United States Patent

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[54] **PROCESSING OF AUTOMOBILE BODIES INTO SCRAP**
5 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** ..... **100/74,** 75/44 S, 100/DIG. 1, 100/92, 100/215, 110/18, 263/2
[51] **Int. Cl.** **B30b 15/30**
[50] **Field of Search** ..... 263/2; 266/6 S; 110/18, 8 A, 119; 75/44 R, 44 S; 100/92, 73, 74, 75, 70, 215, DIG. 1

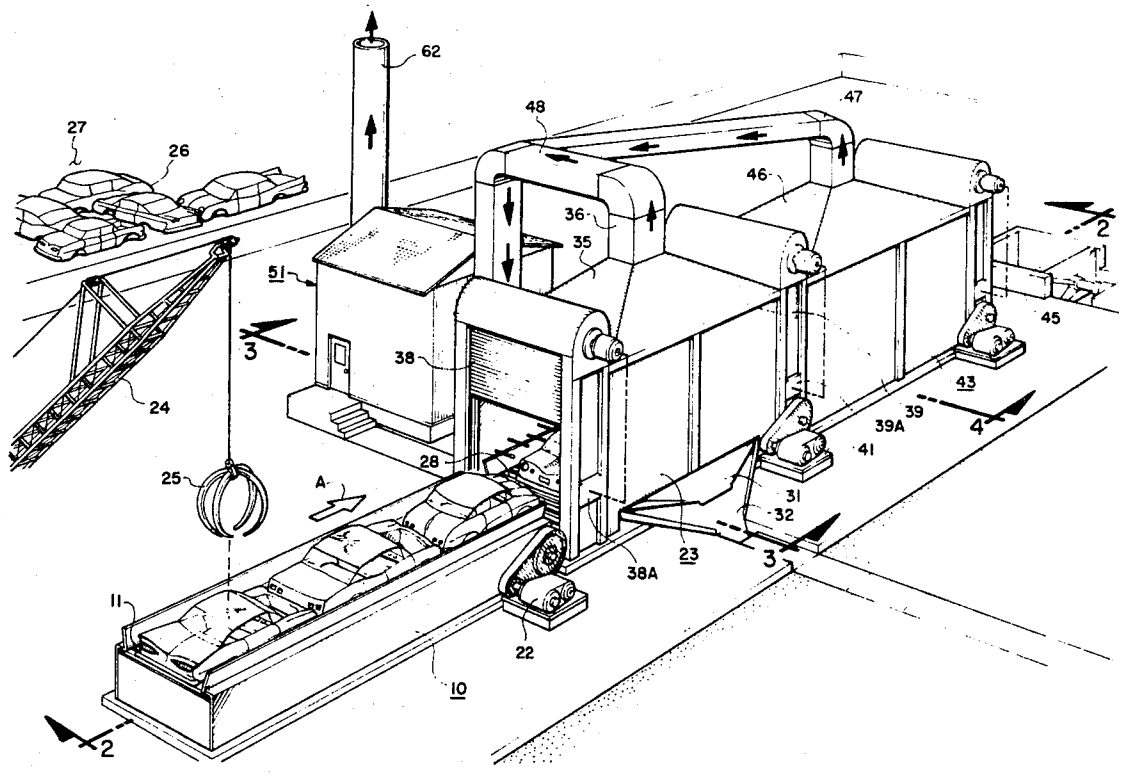
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ABSTRACT: A vehicle body shell processing plant is provided wherein vehicle shells are fired and quenched prior to baling in a manner such as to avoid air pollution difficulties. Exhaust gases from the furnace and quencher stages of the system are routed through an air-cleaning system such that only clean gases are exhausted from the system. Quenching is done in the system such that steam, entrained particulate matter, and residual exhaust gases are conveyed to a gas scrubbing system for cleansing purposes. Independent conveyors are utilized at feed-in, furnace, and quencher points. The quencher conveyor is designed to have a sloping construction such that there can be an automatic and continuous process to shell bodies for each intermittent group processed.



