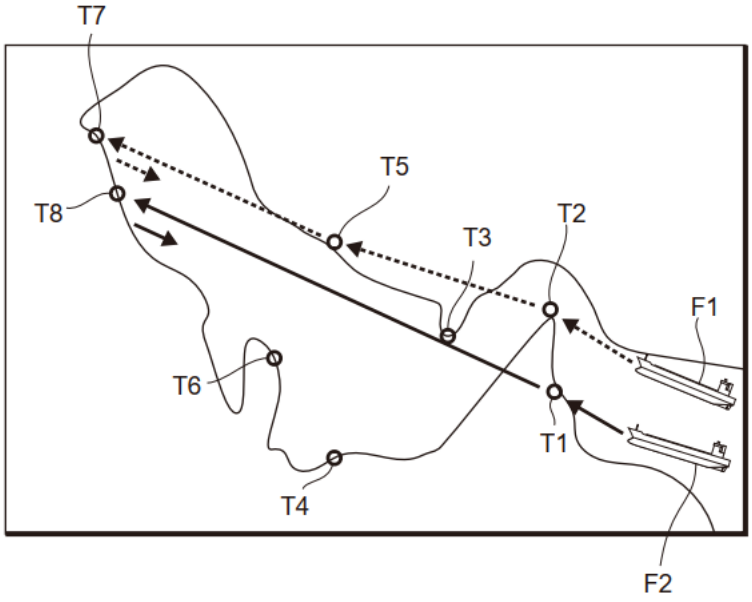


Fig. 8

RAW MATERIAL	PLANNED AMOUNT	DEMANDED AMOUNT	DIFFERENCE
RAW MATERIAL G1	293	300	7
RAW MATERIAL G2	295	300	5
RAW MATERIAL G3	510	500	10
RAW MATERIAL G4	295	300	5
RAW MATERIAL G5	197	200	3

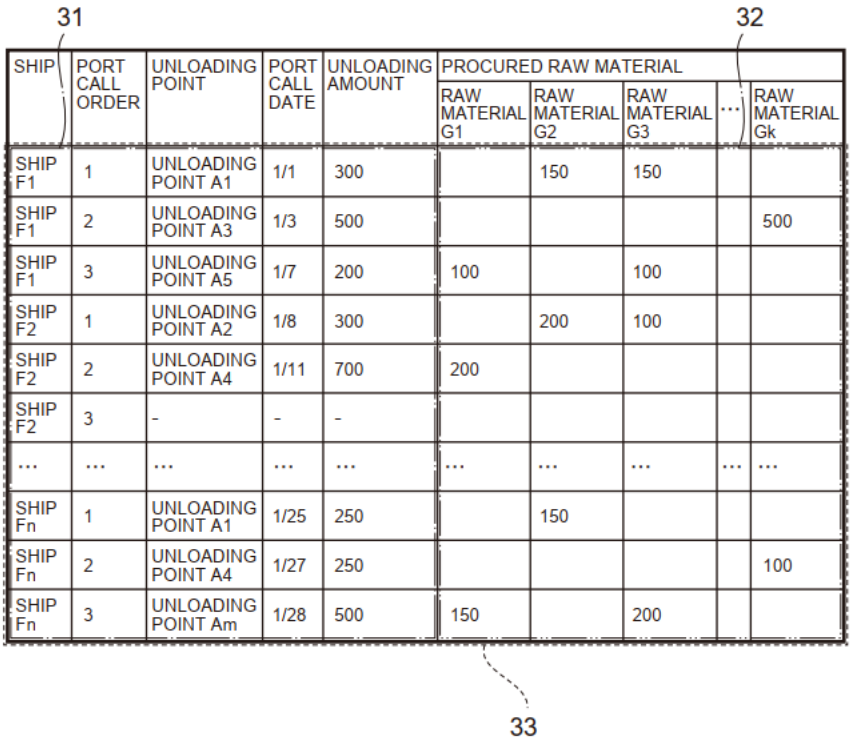
Fig. 9

GROUP	RAW MATERIAL	PLANNED AMOUNT	DEMANDED AMOUNT	DIFFERENCE
Gr1	RAW MATERIAL G1	293	300	3
	RAW MATERIAL G3	510	500	
Gr2	RAW MATERIAL G2	295	300	13
	RAW MATERIAL G4	295	300	
	RAW MATERIAL G5	197	200	

Fig. 10

RAW MATERIAL	DENSITY	PLANNED AMOUNT	DEMANDED AMOUNT	WEIGHTED AVERAGE (PLANNED AMOUNT)	WEIGHTED AVERAGE (DEMANDED AMOUNT)
RAW MATERIAL G1	32	293	300	33.66	33.69
RAW MATERIAL G2	42	295	300		
RAW MATERIAL G3	31	510	500		
RAW MATERIAL G4	36	295	300		
RAW MATERIAL G5	27	197	200		