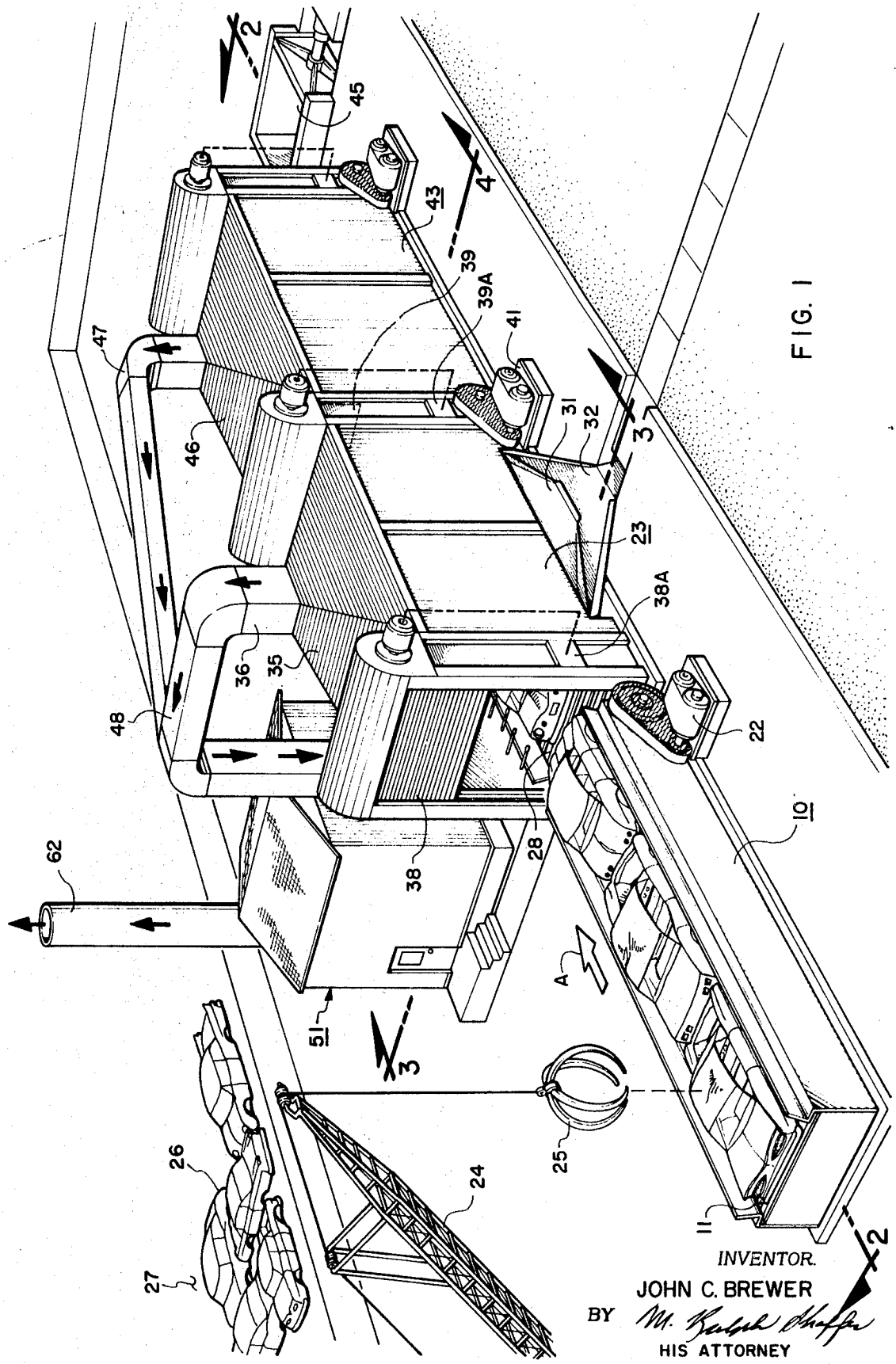


FIG. 1