Fig. 11



SHIP	PORT CALL ORDER	UNLOADING POINT	PORT CALL DATE	UNLOADING AMOUNT	PROCURED RAW MATERIAL				
					RAW MATERIAL G1	RAW MATERIAL G2	RAW MATERIAL G3	...	RAW MATERIAL Gk
SHIP F1	1	UNLOADING POINT A1	1/1	300		150	150		
SHIP F1	2	UNLOADING POINT A3	1/3	500					500
SHIP F1	3	UNLOADING POINT A5	1/7	200	100		100		
SHIP F2	1	UNLOADING POINT A2	1/8	300		200	100		
SHIP F2	2	UNLOADING POINT A4	1/11	700	200				
SHIP F2	3	-	-	-					
...	...	...	...	...	...	...	...	...	...
SHIP Fn	1	UNLOADING POINT A1	1/25	250		150			
SHIP Fn	2	UNLOADING POINT A4	1/27	250					100
SHIP Fn	3	UNLOADING POINT Am	1/28	500	150		200		

Fig. 12

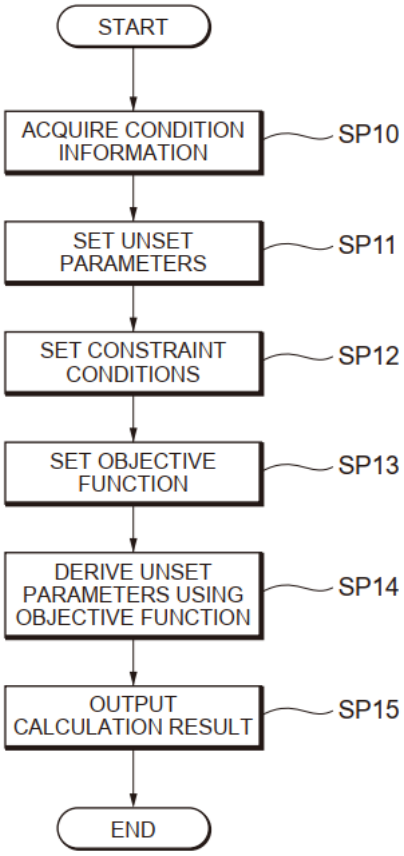

START
ACQUIRE CONDITION INFORMATION
SP10
SET UNSET PARAMETERS
SP11
SET CONSTRAINT CONDITIONS
SP12
SET OBJECTIVE FUNCTION
SP13
DERIVE UNSET PARAMETERS USING OBJECTIVE FUNCTION
SP14
OUTPUT CALCULATION RESULT
SP15
END

Fig. 13

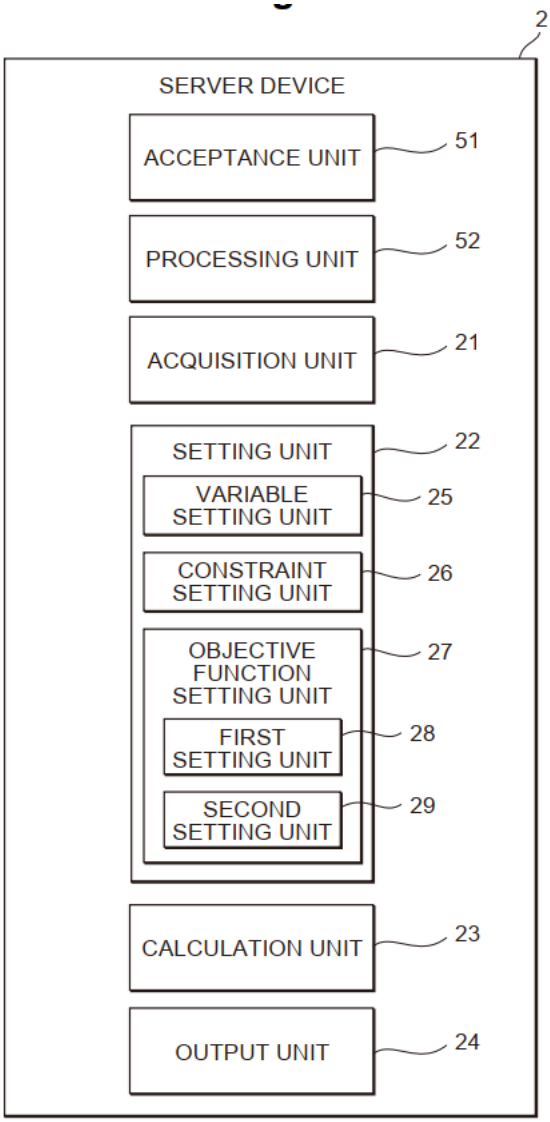

2
SERVER DEVICE
ACCEPTANCE UNIT
51
PROCESSING UNIT
52
ACQUISITION UNIT
21
SETTING UNIT
22
VARIABLE SETTING UNIT
25
CONSTRAINT SETTING UNIT
26
OBJECTIVE FUNCTION SETTING UNIT
27
FIRST SETTING UNIT
28
SECOND SETTING UNIT
29
CALCULATION UNIT
23
OUTPUT UNIT
24