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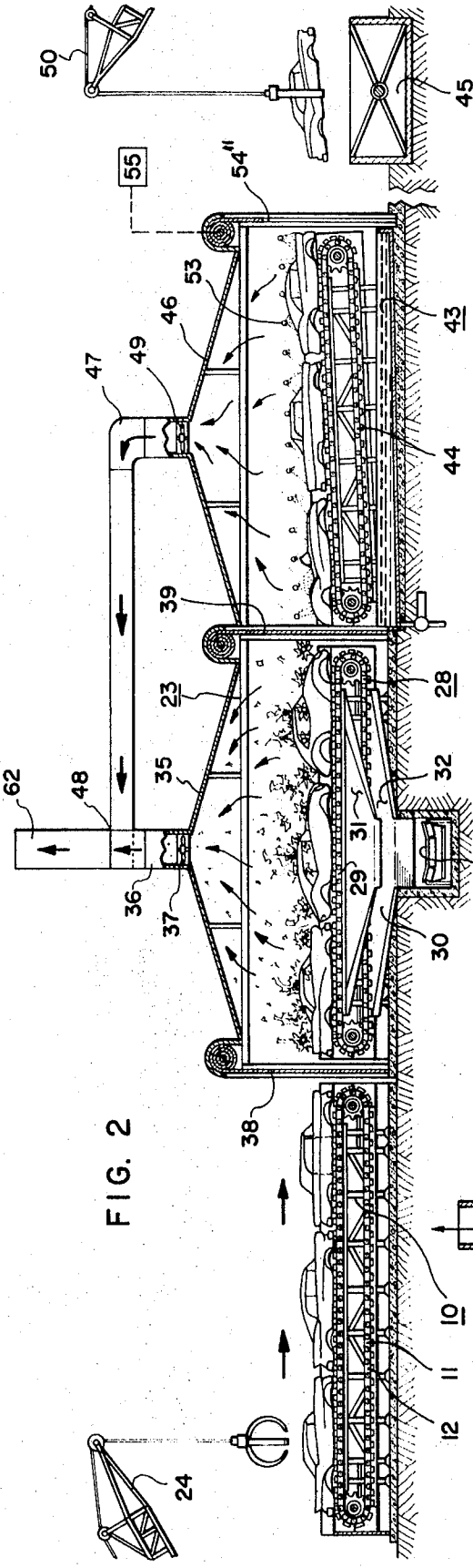