Fig. 14

FIRST PRECONDITION INFORMATION PR0	INFORMATION RELATED TO OCEAN-GOING VESSELS
	INFORMATION RELATED TO COASTAL VESSELS
	INFORMATION RELATED TO UNLOADING POINTS
	INFORMATION RELATED TO TYPES OF RAW MATERIAL
	INFORMATION RELATED TO RAW MATERIAL PURCHASE AMOUNT WITHIN PREDETERMINED PERIOD
	INFORMATION RELATED TO DRAFT VALUE AT EACH UNLOADING POINT
SECOND PRECONDITION INFORMATION PR1	INFORMATION RELATED TO POSITIONAL RELATIONSHIP BETWEEN UNLOADING POINTS
	INFORMATION RELATED TO REMAINING AMOUNT IN RAW MATERIAL TANK AT EACH UNLOADING POINT
	INFORMATION RELATED TO AMOUNT OF CONSUMPTION OF RAW MATERIAL AT EACH UNLOADING POINT
THIRD PRECONDITION INFORMATION PR2	INFORMATION RELATED TO POSITIONAL RELATIONSHIP BETWEEN LOADING POINTS
	INFORMATION RELATED TO COMBINATION OF RAW MATERIALS LOADABLE AT EACH LOADING POINT
	INFORMATION RELATED TO LOWER LIMIT VALUE OF RAW MATERIAL MATCH RATE
	INFORMATION RELATED TO WEIGHTS OF OBJECTIVE FUNCTION
	INFORMATION RELATED TO MAXIMUM ALLOWABLE VALUE OF DENSITY ERROR
	INFORMATION RELATED TO NUMBER OF TYPES OF RAW MATERIAL LOADABLE ON ONE SHIP
	INFORMATION RELATED TO LOWER LIMIT AMOUNT OF OPERATION RELATED TO UNLOADING AND LOADING OF RAW MATERIAL

Fig. 15

SHIP	PORT CALL ORDER	UNLOADING POINT	PORT CALL DATE	UNLOADING AMOUNT	PROCURED RAW MATERIAL				
					RAW MATERIAL G1	RAW MATERIAL G2	RAW MATERIAL G3	...	RAW MATERIAL Gk
SHIP F1	1	UNLOADING POINT A1	1/1	300					
SHIP F1	2	UNLOADING POINT A3	1/3	500					
SHIP F1	3	UNLOADING POINT A5	1/7	200					
SHIP F2	1	UNLOADING POINT A2	1/8	300					
SHIP F2	2	UNLOADING POINT A4	1/11	700					
SHIP F2	3	-	-	-					
...	...	...	...	...	...	...	...	...	...
SHIP Fn	1	UNLOADING POINT A1	1/25	250					
SHIP Fn	2	UNLOADING POINT A4	1/27	250					
SHIP Fn	3	UNLOADING POINT Am	1/28	500					

R1 R2

Fig. 16

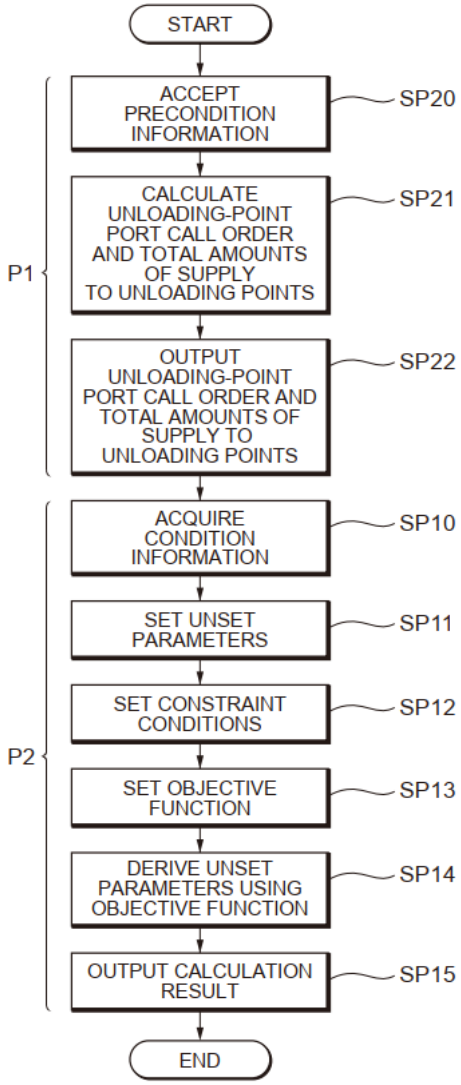

START
ACCEPT PRECONDITION INFORMATION
SP20
CALCULATE UNLOADING-POINT PORT CALL ORDER AND TOTAL AMOUNTS OF SUPPLY TO UNLOADING POINTS
SP21
P1
OUTPUT UNLOADING-POINT PORT CALL ORDER AND TOTAL AMOUNTS OF SUPPLY TO UNLOADING POINTS
SP22
ACQUIRE CONDITION INFORMATION
SP10
SET UNSET PARAMETERS
SP11
SET CONSTRAINT CONDITIONS
SP12
P2
SET OBJECTIVE FUNCTION
SP13
DERIVE UNSET PARAMETERS USING OBJECTIVE FUNCTION
SP14
OUTPUT CALCULATION RESULT
SP15
END

Fig. 17