FIG. 2

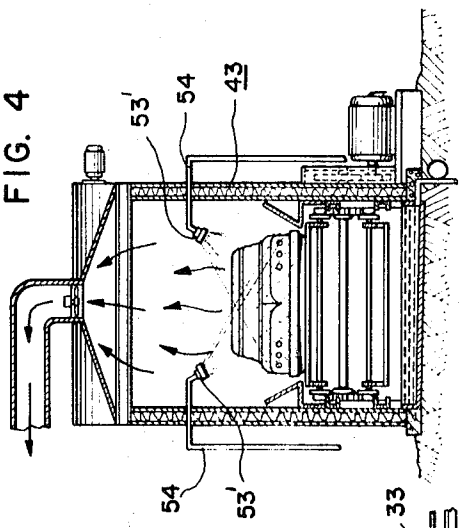


FIG. 4

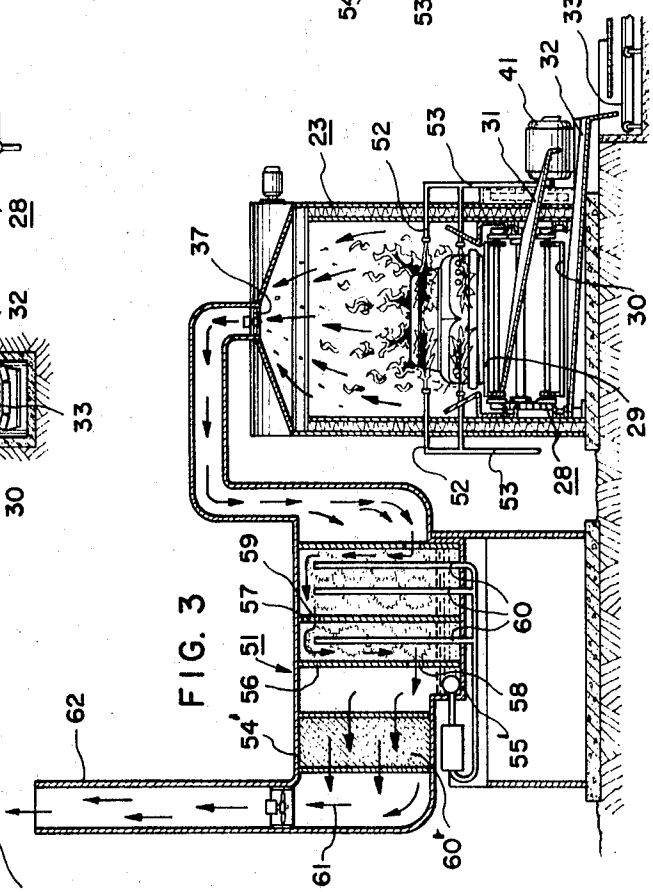


FIG. 3

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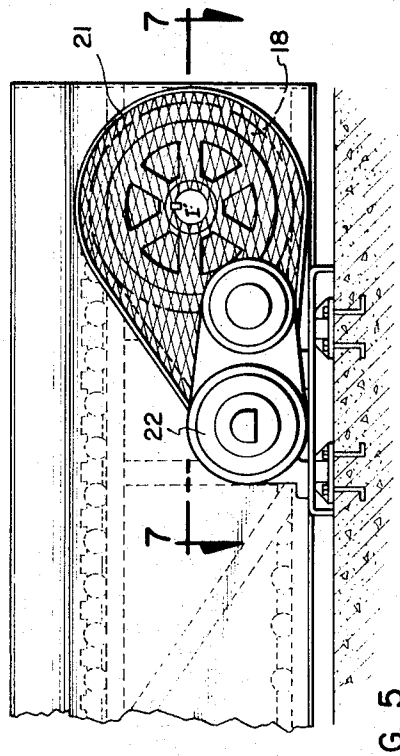


FIG. 5

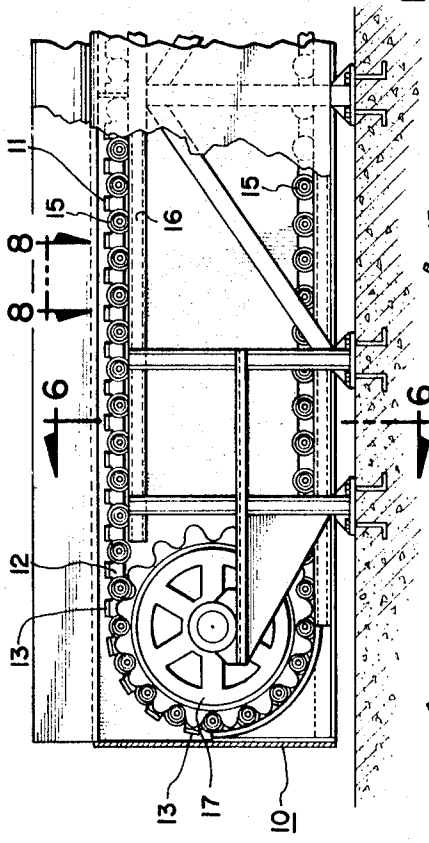


FIG. 6

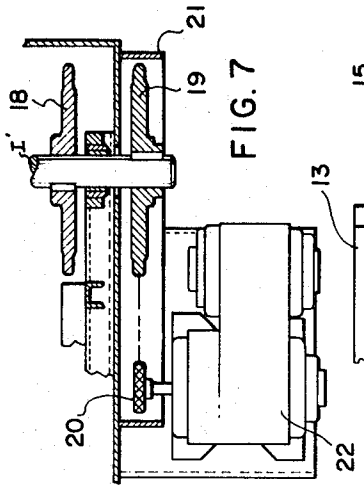


FIG. 7

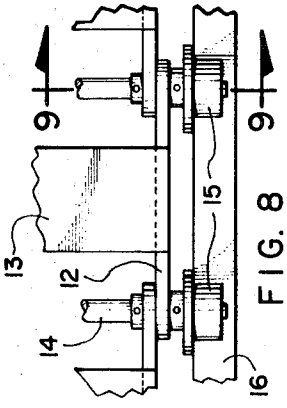


FIG. 8

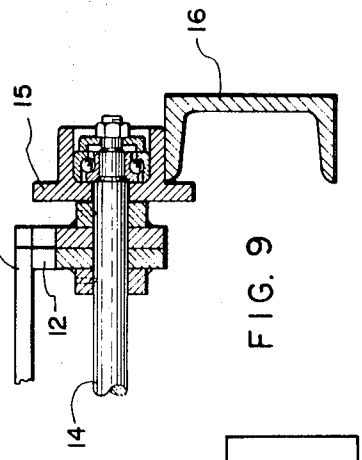


FIG. 9

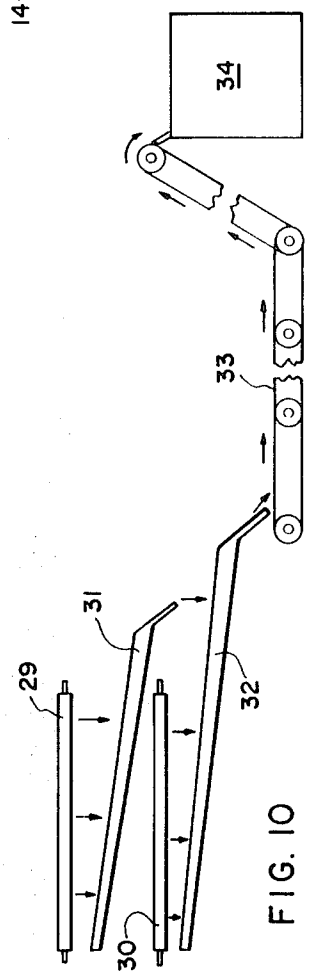


FIG. 10

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PROCESSING OF AUTOMOBILE BODIES INTO SCRAP

The present invention relates to vehicle body processing systems, and more particularly, provides a new and improved, semicontinuous vehicle body shell processing system wherein burning, quenching and balling of processed body shells can be accomplished without measurably contributing to air pollution.

In the past automobile wrecking establishments "strip" cars of items such as transmissions, axles, radiators, and other directly usable parts in order to provide body shells for baling. It frequently is undesirable to bale the body shell without previously burning the same since, in the absence of burning, body shells even though crushed required too much space or bulk for handling. Furthermore, baled body shells which have not been fired retain undesirable materials objectionable to the steel industry. Such materials include upholstering, plastic items, and so forth.

Conventionally, wrecking yards either fire or transport to a firing facility the body shells to remove by combustion upholstery and other products. Conventional operations have become very objectionable to municipalities in that there is a marked contribution to air pollution. It is very important particularly at the present time in view of current, already severe industrial waste and air pollution problems, for body shells to be fired and processed in such a way such that air pollution contributing factors are minimized.

In the present invention the air pollution factor is essentially completely eliminated, or at least controlled to the point of a bare minimum of contribution to the problem. THis is occasioned by the incorporation in the system of the routing of combustion products, steam and gaseous entrainment flow such that these are directed to a cleansing or scrubbing system.

In the present invention a semicontinuous run of body shells is made possible through the intermittent run, through furnace and quencher, of groups of body shells. This is accomplished, preferably, by separate conveyors independently powered and belonging to feed-in, furnace, and quencher stages. The introduction of an initial group of car bodies into the furnace of the system is accomplished by closure of the furnace doors such that the interior of the furnace area can be fired so as to remove as by combustion the upholstery and other products of the body shells. Exhaust fumes are routed directly to air scrubbing or air cleaning units. After firing the car bodies are next introduced into an enclosed quencher, itself provided with its own conveyor, such that the now heated body shells are water quenched, that is cooled, with steam and entrained particulate matter and objectionable gases being routed again to a cleaning system. After quenching takes place the body shells are deposited in a suitable, processed-body storage area preparatory for introduction into a baler. The latter incorporates the usual hydraulic press for compacting the bodies for the steel industry.

Accordingly, a principal object of the present invention is to provide a new and improved system for processing vehicle body shells.

An additional object is to provide a vehicle body shell processing plant which reduces the air pollution factor.

An additional object is to provide a semicontinuous body shell processing plant wherein, by appropriate endless conveyor means, successive groups of body shells can be processed, that is fired and quenched in a manner preparatory for baling, with such operations being accomplished with a minimum air pollution factor being produced.

A further object of the invention is to provide an apparatus for collecting nonferrous products from the furnace stage, from upper and lower courses of the conveyor, so that these may be directly routed to a reprocessing furnace for nonferrous or other recovery.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings in which:

FIG. 1 is a perspective view of a system incorporating the features of the present invention.

FIG. 2 is a longitudinal section taken along the lines 2—2 in FIG. 1.

FIG. 3 is a transverse vertical section taken along the line 3—3 in FIG. 1.

FIG. 4 is a transverse vertical section taken along the line 4—4 in FIG. 1.

FIG, 5 is a fragmentary, enlarged detail of a representative conveyor such as the input conveyor of FIG. 1.

FIG. 6 is a transverse vertical section taken along the line 6—6 in FIG. 5.

FIG. 7 is a fragmentary plan, shown partially in section, of a representative conveyor drive accommodating the respective conveyors used in system.

FIG. 8 is a fragmentary detail indicating cooperation of the endless conveyor structure with remainder of the structure for each conveyor.

FIG. 9 is a sectional view taken along line 9—9 in FIG. 8.

FIG. 10 is a diagrammatic view, illustrating structure useful in collecting droppings from upper and lower portions of a representative conveyor in the system and for conveying the same away for further processing, as desired.

In FIG. 1 input conveyor unit 10 may comprise a frame structure, see FIG. 2 which includes endless conveyor 11. The left-hand side of endless conveyor 11 is illustrated in the left-hand portion of FIG. 5, and all conveyor assemblies utilized in the invention may be similar.

Conveyor 11 is shown to include a pair of mutually spaced endless chains I. Each of the chains I comprise respective sets of links 12 which are pivoted together and the chains joined by shafts 14. Each of the links 12 support and is affixed to a respective end of a support bar 13. The support bars are designed to support vehicle body shells, and themselves are supported by their respective links through the latter being mounted to the roller-supported shafts 14. Rollers 15 are journaled to the shafts 14 and are designed for travel over mutually spaced conveyor tracks 16. Each side of the conveyor is provided with rear and front sprockets 17 and 18. The teeth of these sprockets may be designed to engage the rollers 15 such as to advance the conveyor forwardly. The rear sprockets 17 on each side of the conveyor may be idler sprockets, the same being joined by shaft 17A. A corresponding shaft I' joins the opposite forward sprockets 18, and the same is driven by power unit 22 via drive sprocket 20 and drive sprocket 19, in the manner indicated in FIG. 7.

Accordingly, it is seen that the supplying of power by unit 22 to the conveyor unit 10 will operate to advance automobile bodies and place them into the furnace unit 23. This will be explained hereinafter.

At this point, it is seen that a crane 24 is supplied and is provided with tong work equipment 25 suitable for picking up automobile or truck bodies 26 at a wrecked storage area 27 and depositing these on the conveyor unit 10, in the manner shown in FIG. 1, such that plural car bodies are deposited on the conveyor, prior to actuation thereof, so as to introduce such bodies into the furnace 23.

In FIG. 2 it is seen that the furnace 23 is supplied with a conveyor 28. The latter can be constructed similarly to conveyor 10 relative to the input to the system. Between upper and lower runs 29 and 30 of conveyor 28 will be disposed a sloping pan 31 for receiving and directing outwardly, nonferrous metal droppings from this stage. Correspondingly, there may be an additional pan 32 disposed underneath the lowermost course 30 of the conveyor for receiving metals that might tend to cling even to the bottom course of the conveyor. Such materials are combined and dropped onto an auxiliary endless conveyor 33, which direct the material to a reprocessing furnace 34 for nonferrous metals.

The upper portion of furnace 23 is formed as an exhaust hood 35 for receiving gases and directing the same up conduit

36 into the gas cleaning portion of the system. There is preferably supplied an exhaust fan 37, having an associated motor drive, not shown, for directing such gases upwardly at 36 in the direction shown by the arrow in FIG. 2. The gas-cleaning or gas-scrubbing system will be described hereinafter.

In FIGS. 1 and 2 of the furnace structure is provided with front and rear doors 38 and 39. These may comprise the rollable-type segmented doors that are common in industrial use and which are suitably insulated.

Doors 38 and 39 may be actuated remotely by suitable electrical means, not shown in detail. The manner of raising and lowering the doors and the design of the doors themselves form no part of the present invention taken independently.

It is important to note that the furnace 23 is closed on its sides, with access being provided the furnace conveyor drive 41, for driving conveyor 28 in FIG. 2.

The next unit in the system is quencher unit 43, see FIGS. 1 and 2. Quencher unit 43 likewise includes a powered conveyor unit, this time termed conveyor 44, but which now is slanted or sloping upwardly. This is for the purpose of preventing automobiles in the process to drop down into a storage position prior to transport to the baler 45. The quencher unit 43 includes an exhaust fume or gas collecting hood 46, the latter being supplied with exhaust gases conduit 47 leading to junction 48 in FIG. 1. An exhaust fan 49 may be provided and have its own power unit, not shown, for assisting the exhaust of gases within quencher 43 to the gas-cleaning system.

Baler 45 may be conventional in design; the processed automobile bodies, as received from quencher 43, can be easily picked up and transported by crane 50 to the baler 45 in the manner indicated.

FIG. 3 illustrates a cross section of the furnace 23 and, in addition, shows the structure of the gas cleaning unit 51 which can be employed to clean gases received from furnace 23 as well as from quencher 43. As to the furnace itself, the same will include a plurality of jets 52 which are connected by pipes 53 to a common source of fuel, not shown in detail. As to the quencher 43, the same is provided with water spray nozzles 53' which lead by a respective conduit 54 to a common source of water maintained under pressure.

AS to the design of the gas-scrubbing system or gas-cleaning system as at 51 and in FIG. 3, the same may take any one of several conventional forms. Thus, the same may include a housing 55' provided with mutually spaced baffles 56 and 57 which are apertured at 58 and 59 to provide a tortuous path for ascending vapors. Spray pipes 60 feed into the housing 55' and spray independent streams of water in a fine spray or a mist form into the housing 55'. Such spray tends to spray out of the gases' flow particulate matter. This particulate matter may be conveyed out of the gas scrubbing system in the usual manner to provide water sludge. A filter 60' may be included within housing 54' as a final cleaning agent for the gases which ascend at 61 through exhaust stack 62.

The system shown and described operates as follows. Preliminarily, there will be supplied, as before mentioned, a wreck storage area 27 at which point the automobile bodies will be deposited. It will be understood that prior to processing of these bodies in the manner shown, these bodies will be stripped of components such as radiators, engines, axles, and so forth, so that just the body shell remains. These shells are then transported as by crane 24 onto conveyor unit 10 such that the body shells are conveyed three at a time into furnace 23. When furnace 23 is empty, as for example after a previous firing of a forward group of body shells, then door 38 is opened by door control 38A, of standard design, and the conveyor unit 10 is actuated. Such actuation produces a forward motion as shown by the arrow A in FIG. 1 so that the body shells are introduced onto the running furnace conveyor No. 28 into the furnace area. At this point the door 38 is closed while the door 39 remains closed, via appropriate retention of the condition of door control 39A, of standard design. At this point a standard control, not shown, turns on the fuel supply to conduit 53 so as to produce flame jets within the furnace 23. Suitable pilots, not shown, may be supplied one or more of the flame jets such that the supply of fuel to the burning units of the furnace will produce automatically a series of flames in the furnace area. These flames will be high-pressure flames such that there is a rapid burning of upholstery and other flammable material of the body shells at the furnace point. It is noted that combustion products of a gaseous nature are automatically routed upwardly via exhaust fan 37 so that such gases are routed for cleansing at housings 54' and 55 .

After the burning has taken place, then the body shells are immediately routed to the next conveyor, i.e. conveyor 44 in the quenching unit 43. Quencher 43, receiving the body shells, subjects the same to multiple streams of water as at 53' so that these body shells are suitably cooled. It is important to note that such quenching not only accomplishes a cooling of the body shells at this point but also provides a means whereby particulate matter and also noxious gases can be conveyed upwardly, through action of exhaust fan 49, so that such materials can be brought into the scrubber area and housings 54' and 55'. Consequently, not only are the body shells cooled at the quencher point, but also any particulate matter and noxious gases associated with the rising steam at the quenching unit is conveyed to the air-cleansing system. It is to be noted that not only will door 39 be closed during the quenching operation, but the outlet door 54'' will likewise be closed as by conventional door closure means 55, shown merely in block diagram form.

Once the body shells have been thus quenched, then they can be deposited through appropriate travel of the conveyor 44 so as to be deposited preparatory to being at 45.

What is provided, hence, is an integrated body shell processing system wherein car bodies and truck bodies can be processed suitably prior to baling such that baling may be accomplished with a minimum of space requirements per bale produced. Furthermore, it is noted that the upholstery and other flammable materials are conveniently disposed of in the present process without air pollution that accompanies conventional body shell processing plants. The exhaust in FIG. 1 is clean air coming from stack 62. This renders the system completely unobjectionable to municipalities and adjacent areas. Furthermore, the plant is highly advantageous from an economics as well as a waste disposal point of view, in that the automobile bodies can be conveniently, rapidly and easily processed to provide compact metal bales of scrap, and this without objectionable air pollution problems which have heretofore existed in connection with said wrecking yard facilities.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects, and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

I claim:

1. A vehicle-processing plant including, in combination, furnace means for firing vehicle body shells, water spray quencher means proximate said furnace means and constructed to receive said vehicle body shells, after firing, for cooling the same, first means for conveying said vehicle body shells through said furnace means and from said furnace means to said quencher means, baling means constructed to receive said vehicle body shells, upon cooling by said quencher means, for baling said vehicle body shells, second means for conveying said vehicle body shells from said quencher means to said baling means, an exhaust stack, an air-cleaning system disposed beneath and communicating with said exhaust stack, and venting conduit means interconnecting said air-cleaning system with said furnace means and said quencher means for conducting gases, entrained particulate matter, and water vapor from said furnace means and said quencher means to said air-cleaning system.

2. Structure according to claim 1 wherein said venting conduit means includes an exhaust fan means for directing gaseous matter to said air-cleaning system.

3. The structure of claim 1 wherein said vehicle body shell processing plant includes, as said first and second means, respectively, first and second, endless conveyors disposed end to end, said first conveyor being disposed in said furnace means, said second conveyor being disposed in said quencher means, and openable door means partitioning said furnace means from said quencher means, said first and second conveyors being constructed and arranged to feed vehicle body shells from one respective conveyor to the next succeeding conveyor.

4. Structure according to claim 1 wherein said first conveying means is perforate and is disposed within said furnace means, said furnace means being provided with sloping collection means disposed beneath at least one run of said first conveying means for collecting materials dropping through said first conveying means.

5. Structure according to claim 4 wherein said first conveying means includes upper and lower runs, plural collecting means respectively disposed beneath said upper and lower runs and being constructed and arranged to collect and transport all droppings through said first conveying means at said upper and lower runs to a designated area.